CURRENT ACADEMIC STUDIES IN TECHNOLOGY AND EDUCATION 2024

EDITORS

Dr. Teresa A. Oliveira
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BOOK SERIES

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Current Academic Studies in Technology and Education 2024

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Any paper submitted for the book chapter is reviewed by at least two international reviewers with expertise in the relevant subject area. Based on the reviewers' comments, papers are accepted, rejected, or accepted with revision. If the comments are not addressed well in the improved paper, then the paper is sent back to the authors to make further revisions. The accepted papers are formatted by the conference for publication in the proceedings.

About the Book

The intersection of technology and education exerts a profound and far-reaching influence on societies and learning environments across the world. *Current Academic Studies in Technology and Education 2024* is the latest in a series of texts published annually from selected papers invited by the editors. The present edition consists of contributing international authors from Türkiye, the United States of America, Indonesia, Canada, Iran, Cambodia, Morocco and Kenya. All submissions are reviewed by at least two international reviewers.

The present publication of *Current Academic Studies in Technology and Education 2024* consists of four sections and thirteen chapters, with each chapter focused on a diverse, yet unified, selection of technology and education. The purpose of the book is to provide readers with the opportunity to examine scholarly, peer-reviewed publications in related fields. Every chapter affords valuable insights and knowledge, shedding light on the global significance of the intersection between technology and education.

Citation

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Foreword

In an era characterized by rapid technological advancements and evolving societal demands, the field of education stands at the forefront of transformative change. This book, structured into four thematic sections, explores the interplay between innovative methodologies, digital technologies, cultural inclusivity, and ethical considerations in education. The chapters collectively offer a comprehensive lens through which contemporary and future educational practices can be critically examined and improved.

The first section, Technology and Innovative Teaching Approaches in Education, delves into groundbreaking methodologies that redefine the teaching and learning landscape. From task-based and problem-oriented strategies in language instruction to the application of virtual reality and artificial intelligence in pedagogical practices, this section highlights the dynamic potential of technology to enrich educational experiences.

In the second section, Using Artificial Intelligence, Blockchain, and Digital Tools in Education, the focus shifts to the integration of emerging technologies in various educational contexts. Topics such as generative AI, blockchain's convergence with global educational initiatives, and the cultivation of programming skills through gaming illustrate the opportunities and challenges posed by these digital tools.

The third section, Inclusion, Cultural, and Social Approaches in Education, underscores the imperative of equity and inclusivity in education. By examining culturally relevant pedagogical frameworks and the historical evolution of inclusive education, this section advocates for transformative practices that address the needs of marginalized communities and foster a sense of belonging for all learners.

Finally, the fourth section, Ethics and Theoretical Debates in Education, invites readers to reflect on the philosophical and ethical dimensions of educational practices. Through critical analyses of theoretical divergences and accountability in research publishing, this section provides a space for addressing the moral complexities inherent in the pursuit of knowledge.

This book is the culmination of collaborative efforts by scholars, practitioners, and thought leaders dedicated to advancing educational innovation and equity. It is our hope that the insights presented here will serve as a valuable resource for educators, policymakers, researchers, and students who aspire to shape a more inclusive, ethical, and technologically enriched educational future.

We extend our deepest gratitude to the contributors for their rigorous research and thought-provoking perspectives, as well as to the readers who engage with these ideas in the spirit of continuous learning and improvement.

December 2024

Dr. Teresa A. Oliveira
Universidade Aberta, Portugal

Dr. Mustafa Tevfik Hebebci
Necmettin Erbakan University, Türkiye

Dedication

This book is lovingly dedicated to my grandmother, *Nazmiye Penbe.*

Her boundless kindness, wisdom, and unwavering support have been an inspiration throughout my life.

May her legacy continue to light the way for all who knew her.

December 2024

Dr. Mustafa Tevfik Hebebci

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Introduction

For more than two decades, teaching content subjects in a foreign language, typically conducted by content specialists rather than language instructors, has been prevalent in European educational systems. Initially applied at the elementary and secondary school levels, this method has gradually extended to university programs (Fajardo Dack et al., 2020). According to Coleman (2006) and Molino et al (2022), the use of English as the language of instruction has notably grown in European higher education, encompassing both undergraduate and master's programs since 1991. Given the interconnected nature of teaching and learning, the term "Teaching and Learning Methods" is more accurate than "Teaching Methods" alone. As learning is the result of teaching, treating them as separate activities is not appropriate (Tom, 1997). The effectiveness of teaching is assessed by the extent and quality of student learning (Shahida, 2011). Notably, Al-Rawi's (2013) study found that many teachers still use traditional, teacher-centered methods that limit student interaction. It is crucial to understand that students have varied learning styles and progress at different rates. Since students possess a range of skill levels within any subject, teachers need to apply diverse teaching strategies to effectively engage all learners. Furthermore, advancements in communication, information, and educational technology have shaped the learning preferences of today's students, making the adoption of new teaching methods essential. More interestingly, Vireak and Bunrosy (2024) concur that for greater effectiveness, educators should incorporate technology, adopt communicative teaching methods, and foster a learner-centered environment. Additionally, Vireak et al. (2024) highlight the crucial role of effectively integrating technology in English language teaching. They underscore the importance of school administrators enforcing classroom and school policies to prevent the misuse of digital tools and to ensure that both teachers and students achieve better educational outcomes.

According to, Sharipovna (2023) notes that English teaching has experienced significant changes, particularly over the past decade. In the past, students mainly absorbed information from textbooks during lectures. Currently, there is a stronger

focus on developing communication skills, technical abilities, interpersonal skills, and ICT literacy through alternative teaching methods. This shift aligns with the rising need for graduates who are prepared to compete in today's challenging global job market. Despite changes in attitudes toward language over the last century, English curricula have largely remained unchanged, maintaining a rigid and extensive structure that creates challenges for both students and teachers. In today's fast-paced world, English has become a global language taught from kindergarten to university levels, even in non-English-speaking countries. Traditional teaching approaches, which emphasize rote memorization and grammar, often lead to a decrease in student motivation. Methods such as Task-Based Language Teaching (TBLT) offer innovative and engaging alternatives, gaining significant attention in the field of English education (Chen, 2023). Additionally, Alghamdi et al. (2019) point out that various teaching approaches have been applied throughout the history of English language teaching (ELT), especially in ESL and EFL contexts. Moreover, to inspire students to reach their academic objectives, teachers need more than just knowledge of teaching techniques (Alghamdi et al., 2019). As Archana and Rani (2017) highlight, teaching is only one of the multiple roles educators must play in the learning process. In the classroom, teachers are equipped with the skills, knowledge, and resources necessary to educate young learners.

A 21st-century classroom is designed to foster an educational environment that equips students with essential skills such as critical thinking, collaboration, creativity, and adaptability, ensuring they are prepared for a rapidly changing world. The 21st-century classroom is formed as a living lab to support the changing styles in education and rearrange traditional classrooms and other learning spaces, incorporating 21st-century skills into learning and teaching environments. Such living labs are an emerging model to support co-creative, human-centric, and user-driven research, along with development and innovation, to better cater to learners' needs (Göçen et al., 2020; Santally et al., 2014).

Moreover, by integrating technology and digital tools, students are empowered to take ownership of their learning, progressing at their own pace and engaging in activities

that foster creativity and communication. Teachers act as facilitators, guiding students through learning experiences tailored to individual strengths and needs. The Modern Classrooms Project exemplifies how modern education aims to equip students not only with academic knowledge but with the adaptability and skills essential for success in the 21st century. Ultimately, modern classrooms equip teachers with 21st-century skills through professional development and coaching, enabling them to incorporate self-paced, mastery-based learning principles and technology into their teaching, thus promoting students' capacity for self-directed learning. This initiative is designed to bolster students' independent learning abilities, grounded in three main practices: (1) Blended instruction, where traditional lectures are replaced with video content, freeing class time for teachers to engage directly with students; (2) A self-paced structure, allowing teachers to tailor lessons to individual student needs, keeping them challenged and engaged; (3) Mastery-based learning, which assesses students based on their comprehension rather than task completion, ensuring they only advance once fully prepared (Wolf et al., 2020). Notably, the Modern Classrooms Project embodies an innovative approach to teaching that prioritizes personalized learning and student autonomy. Initiated by Kareem Farah and Robert Barnett during the 2016-2017 school year in a high school math class (Deanon et al., 2021), it has since grown into an international fellowship that provides teachers with training and support via a free online course and a summer mentorship program. Educators may even apply for scholarships to deepen their understanding of project-based, personalized learning (Modern Classrooms Project, 2021). According to the Modern Classrooms Project website (2021), this model positions teachers as facilitators and coaches, roles highlighted by Wiggins and McTighe (2007) as highly effective instructional strategies. Teachers shift from intensive direct instruction to facilitating learning, making themselves less central and more supportive of student independence. In their coaching role, teachers spend class time giving individualized attention and timely feedback to nurture student autonomy (Wiggins & McTighe, 2007). Deanon et al. (2021) describe this model as a combination of self-paced learning and mastery-based grading, emphasizing core practices such as blended learning, flexible pacing, and

mastery assessment. Some teachers in the program also integrate flipped classroom techniques to enhance the learning experience further.

This paper seeks to explore the application of Task-Based Language Teaching (TBLT), Content and Language Integrated Learning (CLIL), and Problem-Based Learning (PBL) in the 21st century classroom, aiming to guide educators on how to implement these methods more effectively. By analyzing preliminary research, case studies, scholarly articles, review papers, academic publications, instructional materials, and empirical studies, this research provides insights into the definitions, objectives, implementation strategies, benefits, and challenges associated with these various approaches.

Task-Based Language Teaching (TBLT)

Definition of TBLT

Integrating Task-Based Language Teaching (TBLT) into English courses offers students a dynamic and practical approach to language learning that meets the demands of real-world professional environments. TBLT is particularly effective in English for Specific Purposes (ESP) courses, as it promotes meaningful communication and engages students through authentic tasks such as role-plays and problem-solving activities. According to Willis and Willis (2007), implementing TBLT in ESP contexts enhances learners' language abilities by engaging them in activities that simulate real-life situations relevant to their fields of study or work. This approach focuses on the needs and interests of learners, providing opportunities to apply language skills in practical settings.

Task-Based Language Teaching (TBLT) has emerged as a learner-centered approach that prioritizes the use of language in authentic, real-world situations. Nunan (2004) notes that TBLT effectively supports learners in developing specific language skills that align with their academic or professional goals, encouraging active learning and the practical use of the target language. Abdullaeva (2023) further emphasizes that TBLT focuses on meaningful communication through engaging tasks. Nunan (1989)

describes a communicative task as a classroom activity that requires students to interact with the target language, emphasizing meaning over form or structure. The primary goal of these tasks is to promote meaningful communication and interaction among learners.

Furthermore, a communicative task should have an inherent sense of completeness, functioning as a self-contained act of communication that is relevant in real-world situations. For example, a task might include role-playing a particular scenario in which learners participate in a conversation or negotiation. Pica (2004) categorizes tasks into five types according to their features and communicative objectives: jigsaw tasks, information-gap tasks, problem-solving tasks, decision-making tasks, and opinion-exchanging tasks.

The Purpose of TBLT

Task-Based Language Teaching (TBLT) is a modern approach utilized in contemporary classrooms to engage students in structured communicative activities. Its primary goal is to enable students to automate the language structures they have internalized. According to Loschky and Bley-Vroman (1993), TBLT emphasizes practical language use through tasks that replicate real-life scenarios, encouraging students to apply their knowledge in meaningful contexts. This method prioritizes communication and fluency over rote memorization, fostering greater confidence and proficiency in language use. In a modern classroom environment, TBLT serves multiple key functions, as noted by Skehan (1998). It introduces new language structures and vocabulary within meaningful tasks, facilitating natural and contextual learning. Furthermore, TBLT encourages students to apply their existing language skills in diverse and new situations, thereby reinforcing and expanding their abilities. By engaging learners in practical tasks, it alleviates cognitive load, promoting more fluent language use without the anxiety of achieving perfect grammar. Additionally, TBLT challenges students to interpret and complete tasks in complex and nuanced manners, fostering critical thinking, creativity, and deeper language proficiency. Overall, TBLT enhances both the acquisition of new language skills and the effective use of existing knowledge through engaging and communicative activities.

The Implementation of TBLT

Task-Based Language Teaching (TBLT) utilizes a structured methodology with targeted focuses and activities designed to enhance learner engagement and promote effective communication through authentic language use. According to Willis and Willis (2007), the task execution process comprises three main phases: pre-task, task cycle, and post-task, each with distinct objectives and activities. In the pre-task phase, students are introduced to the tasks and encouraged to actively participate, using authentic language materials. This phase acts as a warm-up, allowing students to familiarize themselves with relevant background information, grasp the basic content, and prepare for the upcoming communication tasks. Various interactive techniques, such as paired or group discussions, role-plays, and debates, are employed to facilitate task completion.

The task cycle phase consists of three key elements: task execution, planning, and reporting. During this phase, students engage in interactive methods to complete their assignments effectively. The post-task phase, often referred to as the Language Focus or Language Teaching stage, shifts towards analyzing and practicing the language used during the tasks. This phase emphasizes the transition from understanding the language's meaning to focusing on its form, thereby helping students reinforce their foundational language skills and ensure successful task execution. Bula and Murill (2019) highlight that TBLT is based on the principle that tasks are fundamental to language teaching and planning. Ellis (2003) supports this framework by outlining a similar three-phase structure: pre-task, during-task, and post-task. In the pre-task phase, the objectives of the task are established, and students engage in an initial task. The during-task phase involves setting deadlines and defining participant roles, while the post-task phase requires students to report their findings and possibly repeat the task.

Benefits and Challenges of TBLT

Benefits of TBLT in ESP Course

Task-Based Language Teaching (TBLT) has been shown to significantly enhance students' communication abilities, motivation, and critical thinking through engaging scenarios that promote active participation, collaboration, and problem-solving. According to Li Xiaoqi (2006), TBLT differs from traditional methods by focusing on enriching students' subjective experiences, communicative skills, and authenticity.

Firstly, TBLT fosters students' interest in learning by creating realistic communication scenarios that are appropriate for their age and characteristics. Familiar tasks, such as purchasing tickets, encourage easier participation and motivation for language learning (Malihah, 2010). Additionally, as students work on these tasks, they integrate their knowledge and skills, thereby improving their overall communication abilities, collaboration, and problem-solving skills.

In TBLT classrooms, students actively engage as task performers through pair work and group collaborations, empowering each individual to make meaningful contributions to the learning process. Furthermore, as noted by Yan Juan (2013), TBLT encourages students to think independently and participate actively in discussions under the guidance and inspiration of their educators, which helps develop their logical and critical thinking skills. This approach not only fosters enthusiasm for learning but also cultivates positive learning habits among students. In summary, TBLT stands out as a dynamic approach that not only enhances language skills but also promotes holistic development and engagement among learners.

Challenges of TBLT

While Task-Based Language Teaching (TBLT) presents significant advantages, it also encounters several challenges, including time limitations in task design, difficulties in implementing task-based assessments, unpredictability in vocabulary and grammar usage, and the complications of managing large class sizes. According to Willis (2007), one common issue with TBLT is the time constraints teachers face when

preparing and integrating tasks into their lessons. Relying on traditional exams instead of task-based assessments may lead students to depend on memorization rather than showcasing their practical language skills in real-world situations. Additionally, the unpredictable nature of vocabulary and grammar usage during tasks can introduce complexity and inconsistency, contrasting with more conventional learning approaches. Sholeh (2020) also points out that large class sizes can intensify these challenges, as they require more time for task completion and hinder teachers' ability to provide personalized attention and support for students' learning and development.

Content and Language Integrated Learning (CLIL)

Definition of CLIL

Content and Language Integrated Learning (CLIL) is an educational approach that simultaneously teaches language and subject content, thereby enhancing both language acquisition and subject understanding through meaningful, contextualized experiences. While there are various definitions of CLIL, Temirova and Westall (2015) characterize it as a method where language and subject matter are learned together. They explain that CLIL encompasses any educational activity that utilizes language as a tool for gaining knowledge in a specific subject area or theme. Similarly, Ball (2002) posits that CLIL serves dual purposes by achieving both language and content learning concurrently. According to Coyle et al. (2010), CLIL emphasizes using an additional language to learn both content and language itself. With the growing trend of multilingualism, CLIL has gained significant attention in both educational practice and research. Deyrich and Kari Stunnel also describe CLIL as an approach focused on the simultaneous teaching of language and content. In today's context, learning a language is essential for adapting to the demands of a new society, as proficiency in a language can enhance status and provide various opportunities. CLIL is viewed as an effective method for language learning through real, meaningful, and contextualized activities, which increases motivation since the language is applied for authentic purposes, making it more relevant and significant for students. This rationale has prompted many institutions to explore alternative teaching approaches

(Rodriguez Bonces, 2012a, 2012b; Deyrich and Kari Stunnel, 2014a). Additionally, McDougald (2016) notes that integrating a second or foreign language into education complicates the process, particularly when trying to achieve the same outcomes as traditional methods. CLIL addresses this complexity by blending content and language, providing educators with a context-driven, real-time solution for effective education in a second or foreign language.

Similarly, Content and Language Integrated Learning (CLIL) is a dual-focused approach that teaches curricular content using a foreign language. The term CLIL was introduced by David Marsh to describe any educational context where a secondary language, which is not typically the learners' first language, serves as the medium for teaching non-language content. CLIL is defined as a dual-educational environment in which curricular subjects are taught through a foreign language, primarily to students in mainstream education at the primary, secondary, or tertiary levels (Marsh, 2002; Wolf, 2009; Dalton-Puffer, 2011). This approach equips students to engage effectively with the 4C framework proposed by Coyle (1999). The 4Cs framework for CLIL starts with content, encompassing subject matter, themes, and interdisciplinary approaches. It highlights the interrelationships among content (subject matter), communication (language), cognition (thinking), and culture (awareness of oneself and others). This framework takes advantage of the synergies between content learning (cognition) and language acquisition (communication and culture). In Vygotskian terms (1978), language serves as a "tool" that aids in achieving broader educational objectives and the social construction of knowledge, which aligns perfectly with the 4Cs framework, as CLIL develops within a sociocultural learning context. From this perspective, language provides scaffolding—where meaning is collaboratively negotiated between individuals with varying levels of knowledge—within the zone of proximal development (ZPD). Furthermore, CLIL promotes the development of both lower-order and higher-order thinking skills (LOTS and HOTS), further reinforcing the interconnected elements of content, communication, cognition, and culture in the learning process.

The Purpose of CLIL

The CLIL approach, which was originally designed for teaching additional languages, has become a prevalent method for English language education worldwide. While it poses challenges—such as the need for collaboration between language and content teachers and the demands it places on students—CLIL has shown to be both effective and motivating, particularly in Europe, where it successfully merges language acquisition with subject knowledge. Initially, CLIL aimed to prepare individuals to learn an additional language, be it a foreign, heritage, or community language (Coyle et al., 2010). However, it has increasingly become associated with the teaching and learning of English. This evolution has occurred as CLIL has expanded beyond Europe to various countries globally, where English is the primary language taught in schools. As Tedick (2020) points out, "CLIL programs have become synonymous with teaching English in mainland Europe, South America, Asia, and beyond." Furthermore, the CLIL approach is utilized to investigate how learners can effectively gain subject knowledge in an additional language while also developing their second language (L2) skills, including grammar, vocabulary, and cognitive abilities (Pérez Cañado, 2020).

According to Pinner (2013), CLIL presents considerable challenges for both educators and students. Language and content teachers must work closely together and share their expertise, as it is rare for a single teacher to be proficient in both fields at the same time. For students, the dual focus of CLIL courses can make the workload seem particularly heavy. Nevertheless, CLIL has demonstrated significant effectiveness in achieving its dual aims in programs around the world, especially in Europe. While it may appear more challenging, it often proves to be more engaging and authentic for both students and teachers (Marsh, 2002).

The Implementation of CLIL

Cinganotto et al. (2019) highlight that the CLIL approach prioritizes actions, tasks, and student engagement, merging language acquisition with content instruction to improve foreign language skills and intercultural awareness. This method aligns with the broader educational shift noted by Papaja (2013), which reflects a move from

traditional teacher-centered approaches to those that emphasize learner involvement, underscoring the growing significance of student participation and personalized learning in modern education.

Furthermore, the CLIL methodology employs a range of teaching strategies that can significantly impact learning outcomes, as noted by Hattie (2009). Among Hattie's top ten strategies are Direct Instruction, Note Taking and Study Skills, Spaced Practice, Feedback, Teaching Metacognitive Skills, Problem-Solving Skills, Reciprocal Teaching, Mastery Learning, Concept Mapping, and Worked Examples. These strategies effectively enhance student learning and support innovative teaching practices, making them valuable elements to incorporate within a CLIL framework (Cinganotto, 2019).

To deliver CLIL instruction effectively, educators must understand their roles in the process. Marsh et al. (2001) identify the essential competencies that a CLIL teacher should possess across various areas. These include proficient language and communication skills, along with a strong command of the target language and its application in teaching. Teachers should have a theoretical background in language learning and acquisition, enabling them to identify linguistic difficulties and apply communication strategies that facilitate comprehension. They must design activities that blend language learning with subject content, collaborate effectively with students from diverse linguistic and cultural backgrounds, and adapt teaching materials to meet specific needs. Additionally, CLIL educators need to create and implement suitable assessment and evaluation tools to track student progress.

Benefits and Challenges of CLIL

Benefits of CLIL

Based on a study by Gučec (2019) notes that the introduction of CLIL has brought substantial benefits, positively impacting students, teachers, and educational institutions. Students in CLIL programs show high levels of motivation due to the integration of language learning with meaningful subject content, which enhances their overall educational experience. This approach enables students to gain a sense of

achievement and expand their understanding across various subjects, building on their existing knowledge base. Through CLIL, learners engage with authentic content using visual and audio resources, focusing on meaning over grammar, and develop intercultural awareness by exploring diverse topics. Teachers and schools also gain advantages, as CLIL encourages collaboration between language and subject educators and introduces new material, potentially transforming language education practices.

Challenges of CLIL

McDougald (2016) notes that implementing educational programs is complex, regardless of the setting. Beyond typical challenges like scheduling, staffing, budget issues, and resource availability, there are additional often-overlooked concerns. These editorial outlines four significant yet seldom-discussed issues: (1) resistance from subject teachers toward language teaching, (2) experimental CLIL program challenges, (3) the second language acquisition skills needed by subject teachers, and (4) the scarcity of training programs for CLIL educators. For instance, Woźniak (2013) points out that both native and non-native teachers require more training in collaboration to better facilitate content and language integration. Similarly, McDougald (2009) highlights the need for content experts to have more opportunities for learning and teaching language skills to support students' language development effectively. Ruiz Garrido and Gómez (2009) stress that teacher training and collaboration must align with a comprehensive institutional strategy that includes clear objectives and recognition of contributors' roles. Cenoz (2013) and Cenoz et al. (2013) also emphasize the importance of institutional goals for program success.

Arribas (2016) conducted a study on experimental CLIL programs, showing their significant impact on student outcomes, which underscores the importance of context in CLIL implementation. The study assessed students' attitudes, motivation, and receptive vocabulary in regular English and CLIL classes, revealing higher scores in receptive vocabulary for the CLIL group, likely due to increased motivation. However, despite positive results, CLIL was seen as providing limited help, attributed by Arribas to inconsistent implementation. This indicates that the success of CLIL programs

depends on how effectively they are executed in different contexts, a factor evident in Latin America, where the adoption of CLIL varies, as reflected in Colombia's 175 registered bilingual schools (McDougald, 2015; Rodríguez, 2011).

To ensure successful CLIL implementation, teacher empowerment and strong collaboration between content and language educators are vital. Arnó-Macià and Mancho-Barés (2015) stress training content teachers to improve students' English proficiency, emphasizing the need for communication skills development. Biçaku (2011) also highlights that close collaboration between content and language teachers can enhance the effectiveness of CLIL by enabling them to jointly create and deliver appropriate learning tasks, leading to better educational outcomes.

Problem-Based Learning (PBL)

Definition of PBL

Problem-based learning (PBL) is a student-centered instructional method where learners acquire knowledge by addressing an open-ended problem presented at the outset. This approach enhances knowledge retention, group collaboration, and communication skills. PBL involves students tackling real-life problems and working collaboratively to find solutions, fostering critical thinking, problem-solving abilities, and the application of theoretical knowledge to practical situations (Marcinauskas et al., 2024; Sahin, 2010; Argaw et al., 2016; Ismoyo, 2017).

Transitioning from a traditional teaching model to a learning-focused paradigm, as noted by Barr and Tagg (1995), emphasizes student learning over teacher instruction. Ali (2019) describes PBL as a method where students develop analytical and critical thinking skills by solving practical or complex problems in groups, improving problem-solving, analytical, and communication skills. PBL encourages collaborative work, resource evaluation, and continuous learning, equipping students with lifelong learning capabilities. In PBL, students use "triggers" from the initial problem to set learning goals, conduct self-directed study, and return to their group to share and refine their findings. This approach deepens understanding through relevant problem-solving and helps students develop teamwork, critical literature evaluation, leadership in group

discussions, self-directed learning, and resource utilization. It also enhances listening, cooperation, presentation skills, and fosters respect for peers' opinions while supporting collaborative information organization (Wood, 2003).

Key PBL features include (a) initiating learning with a problem to engage prior knowledge and interest; (b) focusing on active, student-centered learning; (c) promoting small group collaboration (5-12 students); (d) providing teacher facilitation; and (e) encouraging self-directed learning with ample time for independent study (Barrows, 1996; Hmelo-Silver, 2004; Schmidt et al., 2009). Problems can take various forms, such as case studies or visual cues, designed to challenge students appropriately and, with teacher support, enhance their motivation and values (Belland et al., 2013). For example, Schmidt et al. (2007) used a clinical psychology problem about "phobias," involving a scenario where an account manager, Anita, encounters spiders in her bathtub, triggering fear and physiological responses.

The PBL process typically involves (a) problem identification and recognition of knowledge gaps, (b) information gathering and independent study, and (c) debriefing or presenting findings (Barrows, 1985; Schmidt, 1983). Initially, students draw on existing knowledge and reasoning to explore the problem, identify knowledge gaps, and formulate study questions, which enhances their motivation for further learning (Rotgans & Schmidt, 2011, 2014).

The Purpose of PBL

Problem-Based Learning (PBL) often faces criticism for prioritizing the enhancement of critical thinking and problem-solving skills over foundational knowledge acquisition. Despite this, PBL has gained significant relevance in contemporary education, especially as there is a growing focus on fostering flexible thinking and promoting lifelong learning. As educational reforms increasingly shift towards active, student-centered methodologies, PBL stands out for involving students in tackling real-world challenges and developing skills that can be transferred to various contexts. Educators appreciate PBL for its ability to motivate learners and facilitate the practical application of theoretical knowledge, making it an effective approach for building both

cognitive and practical skills. For example, Hung et al. (2008) noted that PBL is often criticized for emphasizing higher-order thinking and problem-solving over fundamental knowledge. Nevertheless, the approach aligns well with current educational priorities that highlight active learning, adaptability, and student engagement (Bransford et al., 2000; Greeno et al., 1996).

The Implementation of PBL

Problem-Based Learning (PBL) is a student-focused teaching approach that encourages critical thinking, problem-solving, and independent learning. While instructors provide guidance and resources, the primary responsibility lies with students, who actively work through real-world problems. For effective PBL implementation, educators need to design problems that resonate with students' prior knowledge and experiences, promoting collaboration and a deeper understanding of the material. The process typically involves identifying the problem, conducting research, and presenting solutions, allowing students to take ownership of their learning. Techniques such as case studies, role-plays, and simulations help maintain focus on real-world problem-solving and skill development throughout the PBL process.

Research indicates that PBL is effective in cultivating students' critical thinking and analytical abilities. As noted by Cooke & Moyle (2002) and Delisle (1997), PBL stimulates students to approach complex problems critically and analytically. Instructors provide hints and strategies to help students find relevant research materials, validate their understanding, and develop self-directed learning habits. This method enhances critical thinking, problem-solving, and independent learning. To implement PBL effectively, educators should select suitable content, identify resources, create clear problem statements, develop engaging activities, pose focus questions, and establish evaluation methods.

Successful PBL requires thorough preparation and well-crafted problems to ensure student engagement and motivation. Teachers should design problems that stimulate interest and encourage deeper exploration of the subject. These problems should

include guiding clues that help students make informed decisions during problem-solving. Moreover, the content should be relevant to students' lives and prior knowledge to ensure relatability. For group work, the problem should be complex enough to promote collaboration and introduced in stages so that students can identify key learning issues, conduct research, and understand the necessary concepts for resolution (Duch et al., 2001).

Creating an environment that promotes collaboration, and active participation is crucial for maximizing the benefits of PBL. Students should work in groups with allocated time for their PBL projects. Rather than simply delivering content, teachers should first introduce the problems. PBL tasks should be concise and connected to real-life situations and existing knowledge. Delisle (1997) points out that greater student involvement leads to higher investment and effort in solving problems, making topic selection and problem design critical for effective PBL.

PBL involves a structured approach where students solve real-world problems, developing critical thinking and problem-solving skills. According to Nilson (2010), students follow a series of steps during PBL. They start by identifying and defining the problem, assessing their prior knowledge, and brainstorming causes and contributing factors. They then identify information gaps and conduct research to gather relevant data. Solutions are applied, findings documented, and solutions presented and justified, followed by reflection on performance and process.

Various methods can engage students in solving real-world problems in PBL. Both teachers and students can introduce problems in different contexts using diverse approaches. Common types of problems include case studies, simulations, role-plays, task-based or project-based problems, and "ill-structured" problems with multiple solutions (Tick, 2007). Case studies involve analyzing detailed real-world scenarios, role-plays allow enactment of problem-related situations, and simulations often combine various learning techniques to replicate real-life experiences. Despite differing methods, all focus on addressing real-world challenges.

Benefits and Challenges of PBL

Benefits of PBL

A major advantage of Problem-Based Learning (PBL) is its ability to develop various skills through collaborative problem-solving. PBL promotes teamwork and cooperation as students work in groups to solve case studies or tackle problems, strengthening their ability to function effectively in teams. It also nurtures leadership, as students take turns guiding discussions and making decisions. PBL enhances communication and social skills through group interactions and presentations. Students build self-awareness by reflecting on their strengths and weaknesses and engage in critical thinking through independent research and reflection. Furthermore, PBL encourages self-directed learning, fostering independence in the learning process, and boosts information literacy by teaching students how to effectively locate and utilize information.

PBL is shown to support teamwork and collaboration by having students work collectively on case studies or problems, enhancing their ability to work in small groups and develop leadership skills as they rotate leading discussions and deciding on solutions (Ahamad et al., 2017; Azer, 2001). Group discussions and presentations improve students' communication and social skills, allowing them to learn from peer feedback (Azman & Shin, 2012; Ahamad et al., 2017). Additionally, PBL promotes self-awareness and critical thinking as students evaluate their strengths and weaknesses and engage in independent research to expand their knowledge (Fenwick, 2010; Yuan et al., 2008). By tackling real-world challenges, students become more self-directed and enhance their information literacy, equipping them with skills for lifelong learning and practical application (Malan & Ndlovu, 2014; Akcay, 2009; Carder et al., 2001).

Challenges of PBL

Understanding the intricacies of implementing Problem-Based Learning (PBL) involves recognizing its distinct approach and inherent challenges. PBL is not just a teaching method but a unique way of structuring lessons, focusing on presenting problems for students to solve rather than delivering direct instruction (Boud & Feletti, 1997; Boud & Feletti, 2013). This approach guides students through the process of problem-solving, enabling them to develop knowledge and skills with the support of instructors. Educators face challenges such as providing materials to prompt discussions, guiding students' critical thinking, and offering resources for solving problems. Teachers must have a thorough understanding of the problems they present and help students collaborate to gather and analyze information. Additionally, they need to support students in identifying learning needs and effectively using reliable resources, while also encouraging English speaking to enhance language proficiency and communication skills. For example, learning English can be difficult due to students' lack of motivation, encouragement, and effective learning strategies (Sam, 2024). Finally, teachers must evaluate how well students apply their new knowledge to the initial problem and assess their overall learning process.

Results

Task-Based Language Teaching (TBLT) is integrated into modern education through self-paced, mastery-focused strategies and technology, aligning with 21st-century learning practices. Modern classrooms equip teachers to promote self-directed learning by incorporating blended instruction, where traditional lectures are replaced by video content. This shift allows teachers to dedicate more time to direct student interaction, fostering personalized learning. Within this framework, TBLT is crucial as it engages students in meaningful, real-world tasks that encourage active learning and practical language application. The self-paced format of modern classrooms supports the effective use of TBLT, enabling students to work through tasks at their own speed and focus on mastering language skills.

As expected, it is aligned with the recent study by Junior & Castro, technology-mediated TBLT enhances digital intercultural communication by involving students in tasks that combine language practice with cultural exchanges, leading to increased interest, enjoyment, and active participation—key factors for the success of this method. This setting also promotes cultural learning while developing language skills, thereby boosting motivation and engagement. These findings align with Lopes Jr. (2021), who describes the technology-mediated task cycle as a Complex Adaptive System (CAS), where teachers manage the inherent unpredictability and self-organization of the task cycle. This approach allows complexity to unfold naturally and encourages students to independently assess their performance and meaning-making processes.

The mastery-based learning framework complements TBLT by evaluating students on their comprehension and task completion, rather than just completing assignments. This approach fosters deeper language learning and critical thinking, as students must use their language skills in practical contexts. TBLT's emphasis on real communication and teamwork aligns well with the 21st century classroom, which supports student independence and personalized learning. In this model, teachers function as facilitators and mentors, guiding students through task-based activities, providing tailored feedback, and cultivating an environment that promotes autonomy and mastery in language and critical thinking.

Conversely, modern classrooms are increasingly adopting Content and Language Integrated Learning (CLIL) to build 21st-century skills by blending instruction, self-paced learning, and mastery-based methods. CLIL combines language learning with subject content, promoting self-directed learning and reinforcing both linguistic and subject-area knowledge. This method incorporates three main practices: blended learning, where teachers replace traditional lectures with video-based instruction to focus more on student interaction; self-paced learning, allowing customized instruction; and mastery-based learning, ensuring students understand material thoroughly before moving forward. This student-centered approach, similar to the Modern Classrooms Project, empowers learners to take charge of their education and

develop skills in critical thinking, communication, and intercultural awareness. CLIL not only boosts student motivation by using language in meaningful contexts but also supports cognitive development by integrating content, communication, culture, and cognition.

Despite the need for collaboration between language and subject teachers, CLIL remains an effective strategy for merging language and content teaching in an autonomous, 21st century classroom. According to the Alice Methodologyland Blog (2022), CLIL aids in developing 21st-century skills through theme-based instruction, combining language learning with other disciplines to foster interdisciplinary connections. This encourages critical thinking, communication, and intercultural competence. The use of digital tools plays a crucial role, promoting self-paced learning and mastery while enhancing student engagement and understanding through hands-on activities.

Problem-Based Learning (PBL) is utilized in the 21st century classrooms to prepare students with essential 21st-century skills by promoting self-directed learning, collaboration, and critical thinking. PBL is in line with modern educational methods like blended learning, where traditional lectures are substituted with videos, freeing up class time for active problem-solving and teamwork. In PBL settings, teachers act as facilitators, guiding students as they identify and solve real-world problems, fostering a deeper understanding of the material. The self-paced nature of PBL allows educators to customize problem-based activities according to students' individual needs, ensuring continuous engagement and challenge. Mastery-based learning is integral to PBL, as students are evaluated based on their comprehension of problem-solving processes rather than just task completion, ensuring skill development before moving forward.

The Modern Classrooms Project incorporates many PBL principles, focusing on student autonomy and personalized learning. Teachers minimize direct instruction, allowing students to lead the problem-solving process while providing tailored support and immediate feedback. This empowers students to take control of their learning, engage with real-world challenges, and work collaboratively. Integrating PBL into

modern education encourages critical thinking, creativity, and problem-solving skills, fostering an environment conducive to self-directed learning and mastery. Research by Sebatana & Dudu (2022) highlights that PBL promotes creativity, collaboration, and innovation, essential for tackling real-world challenges. The Modern Classrooms Project showcases PBL concepts by prioritizing personalized learning and student-driven progress, supported by teacher guidance. This approach nurtures essential skills like teamwork, creative problem-solving, and critical thinking, crucial for success in diverse fields.

Conclusion and Recommendation

In conclusion, incorporating Task-Based Language Teaching (TBLT), Content and Language Integrated Learning (CLIL), and Problem-Based Learning (PBL) into contemporary classrooms provides an effective strategy for developing key 21st-century skills. TBLT engages students in practical, real-world tasks that foster independence, mastery-based learning, and critical thinking, supported by technology and tailored instruction. CLIL combines language learning with subject content, promoting interdisciplinary abilities such as critical thinking, communication, and cultural understanding. PBL enhances creativity, teamwork, and problem-solving by empowering students to take responsibility for their learning, progress at their own pace, and apply knowledge to address real-world challenges. The Modern Classrooms Project embodies these methods by advocating for self-directed, mastery-oriented learning and personalized student participation through blended learning and technological integration. These approaches align with modern educational practices, preparing students with the essential skills needed for success in an ever-changing world.

From the findings of this review, it is suggested that teachers adopt a facilitator role to support self-paced learning within Task-Based Language Teaching (TBLT) and Problem-Based Learning (PBL) settings. By guiding students through activities that allow independent pacing, educators can help students develop language and problem-solving skills through engaging, real-world tasks. Emphasizing mastery-based learning is vital; teachers should prioritize assessing students' comprehension and

ability to apply concepts over simply completing tasks. This method encourages deeper critical thinking and practical language use. Additionally, integrating technology is important for enhancing TBLT and PBL effectiveness. Teachers should use digital tools like videos, online resources, and collaborative platforms to combine traditional teaching with modern practices, making room for hands-on learning and problem-solving in class. Furthermore, interdisciplinary collaboration is essential for successful Content and Language Integrated Learning (CLIL) implementation. By partnering with colleagues across different subjects, teachers can create curricula that not only enhance language learning but also build key 21st-century skills such as communication, critical thinking, and cultural awareness.

Future research could explore different teaching methods used in modern classrooms to assess how each approach benefits language learners in the digital age.

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GenAI-Mediated Informal Digital Learning of English

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Introduction

Understanding GenAI-Mediated Informal Digital Learning of English (IDLE)

Students in this era who were raised with technology engage and communicate in a digital world. This phenomenon has significantly changed how students learn. In technology-enhanced language learning (TELL), a growing body of literature investigates the impact of leisure-oriented digital activities on language learning, such as digital comic writing, YouTube watching, online gaming, etc. Those activities are categorized as autonomous language learning utilizing technology (Lai, 2019), recreational language acquisition (Chik & Ho, 2017), and informal digital learning of English (Dressman & Lee, 2021). As opportunities for English language learning expand out-of-school digital environments, students are becoming increasingly involved in Informal Digital Learning of English (IDLE). It is defined as autonomous

English learning activities implemented in informal digital settings, driven by individual interests, and performed autonomously without teacher guidance (Lee & Lee, 2021). Benson (2011) proposes four dimensions for IDLE practice: formality, location, pedagogy, and locus of control – the degree to which students have control over their own learning, such as self-directed or other-directed.

Table 1 illustrates two alternative IDLE contexts (extracurricular and extramural) related to different learning forms.

Table 1. Benson's Framework of IDLE

	IDLE	
	Extracurricular	**Extramural**
Formality	Semi-structured, certification	Unstructured, no certification
Location	Out-of-class	Out-of-class
Pedagogy	Self-instructed	Naturalistic
Locus of control	Self-directed	Self-directed

The "digital" refers to digital devices such as smartphones, tablets, laptops, personal computers, etc. and other sources such as social media, mobile applications, computer software, etc. (Lee, 2019). Additionally, the 'certification' aspect within the 'formality' category pertains to any official and trustworthy document that verifies an individual's qualifications for a particular skill or competence (Lee & Drajati, 2019). There are distinctions between extracurricular and extramural in IDLE practice. In certain ways, extracurricular engagement is associated with educational situations that aim to facilitate formal learning. For instance, language learning at evening school is considered extracurricular because of the involvement of the teachers and its relevance to educational situations (Sylvén & Sundqvist, 2017). In contrast to extracurriculars, extramural learning involves students interacting with language outside the classroom walls. This learning process is predominantly initiated by the students themselves rather than teachers and is usually a voluntary decision made by the students (Sylvén & Sundqvist, 2017). So, extramural activities are voluntary and initiated by the students, while extracurricular activities are linked to formal educational settings.

Several studies about IDLE have been conducted worldwide, such as in Saudi Arabia (Mohammed & Ali, 2021), Kazakhstan (Zadorozhnyy & Lee, 2023), Sweden (Lee & Sylvén, 2021), China (Liu & Wang, 2024), South Korea (Lee & Dressman, 2018) and Indonesia (Lee & Drajati, 2019). Those studies have highlighted the educational potential of IDLE by illustrating the informal digital activities that students engage in various contexts and emphasizing how these activities contribute to improving language proficiency and effective learning. A substantial body of research also highlights the linguistic and psychological advantages of involving language learners in IDLE activities. These benefits include but are not limited to improved self-assessed language proficiency (Zhang & Liu, 2022), increased vocabulary acquisition (Lee, 2019), enhanced intercultural competence (Liu, 2023), greater willingness to communicate (Lee & Drajati, 2019; Lee & Lu, 2023; Liu, 2023), heightened self-efficacy (Zadorozhnyy & Lee, 2023), reduced language anxiety (Lee & Hsieh, 2019), and an increased sense of enjoyment (Lee & Lee, 2021). These findings affirm that IDLE has become a vital component of second language education, particularly in a digital era where learners can leverage greater and more accessible opportunities for self-directed, technology-assisted English learning (Lee & Dressman, 2018; Liu & Wang, 2024)

The potential of large language models (LLMs) as revolutionary and empowering language learning and assessment tools was significantly increased in late 2022 by the emergence of GenAI. In the field of foreign and second language (L2) education, large language models (LLMs) offer flexible and impactful tools that are transforming the processes of learning and teaching an additional language. This has driven researchers to reflect on the ways in which GenAI facilitates language learning, either inside or outside the classroom (Kohnke et al., 2023; Mizumoto & Eguchi, 2023). AI-enabled LLMs are believed to promote more effective personalized language learning by fostering authentic dialogues in the target language, delivering fast-tailored feedback, and more effectively recommending learning resources (Jeon & Lee, 2023; Kohnke et al., 2023). Researchers mostly consider GenAI implementation to be an IDLE practice. It is proven that previous quantitative research has identified similarities between individuals' perceptions of utilizing technology for English learning and college

students' use of GenAI as an IDLE practice (Liu & Ma, 2024). From the students' perspectives of GenAI, they depend on GenAI as a "teacher" for providing knowledge, consultation, and conversational partners (Liu et al., 2024; Ou et al., 2024). In contrast to traditional classrooms, which restrict EFL students' in-class practice and interaction opportunities due to class sizes and restricted class duration (Chen, 2024), GenAI can offer personalized feedback (Escalante et al., 2023) and serve as a conversational partner to enhance interaction frequency (Belda-Medina & Calvo-Ferrer, 2022). A wide variety of powerful GenAI technologies has emerged, which have the potential to enable students to participate in IDLE with a larger degree of creativity and adaptability. Thus, GenAI can potentially empower students as autonomous learners in the IDLE context because students can set their learning goals and access fast-tailored feedback, which they may not get during in-class learning because of the class size and limited class time.

Gen-AI Tools for IDLE

Several GenAI tools can be integrated into IDLE. This section explores several GenAI tools to support IDLE in English language learning.

Lingolette (https://lingolette.com/)

Lingolette is an application that uses an element of Generative AI. It is designed to develop students' reading proficiency through interactive features, such as personalized reading materials that offer various reading texts tailored to their proficiency levels and topic interests. Students can also use audio pronunciation to engage with the text more deeply and to facilitate reading comprehension. It also generates discussion from the reading text that the students read. It exhibits several strengths for IDLE, such as the accessibility across various devices to engage students with the reading text provided. The students can access the reading text anytime and anywhere to promote autonomous learning. The reading materials provided resonate with students' interests and English proficiency levels. In addition, it generates feedback on students' reading comprehension through quizzes and assessments. By integrating Lingolette into IDLE practice, students can understand their strengths and

weaknesses from the feedback provided. Thus, they can adjust their learning strategies accordingly.

Meanwhile, the text quality may vary, making some students find that the texts do not challenge or align with the learning goals. Moreover, the feedback generated by Lingolette might lack depth or fail to provide specific explanations for improvement, which could limit its usefulness for students aiming to improve their reading skills. Another drawback is that this tool might occasionally result in errors or inaccuracies of the content which could mislead learners in the learning process. Additionally, students who are not yet proficient in navigating digital tools might struggle to utilize the application's features. Lastly, Lingolette's dependence on internet connectivity may pose challenges for students in areas with limited or unreliable access, hindering its accessibility for all users.

Gliglish (https://gliglish.com/)

Gliglish is an AI-driven platform that enhances English speaking skills, primarily through conversational practice. It engages students in a realistic scenario by practising asking and responding to questions appropriately and maintaining meaningful dialogue in a conversation. Giglish is designed to adapt to students' proficiency levels, offering grammar, vocabulary, and pronunciation feedback. The features provided by Giglish make it a useful resource for learners to improve their speaking skills. In the IDLE context, this tool can make speaking practice more engaging and relevant because students can choose the topics provided based on their personal interests, which can foster their motivation and enthusiasm for learning.

Learners can also determine their own pace to practice as much or as little as needed based on their comfort and availability. In addition, learners' flexibility to practice speaking anytime and anywhere using Giglish aligns well with the principles of IDLE, which prioritize autonomy and accessibility. This tool can help students reduce the fear of making mistakes in speaking, which is the common challenge students face in English speaking. Providing a non-judgmental environment encourages students to experiment with language and gain confidence in their speaking skills. Furthermore,

the instant feedback given by this tool can identify and address students' speaking errors to reinforce their learning.

However, Gliglish also has limitations, such as its lack of depth and unpredictability in conversations with real people. For instance, it might not fully replicate authentic dialogue's cultural nuances, emotional expressions, and contextual variances. Additionally, the feedback provided, though personalized, may not always capture specific issues unique to individual learners. To maximize the benefits of Gliglish, students can pair it with other speaking opportunities, such as practising with peers or participating in language exchange programs. Teachers can also guide students on incorporating Gliglish effectively into their learning routines, encouraging reflective practices such as recording their sessions, tracking progress, and setting specific speaking goals. This integration ensures that Gliglish complements other speaking practices, resulting in a more holistic language learning experience.

ChatGPT (https://chatgpt.com/)

ChatGPT is one of the Generative AI (GenAI) tools that support students' writing activities in the context of IDLE. It leverages advanced natural language processing capabilities to assist students in various stages of the writing process. For example, it can correct grammatical errors, enhance sentence structures, and provide explanations for revisions, helping students understand their mistakes and improve their writing. ChatGPT provides personalized feedback tailored to individual writing challenges, enabling students to address their weaknesses. In the IDLE context, ChatGPT can act as a peer reviewer, offering constructive criticism on students' drafts and helping them refine their ideas. Beyond corrections, learners can also use ChatGPT to brainstorm ideas, clarify concepts, and generate outlines for their writing tasks. This flexibility makes ChatGPT a valuable tool for fostering creativity and developing writing skills in an informal learning environment. However, a potential drawback of using ChatGPT is the risk of over-reliance, which could hinder the development of critical thinking and problem-solving skills in writing. To overcome this problem, students should be encouraged to use ChatGPT as a complementary resource rather than a replacement for their own efforts. For example, they can write independently before

consulting ChatGPT for improvements and explanations. Moreover, teachers can guide learners in using ChatGPT ethically and effectively by introducing reflective practices, such as comparing ChatGPT's suggestions with their original writing or discussing how AI tools contribute to their learning. This approach ensures that ChatGPT enhances writing quality and promotes the development of metacognitive skills in learning to write.

Students' Frequency of IDLE Activities

Research highlights inconsistencies in the impact of informal language learning frequency on students' English proficiency and vocabulary mastery. While some studies suggest a positive correlation between informal language learning activities and students' school grades in English (Sundqvist & Sylvén, 2014; Sundqvist & Wikström, 2015), others report contradictory findings (Lai et al., 2015; Lee, 2019). Some studies explained that spending significant time on IDLE activities may have varying impacts on students' English proficiency, depending on students' learning conditions (Sung et al., 2015, 2016). For example, students' excessive focus on digital devices used primarily for gaming and social media can lead to a lack of motivation to study. Lai et al. (2015) conducted a study using questionnaires, tests, and focus group interviews to examine students' out-of-class learning habits, learning outcomes, affective factors like confidence and enjoyment, and the elements influencing their choices for out-of-class English learning. The findings revealed that foreign language learners reported spending an average of 1-3 hours per week on self-initiated, self-directed, technology-based language learning. However, correlation analyses showed that the frequency of these learning activities was more strongly linked to affective factors than cognitive learning outcomes. This suggests that while increased engagement in out-of-class learning activities enhanced students' enjoyment and confidence in learning English, it did not necessarily translate into higher academic performance or improved English grades.

In conclusion, while informal digital language learning activities (IDLE) offer valuable opportunities to enhance learners' engagement and enjoyment, their impact on English proficiency and academic performance remains inconsistent. The

effectiveness of IDLE practices is influenced by various factors, including learners' focus, motivation, and the specific ways they engage with technology. Although these activities can foster confidence and positive attitudes toward language learning, they may not always lead to measurable improvements in cognitive outcomes such as vocabulary mastery or academic achievement. To maximize the benefits of IDLE, educators and learners should focus on creating balanced, purposeful interactions with digital tools that align with learning goals and provide opportunities for meaningful practice and application.

Challenges of GenAI-Mediated IDLE

Previous studies explained that EFL learners are positive about the potential of digital learning in an IDLE context (Nugroho & Triana, 2021). Most students select smartphones as their preferred device for performing IDLE activities (Yang & Chen, 2020). GenAI and English resources are readily accessible and available from anywhere in the virtual world where smartphones are used. Meanwhile, there are several challenges when integrating smartphones and GenAI into students' IDLE practice, including inadequate memory and battery life, difficulty updating mobile devices, small keypads or screens, and unreliable or unsafe internet access (Sabah, 2016). In the IDLE context, the frequency of engagement is of crucial importance. Regular engagement with the GenAI is crucial for skill enhancement and retention. Motivating students to engage with diverse materials, genres, and topics helps develop their language proficiency. Moreover, exposure to accents, dialects, and cultural viewpoints can improve students' linguistic proficiency and cultural competence (Peters, 2018).

Undeniably, intrinsic and extrinsic motivations are critical elements of the student's learning process. Students who are actively engaged are intrinsically motivated by their enjoyment, curiosity, and desire to accomplish personal goals. Nevertheless, getting learning support as an extrinsic motivation can be challenging. Learning support is any form of guidance from stakeholders (e.g. teachers, parents, and friends) to students to facilitate their learning beyond the formal context. Teacher assistance

significantly improves students' awareness and motivation to engage in the IDLE context (Hembrough & Jordan, 2020). For example, teachers can establish community programs, including informal groups encompassing students from diverse social backgrounds and English proficiency. It is intended to help students foster their self-confidence in social communities and practice their target language skills in a supportive environment.

The positive attitude and frequent use of GenAI in EFL learners' IDLE activities emphasize the fact that GenAI offers a greater number of opportunities for students to effectively learn English in the AI era, particularly for today's students who may be able to use technology more effortlessly and intuitively than their teachers (Rudolph et al., 2023). In this sense, while GenAI has created obstacles to academic integrity, assessment, and other educational components, it is crucial to provide students with more comprehensive instruction on effectively employing technology rather than disregarding its potential advantages.

Furthermore, not all students have equal access to certain devices or high-speed internet connections for IDLE activities. This digital divide problem can create inequality in learning opportunities, affecting learning outcomes. To address those issues, a system must help learners access the technology, especially those in remote areas. Another important issue is about the privacy and ethical use of GenAI. The students' interactions with GenAI involve their personal data, which leads to data security and ethical use in educational contexts. In addition, learners' dependency on AI is another ethical concern. Although GenAI can enhance learners' autonomy by providing fast feedback and responses, it can create overreliance on technology. This issue can diminish learners' ability to think critically. For instance, students might become accustomed to relying on AI for their writing, reducing opportunities to develop their thinking and evaluative skills.

AI-generated content can also lead to bias. Since GenAI models are trained on created datasets, they often reflect the biases in their data. This can generate learning materials or feedback that inadvertently reinforces stereotypes or excludes certain cultural or linguistic perspectives. Such biases may lead to unequal learning experiences,

particularly disadvantaging students from marginalized backgrounds. Addressing these biases requires careful curation to ensure fairness and inclusivity. Addressing these ethical challenges also requires a collective effort from teachers, developers, policymakers, and users to promote transparency, inclusivity, and accountability in using GenAI for IDLE practices. We can leverage GenAI's benefits by tackling these issues while minimizing its potential harms.

In conclusion, integrating GenAI into EFL learners' IDLE practices offers important opportunities for enhancing English language learning by providing accessible and engaging resources. Students' positive attitudes and frequent use of GenAI underscore its potential to support language acquisition in the digital era. However, the benefits must be balanced with thoughtful strategies to address challenges such as digital equity, data privacy, and learners' overreliance on AI. Teachers play a significant role in fostering an environment where students can use GenAI responsibly.

In addition, ethical concerns like bias in AI content and the potential exclusion of marginalized perspectives highlight the need for inclusivity in GenAI applications. Policymakers, developers, and educators must collaborate to ensure equitable access to technology and mitigate the risks associated with its use. By promoting transparency, accountability, and a focus on independent learning, teachers can harness the advantages of GenAI while minimizing its drawbacks. It is hoped that GenAI can be a transformative tool in shaping inclusive, innovative, and effective language learning practices for EFL learners.

Conclusion

The exploration of GenAI-mediated IDLE highlights the shift in language learning paradigms as learners use technology to foster autonomous and personalized learning experiences. IDLE allows learners to set goals, manage their pace, and explore topics of personal interest. The integration of GenAI into IDLE amplifies this potential by providing tools that support authentic interactions, personalized feedback, and enhanced engagement. These advancements underscore the evolving nature of

language learning, where autonomy and digital resources play important roles in shaping students' linguistic and cognitive growth.

Despite its benefits, the impact of IDLE on learners' academic performance remains inconsistent caused by factors such as learning strategies and learners' contextual conditions. While many studies stated IDLE's psychological and affective benefits, such as increased confidence, reduced anxiety, and achieved enjoyment, its direct contribution to measurable learning outcomes still varies. Thus, it needs a balanced approach, where GenAI tools complement structured teaching and learning process to foster students' learning outcomes.

Several challenges associated with GenAI-mediated IDLE, such as digital equity, ethical concerns, and the risk of overreliance on AI, call for thoughtful implementation strategies. Addressing these issues requires systemic efforts to ensure equitable access to technology, promote ethical data use, and encourage critical thinking alongside AI-assisted learning. Teachers and learners must navigate these challenges to optimize the benefits of GenAI, fostering environments where technology enhances, rather than replaces, independent problem-solving and critical thinking skills.

To sum up, GenAI-mediated IDLE represents a transformative opportunity for English language education in the digital era. Blending autonomous learning with advanced AI features enables learners to engage in meaningful, tailored learning experiences that align with their interests and needs. However, realizing its full potential necessitates careful consideration of its limitations and challenges. Teachers must design inclusive, ethical, and balanced teaching and learning ecosystems to ensure that GenAI is a powerful language-learning tool to foster students' learning outcomes.

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More than Meets the Eye with Hypertext and Paper-Based Reading: An In-Depth Comparison

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Introduction

Students today spend more time using their computers, laptops, tablets, and other diverse technological devices than before. Moreover, there is mounting evidence that students nowadays read articles, short stories, poems, books, and other reading materials on digital screens more than before (Baron, 2013; Taky-eddine & Madaoui, 2022). Hypertexts, also called electronic texts or online written materials, can incorporate hyperlinks, audios, videos, and/or animations (Yankelovich et al., 1988). The World Wide Web is the widely used hypertext to obtain information in varied subject fields in the twenty-first century (Spires & Estes, 2002).

Additionally, hypertext reading has been promoted as an alternative to paper-based reading by the ongoing integration of ICT in learning and teaching. The mounting efforts by educational systems worldwide to integrate Information and

Communication Technology (ICT) in schools and universities have made technology a priority in empowering education. In fact, the integration of ICT in education redefines the role of teachers, whose roles become facilitators and guiders to diverse digital content. Hypertexts, which characterize reading digital content, have transformed how knowledge is accessed, shared, and retained. Moreover, since the Coronavirus pandemic, ministries of education worldwide have made considerable efforts to equip schools and universities with ICT equipment and provide students with free access to online learning platforms and courses.

Considering the points discussed above, the increasing dependence on technology in education and the advancement in using digital inventions for learning and accessing information have made students experience more hypertext reading than before. Although hypertext reading is likely to dominate the future of reading in the coming decades and thus transform how readers approach information, little is known about its traits and how readers interact with it. In fact, this phenomenal shift from paper-based texts to hypertexts begs the following questions: do readers read hypertexts the same way they read paper-based texts? Is navigating hypertexts equivalent or different from flickering printed pages? How exactly do hypertexts change the way readers read? These questions are exceptionally critical inquiries that need examination to understand the changes readers undergo nowadays. To offer insights into these questions, this review examines the main traits that distinguish hypertext reading and, at the same time, provides an in-depth comparison between it and paper-based reading.

Hypertexts are Nonlinear

The first prominent trait that characterizes hypertexts is that they are nonlinear. Hypertexts can be read in multiple sequences; therefore, they are described as nonlinear and non-sequential (Nielsen, 1990). This, however, does not mean that hypertexts are random or unplanned. Instead, the term nonlinear suggests hypertexts can be read in more than one single sequence. As previously defined, hypertexts are blocks of electronically connected texts via links (Delany & Landow, 1994). Thus, readers can read the text non-linearly by choosing and ordering information according to their purposes and motives. Put differently, unlike paper-based textual content in

which information is linearly structured into sentences, paragraphs, and chapters that readers follow from beginning to end, the hypertext environment provides readers with multiple pathways that they can follow differently and freely (Nielsen, 1995; Stalin, 1990).

However, Protopsaltis (2006) asserted that ascribing nonlinearity only to hypertexts can somehow be both misguided and misleading. In fact, reading paper-based texts can also be nonlinear, for they contain some nonlinear traits such as tables of content and indexes that entitle readers to locate and read the requested information without going through the entire textual content linearly. Furthermore, not all paper-based texts necessitate readers to follow a predefined order to make sense of the reading material. For instance, reading magazines, newspapers, and dictionaries allows readers to skip or read in their chosen order. In this regard, Platteaux (2008) pointed out:

> Text structuring tools play a central role in the concept of nonlinearity. On the one hand, they break the linearity of a text by proposing links to other text passages. On the other hand, they support the nonlinear reading activity of the reader who can activate or not the proposed link, according to his navigation aims. (p. 204)

In this quotation, Platteaux (2008) indicated that nonlinearity is restricted to how readers interact with the hypertext vis-à-vis paper-based texts and not how information is stored. In this way, a reader can linearly read hypertexts if he/she chooses to follow one node after the other in a linear, sequential order and can read paper-based texts in a nonlinear manner if s/he chooses to jump from one title to another. Accordingly, the fact that hypertexts contain multiple links (paths) that readers can interact with freely and differently can also make them linear. In other words, despite being described as naturally nonlinear, some readers can still interact with hypertexts linearly and sequentially (Luzón et al., 2010).

Notwithstanding, what makes hypertexts nonlinear, par excellence, is that they are structured to enable readers to access multiple electronic links and other multimedia

information (Hua, 2012). The embedded traits of hypertexts enable readers to establish their pathways through various nodes in a non-sequential manner (Coiro & Dobler, 2007). That is, while paper-based texts are written to be read in sequential order, hypertexts are designed to be read in a multi-directional order (Bolter, 1991). In this regard, Landow (1992) addressed hypertext readers as follows: "You have chosen your reading path - and since you, like all readers, will choose individualized paths, the hypertext version of this book might take a very different form in your reading, perhaps suggesting the values of alternative routes." (p. 7).

Briefly, nonlinearity is the main trait that features hypertexts. Contrary to static texts that are fixed in a sequenced order, hypertexts offer multiple options (embedded links) that readers interact with to construct their own meaning (Coiro & Dobler, 2007). That hypertexts offer more optional content leads us to the next trait, which revolves around readers' accessibility to hyperlinks.

Hypertexts have Access to Electronic Links

As stated before, hypertexts permit readers to click on links, pop-up windows, or bold words to access different information, including texts, pictures, tables, diagrams, or multimedia content (audio or video). To illustrate, the famous free online encyclopedia Wikipedia (see the figure below) is a typical example of a hypertext that students widely employ to look for school-related information. According to Selwyn and Gorard (2016), 87.5% of students report using Wikipedia for their academic work. Furthermore, online connectivity enables readers to access further links within the same hypertext and simultaneously navigate through other hypertext web pages for supplementary information.
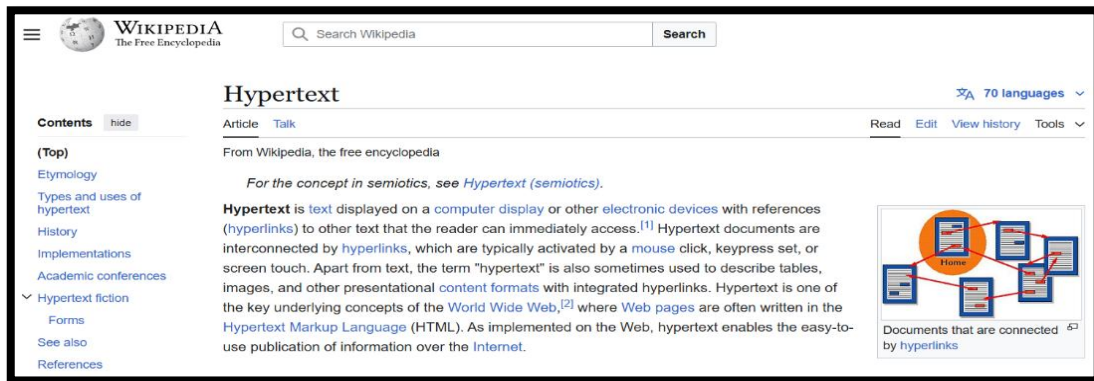
Figure 1. Screenshot source: Wikipedia. (2024), Wikipedia, the free encyclopedia

Retrieved October 30, 2024, from: https://en.wikipedia.org/wiki/Morocco/wiki/Hypertext

Contrary to classical reading, which (Mangen, 2008) described as "a static and fixed perceptual phenomenon does not provide us with options for attentional switching" (p: 410), hypertext readers enjoy the freedom to click on diverse links and switch to other web contents. However, critics warned that access to endless electronic links makes readers more vulnerable to various stimulations that distract and scatter their attention (Mangen, 2008). In this regard, Foss (1989) talked about the "Art Museum Problem" through which he analogized between gazing at too many paintings in a museum and navigating through a hypertext containing multiple stimulating links. That is, Foss believes that cognitive processing requirements imposed by navigating hypertexts are akin to being unable to remember or examine a particular painting when too many paintings are presented at once. Psychologists assert that we are naturally inclined to lose focus quickly as our interest and excitement fade. In this regard, Tversky and Kahneman (1974) pointed out that our attention naturally prefers new, engaging, or unanticipated information, thus making it hard to focus on monotonous or ordinary tasks.

> The natural tendency of attention when left to itself is to wander to ever new things; and so soon as the interest of its object is over, so soon as nothing new is to be noticed there, it passes, in spite of our will, to something else. If we wish to keep it upon one and the same object, we

must seek constantly to find something new about the latter, especially if powerful impressions are attracting us away (Carroll, 2003, p. 29).

The numerous and diverse hyperlinks embedded in hypertexts encourage readers to leap from one link to another to revive their attention, maintain interest, and suppress boredom. Hence, with such temptations, it might take considerable effort for hypertext readers to remain focused on what they read. This distraction or the phenomenological experience of "being neither here nor there" - as Ben-Shauld (2004) called it - results from readers' realization of their accessibility to countless links to other nodes, new websites, multimedia content, and/or other stimuli at hand. In other words, readers' attention is split between constructing meaning from the written text and their knowledge of options offered by the hypertext. As a result, hypertext readers are more likely to find themselves subject to clicking on links and switching to other hypertexts or multimedia content. In this respect, Ben-Shauld (2004) asserted that:

> The split attention of the viewer/user between what he/she cognitively constructs from what's going on in front of him/her, and his/her constant awareness to what may potentially lie at stake in options made available by behaviorally changing the course of events... In all of these experiences the behavioral option is restlessly often activated, resulting in the user/viewer being neither here nor there. (p: 157)

In this respect, Mangen (2008) analogized reading screen-based texts to watching TV. The common reflex of TV viewers as they start losing interest and getting bored with a channel's content is deviating attention to another TV channel to substitute the old, fading stimulus with a new, interesting one. By the same token, readers of hypertexts are predisposed to quickly lose interest, especially since they are aware that numerous new stimuli are at hand. Accordingly, using the remote control to switch from one channel to another becomes akin to using the mouse, the touchpad, or the screen to jump from one link to another.

Likewise, Carr (2011) blamed hypertexts for stimulating readers to bounce from one hyperlink to another without being capable of processing information deeply. He also made a similar analogy to Mangen's when he analogized reading hypertexts to zipping

along the surface with a Jet Sky. Carr stated in this regard that once he was a scuba diver in the sea of words, but now he zips along the surface like a guy on a Jet Ski. Carr used this analogy to show the transformation in his reading experience, which was deep and focused on paper and now is becoming shallow and rapid on digital devices.

Similarly, Coiro et al., (2008) asserted that superficial, unfocused reading is the greatest challenge that typifies hypertext reading. The fact that most digital reading devices are connected to the Internet makes readers more vulnerable to distracting stimulations, which increases the dangers of multitasking and poor reading performance (Burak, 2012). In short, the availability of the Internet and web links that readers may encounter in hypertexts make readers easily distracted and their attention more likely to be scattered.

Notwithstanding, describing hypertext reading as shallow and unfocused and analogizing it to jet skiing or TV viewing is a sweeping generalization. Hypertexts indeed contain multiple hyperlinks that make browsing one of their main traits, yet still, it is also true that readers can browse while reading paper-based texts. Ascribing some reading ills such as shallow, unfocused, or distracted reading exclusively to hypertexts might put the whole blame on the reading device, overlook readers' active role, and picture them as helpless victims of the reading device. Contrariwise, the availability of embedded hyperlinks can encourage readers to investigate their own reading path, become actively engaged with the text, and boost their cognitive flexibility (Spiro et al., 1991). As for the problem of multitasking, Prensky (2001) stated that, through practice and interaction, digital natives have developed cognitive skills to successfully play new roles in reading hypertexts. In light of this, the following section examines new roles that distinguish readers in the hypertext environment to deepen our understanding of this issue.

Hypertexts Entail New Roles for Readers

As stated earlier, hypertexts are characterized as being nonlinear, allowing readers to take multiple paths to navigate the text. Accordingly, readers' interaction with the

hypertext differs from one reader to another depending on their interests, needs, and purposes. Thus, hypertext readers navigate, explore, build, and make sense of what they read not necessarily according to writers' plans but rather to their own plans (Murray, 1997). Murray further declared that by selecting, exploring, and organizing their own paths through the hypertext, readers participate in recreating new texts and exercising agency. Therefore, hypertexts changed not only the way texts exist but also how readers read these texts (Landow, 1992).

Stalin (1990) distinguished three roles readers can play while reading hypertexts: the browser, the user, and the co-author. To begin with, the browser is the most common description associated with readers of hypertexts due to the reading process of shifting attention from one node to another (navigation). Stalin affirmed that the browser reads hypertexts with no pre-determined objective in mind. Readers, hence, purposelessly jump from one hyperlink to another without essentially reading the whole text in the node. In fact, this reminds us of Carr (2011) and Mangen (2008) who criticized hypertexts for inducing readers to bounce from one hyperlink to another without being capable of deeply processing information. Besides, according to many researchers (e.g., Lawless & Kulikowich, 1996, 1998), the fact that hypertexts are characterized by browsing to explore and find the required information has made hypertext reading more time-consuming than paper-based reading. The role of browser-readers was also called apathetic hypertext readers (Lawless & Kulikowich, 1996, 1998); these readers arbitrarily browse hypertexts without necessarily applying logical strategies or following a meaningful sequence.

Additionally, the second role readers can play while reading hypertexts, according to Stalin (1990), is that of a user, also referred to as a "knowledge seeker" (Lawless & Kulikowich, 1998). This role demands readers to scan hypertexts purposefully to find the information they want. Thus, readers know their reading objectives, plan to achieve them, and finish reading when they achieve them (Slatin, 1990). In other words, while playing the role of a user, readers of hypertexts employ reading strategies to navigate and locate the required information in a planned and organized way (Lawless & Kulikowich, 1996).

Furthermore, the third new role that features hypertext readers is that of being a co-author. According to Landow (2006), this role permits and encourages readers to comment, contribute and react to the information in the hypertext by communicating their information, opinions, and ideas with both the author and its readers. In other words, in addition to the freedom that permits readers to choose their reading path through hypertexts actively, Web 2.0 technologies such as blogs, social networks, and wikis allow users to share, react and contribute to the websites' content (Guntram, 2007).

In fact, Web 2.0 tools have been widely used in educational settings to create an extra flexible learning environment that enables students to actively and responsibly publish, share, develop, edit, evaluate, reuse and comment (Guntram, 2007). In this regard, Landow (1992) pointed out that "although you cannot change my text, you can write a response and then link it to my document" (p. 7). However, it is essential to note that not all hypertext systems were developed to provide such options. In other words, unlike the Web 2.0 environment that allows readers to read and write, early hypertext systems (Web 1.0) do not allow their readers to react to the text (Greenhow et al., 2009).

Hypertexts are Screen-based

The most obvious trait that characterizes hypertexts is that they are screen-based. Contrary to paper-based reading, which necessitates readers to sequentially flicker through printed pages from top to bottom and front to back, hypertext readers are involved in clicking, scrolling, and interacting with screen-based textual content (Chen, 2009). In fact, the physical dissimilarity and the intangibility of textual materials in the two reading formats have triggered both criticism and support from researchers in the field.

To start with, critics consider the intangibility of hypertexts to result in readers' detachment from the text, which negatively influences their immersion and engagement with the text (Coiro et al., 2008). In this regard, Mangen (2008) affirmed that screens, such as computers, smartphones, or e-readers, create a gap that disunites

a direct connection between the reader and the text. Mangen further proclaimed that - Unlike the sense of detachment that can arise from the clicking and scrolling involved in reading on digital platforms –printed texts are "physically and functionally unitary object where content cannot be distinguished from material part" (p: 408). Similarly, Baron (2013) declared that the loss of the physical feeling of textual materials has a significant impact on readers:

> It's not a book. It doesn't have a smell, you don't touch it…, you're plugged into the Internet, you can't concentrate, it hurts your eyes, and you lose the beauty of the words behind this screen. Life itself is in hard copy. … Not this treacherous digitalism, which has permeated our lives and our reality. (p. 01)

Additionally, different researchers warned against the negative effects of the screen on readers' well-being. Baron (2013), for instance, considered eyestrain, headaches, sensitivity to light, and eye discomfort as some of the symptoms that readers often suffer from while reading onscreen. Other researchers (e.g., Spencer, 2006; Baron, 2013; Liu, 2006) indicated similar onscreen reading drawbacks such as (1) adverse health effects such as neck pain, headache, and eyestrain, (2) absence of physical holding of the reading material, (3) loss of focus and increased likelihood to multitasking, (4) difficulties in highlighting, underlining, and jotting down notes. Likewise, Taky-eddine and Madaoui (2022) cautioned about several drawbacks students face while reading onscreen. These include cognitive and health drawbacks, such as multitasking, slow reading, unfocused reading, neck pain, headache, and eyestrain.

Notwithstanding conservatives' criticism, the actual situation shows that the shift towards hypertext reading is rapidly growing, especially with the proliferation of digital devices and new information access, such as AI. Contrary to the critics, advocates of hypertext reading conceive the shift from paper to screen as having numerous benefits. Coiro (2003), for instance, described screen-based texts as having three main traits missing in the paper-based ones: nonlinearity, interactivity, and multiplicity of text structures. These traits allow and encourage readers to investigate

their own reading path, become actively engaged with the text in personally relevant ways, and boost their cognitive flexibility (Spiro et al., 1991).

Other advocates of screens, such as Prensky (2001), stated that young readers, who are digital natives, have a natural inclination and cognitive abilities that enable them to engage successfully with hypertexts more than static, conventional ones. More interestingly, Baron (2013) advocated screen-based texts for being environmentally friendly and practically portable. One digital device lowers paper consumption by holding countless eBooks, PDFs, and Word documents that can be carried effortlessly anywhere and anytime.

To summarize, the fact that hypertexts are screen-based prompted a heated debate on the pros and cons of screens on readers. Nevertheless, despite its limitations, hypertext reading is obviously not a phenomenon that today's readers can do without. In fact, the shift from paper to screen is evolutionary and inevitable (Rose, 2011). Therefore, a more productive approach to dealing with the "paper-vs.-screen" debate is to refrain from viewing one as better or favouring one while opposing the other. Alternatively, a more constructive standpoint is to perceive this debate in a complementary approach. An approach that embraces technological changes, provides more learning opportunities for readers, and trains them to use effective reading strategies to obtain optimal advantages of the screens. Put differently, the goal should not be to make readers afraid of or avoid digital screens; rather, it should be to inform and empower them to maximize the benefits of hypertext reading in an age characterized by the constant spread of digital screens.

Conclusions and Recommendations

The World Wide Web is the widely used hypertext to obtain information in varied subject fields in the twenty-first century (Spires & Estes, 2002). Thus, students find themselves required to comprehend information presented in different hypertext structures and probably utilize more or new reading strategies to compensate for the inherent difficulties of the hypertextual environment. This review discussed four key traits that distinguish hypertext reading from paper-based reading. Hypertexts are

nonlinear, screen-based texts embedded with multiple electronic links, and entail new reading roles. From this perspective, 21st-century teachers should be aware of the changes and challenges their students experience when reading in the hypertext environment. Also, research in hypertext reading should continue providing knowledge and recommendations for enhancing students' comprehension of hypertexts.

To begin with, the multiplicity of links in the hypertext environment stresses the need to develop students' critical thinking skills to evaluate information on the World Wide Web. In fact, it became crucial for students to be able to navigate, integrate, and evaluate the required information from multiple hypertext structures. Thus, students are required not only to comprehend information presented in different hypertext structures but, more crucially, to develop critical thinking skills to determine the quality, accuracy, and credibility of the information on the WWW. This can be attained by training students to identify credible and trustworthy sources of information and examine the authorship, publication date, and references on the WWW.

On the other hand, hypertexts provide the perfect reading and learning educational environment. In contrast to the straightforward manner in which paper-based texts are read, Cognitive Flexibility Theory (CFT) recommends complex learning environments, such as the hypertext reading environment, for such environment encourages active construction of knowledge rather than passive consumption of knowledge products (Spiro et al., 1991). To illustrate, unlike paper-based texts that participants had to read linearly, hypertext readers can/must choose their reading path freely and maintain coherence between links, contributing to cognitive flexibility. Nevertheless, as already stated in this review, additional cognitive demands and access to endless electronic links can make readers more vulnerable to various stimulations that distract and scatter their focus. Therefore, comparing and understanding the strengths and weaknesses of hypertext reading is crucial for not only keeping abreast of recent developments in the field of reading but also for preparing students for future challenges of innovative reading and learning environments.

Furthermore, the fact that hypertexts entail new roles (browser, user, and co-author) requires fostering students' self-directed learning. In fact, teaching students to become autonomous, independent readers and develop responsibility for their own learning are the foundation for students' progress and success through high school, University, and occupational fields. Therefore, educational systems should embrace the opportunities of the World Wide Web to foster independent learning and reading. To this end, schools need to adopt and promote a learner-centred approach to teaching that can instill and nurture an independent reading and learning culture among students. Also, educational systems should work towards suggesting programs and/or courses that intend to ameliorate students' control of their own reading to become independent readers and learners.

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Virtual Reality Simulations in English Teachers' Pedagogical Practices: Systematic Literature Review

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Introduction

Virtual Reality (VR) simulations have emerged as a transformative educational resource, providing innovative approaches for educators to captivate students and improve their learning experiences. The immersive environments crafted by VR enable educators to develop realistic scenarios that enhance interactive learning, allowing students to practice language skills in authentic contexts and enrich their understanding through experiential activities. With the increasing adoption of VR technology in educational settings, it is crucial to investigate the impact of these simulations on teaching methodologies and their role in enhancing pedagogical approaches, especially in language instruction.

This paper seeks to synthesize existing research on applying VR simulations in English language instruction, emphasizing the advantages and obstacles educators encounter in this developing area, as noted by Ozkan (2017). Although VR provides engaging learning experiences, its integration into education faces numerous challenges, including restricted resources and differing degrees of technological skill among educators (Lawrence & Ahmed, 2020). It will examine the benefits and challenges of VR and investigate how it can improve student engagement and motivation in language learning. The immersive learning environments offered by VR enhance language comprehension and retention (Pan et al., 2021), highlighting the crucial influence that heightened engagement and understanding exert on student learning outcomes.

This paper offers insights into the effective implementation of VR and provides practical guidance for educators and educational institutions looking to integrate VR technology into their English language teaching practices (Li et al., 2021). As VR becomes increasingly integrated into education, it is essential to explore strategies to support the transition for instructors and students alike. This encompasses the training of educators, the creation of suitable curriculum materials, and the assurance that every student has fair access to this technology, irrespective of their background or learning environment (Tschanz & Baerlocher, 2022). It can pinpoint optimal strategies for equipping educators with the skills to effectively utilize VR, create pertinent curriculum resources, and guarantee that technology is accessible in various educational environments. The primary objective is to incorporate VR in manners that improve student involvement and educational results in English language teaching. Furthermore, it is essential to consistently assess the effects of VR experiences on language acquisition by collecting input from educators and learners to guarantee continuous enhancement in the integration process.

Partnerships between technology creators and educators will be essential in developing VR resources that are both captivating and educationally sound. Through the establishment of strong collaboration between the two parties, educational institutions can fully leverage the capabilities of VR to develop tailored and meaningful learning

experiences for varied student groups while simultaneously enhancing their comprehension of intricate topics. This iterative and collaborative approach aims to integrate VR into English language instruction, aligning with educational standards and responding to the evolving needs of students in a dynamic learning environment (Andrade, 2022). Therefore, the key research questions are as follows:

1. How do VR simulations modify the instructional methodologies of English language educators?

2. What is the teacher's perspective on the efficacy of VR simulations in improving their teaching methodologies?

Methodology

Process of Study and Literature Search

The systematic review included peer-reviewed journal papers that fulfilled all inclusion criteria. A preliminary scoping analysis identified seven databases, relevant keywords, and search terms suitable for inclusion in a systematic literature review. The literature search employed a straightforward method utilizing keywords. The study identifies virtual reality as a pedagogical tool for enhancing experiential learning. Consequently, search terms such as "virtual reality as a pedagogical tool" and "virtual reality for teaching English" were utilized in Google, Google Scholar, InterDok, ProQuest, Scopus, Semantic Scholar, and SearchPlus. Through this search, 41 articles were identified, from which the 12 most relevant articles were selected for this review.

Selection Process and Inclusion Criteria

A total of 41 articles were identified in the search results, of which 12 were selected for further analysis. The selection of the 12 articles was based on the relevance of virtual reality as a pedagogical tool and its application in teaching English. From 2020 to 2024, articles from reputable and established publishers were selected, excluding conference papers, theses, and reports.

Results and Discussion

Incorporating Virtual Reality (VR) in English language instruction demonstrates considerable potential to improve learning outcomes in diverse educational settings. Virtual reality fosters enhanced engagement and practical language application through the creation of immersive and interactive environments, effectively overcoming the limitations commonly associated with traditional methods. Virtual reality can replicate authentic language scenarios, enabling learners to engage in contextual practice, thereby enhancing comprehension and retention (Sabadosh & Baranovska, 2024).

Tabel 1. Systematic literature review

Author and year	Main Findings	Limitation
Yuseon et al., 2024	- The relationship between virtual reality and English language acquisition is notably beneficial. - A meta-analysis involving 461 participants from six studies was performed to validate academic achievement in VR-based English education. The authors conducted a systematic review of the literature on VR-based English education, analyzing different facets of the studies.	Not mentioned
Peixoto et al., 2021	- The correlation between immersive virtual reality and foreign language acquisition is notably advantageous, especially in contrast to traditional educational methods. - The relationship between immersive virtual reality and user motivation and pleasure is notably favorable. - The study highlighted limitations, including a limited number of studies and gaps in the literature, and offered recommendations for future research and advancements in this field.	- Insufficient sample size of the evaluated research - Deficiencies in the literature about this subject - Absence of detailed information on the particular studies and their techniques

Parmaxi, 2023	- Virtual reality is an indispensable instrument for language acquisition; nonetheless, it encounters obstacles related to technological setup and educational foundation. - Recent evaluations particularly addressing the use of VR in language acquisition are scarce, notwithstanding the existence of general reviews on the educational utilization of VR.	- Technical configuration challenges of VR in language learning - Pedagogical grounding challenges of VR in language classrooms - Necessity for further research and implications for researchers and practitioners
Pinto et al., 2021	- Over fifty percent of the analyzed research indicated that virtual reality technology including gaming tactics can facilitate foreign language acquisition. - The predominant dependent variable examined was "learning," the major technology utilized was augmented reality, the most often explored educational levels were primary and lower secondary, and the most prevalent language studied was English. - The authors advocate for the utilization of virtual reality and gaming to complement, rather than wholly supplant, conventional second language acquisition methods.	Not mentioned
Bahari, 2022	- The evaluation identified a greater volume of research on the application of virtual reality for teaching listening and speaking abilities than for reading and writing skills. - The review systematically categorized the data about the advantages and obstacles of employing VR for language acquisition across several linguistic competencies (listening, speaking, reading, writing). - The review presented pedagogical implications for educators on the advantages of utilizing virtual reality to teach language skills, with consequences for improving digital language pedagogy.	Not mentioned

Ece et al., 2023	- Virtual reality technologies substantially enhance student performance in English as a foreign language (EFL) instruction. -The evaluation was confined to the EFL setting, and subsequent research should investigate the application of VR in other language learning environments.	- The evaluation is limited to the EFL (English as a Foreign Language) setting and excludes the application of VR in other foreign language learning environments. - The evaluation just discusses future work directions, without detailing what those directions include.
Hamilton et al., 2021	- The majority of research identified a notable benefit of employing immersive virtual reality (I-VR) in education relative to non-immersive approaches. - A limited number of research indicated no substantial disparities in learning results between I-VR and non-immersive approaches. - Merely two investigations identified unequivocal adverse effects associated with the use of I-VR.	- Brief intervention durations in the analyzed studies - Absence of evaluation on long -term information retention - Concentration on select academic disciplines (e.g., biology, physics) - Insufficient methodologies employed to measure learning outcomes in the analyzed research - There is a necessity for more stringent research incorporating suitable evaluation metrics, intervention attributes, and educational results.
Esteves et al., 2023	- China and Taiwan exhibited the biggest volume of papers concerning iVR applications for English language acquisition. - The visual and aural senses were predominantly utilized in the examined iVR applications, whereas touch and proprioception were engaged to a lesser degree.	- The suggestions are exclusively derived from a systematic literature study; future research incorporating interviews with VR specialists may yield fresh insights and facilitate amended recommendations.
Altun, H. K., and Lee, J., 2020	- Vocabulary was the primary focus for Augmented Reality, whereas speaking was emphasized for Virtual Reality. The analysis highlighted the benefits and obstacles related to the implementation of immersive learning technology in English Language Teaching (ELT).	Not mentioned
Adams et al., 2021	- The research performed a thematic analysis of the current literature about the application of virtual reality (VR)	Not mentioned

	in education across many disciplines. - The researchers employed the activity system (AS) paradigm to examine the literature and examples, aiming to elucidate the intricate connections between VR technology and the human learning process. - The research offers recommendations for instructional design and implementation of VR in education, grounded in the activity system framework insights.	
Pataquiva and Klimova, 2022	- Virtual Reality (VR) and Augmented Reality (AR) technologies enhance second language (L2) acquisition more effectively than conventional learning techniques. - Virtual Reality (VR) and Augmented Reality (AR) can facilitate second language acquisition for students throughout a spectrum of skill, from novice to expert levels. - Improvements were observed just in listening and reading skills, whereas speaking and writing skills were unaffected by the usage of VR and AR.	- Limited sample sizes - Brief study duration - Minimal engagement with the technology, often restricted to a single session - Absence of follow-up assessments to evaluate long-term learning outcomes - Excessive dependence on quantitative data - Possible novelty effects stemming from the innovative nature of VR/AR technologies.
Lampropoulos and Kinshuk, 2024	- Gamification and virtual reality enhance many educational theories and methodologies, and their incorporation into education can improve and revolutionize conventional teaching and learning, receiving favorable evaluations from both students and educators. - Gamification aspects substantially influenced pupils' performance. - Gamified virtual reality learning environments provided more motivation, engagement, and interactivity for students, as well as enhanced options for individualized and collaborative learning in contrast to traditional classroom settings.	- The study encompassed a wide scope, imposing no restrictions on educational level, study kind, topic matter, or publication year. - The quality of the included studies was assessed using the MMAT, which may be regarded as a restriction for the overall quality of the examined data. - The study examined several outcomes, encompassing student attitude, behavior, mentality, and cognitive, physical, and social-emotional development, which may serve as a strength but also provide a possible constraint regarding the depth of analysis for any one result.

Virtual Reality as a Pedagogical Tool

Numerous studies underscore the revolutionary potential of VR in improving English language acquisition and teaching approaches. Yuseon et al. (2024) emphasize the significantly advantageous correlation between virtual reality and language acquisition, substantiated by a meta-analysis including 461 participants that confirm academic success in VR-based education. Peixoto et al. (2021) highlight the benefits of immersive VR compared to conventional approaches, associating it with heightened user motivation while also acknowledging drawbacks such as inadequate sample sizes in current studies. Parmaxi (2023) recognizes virtual reality as crucial for language acquisition; however, obstacles are encountered with technology infrastructure and educational principles. Pinto et al. (2021) endorse the utilization of virtual reality and gaming as supplementary instruments in language acquisition rather than substitutes for traditional approaches. The analysis effectively argues for VR as a significant educational tool, notwithstanding the research deficiencies and practical obstacles that require more investigation. Future research should concentrate on bridging these gaps by investigating bigger sample sizes and establishing standardized frameworks for the efficient integration of VR into language learning curricula. Elaborating on these elements would not only augment the credibility of study outcomes but also provide educators with practical insights into optimal strategies for employing VR in varied educational settings. Incorporating VR technology into language education may provide immersive experiences that include students in authentic situations, therefore improving their conversational abilities and cultural comprehension. Through the simulation of genuine encounters, virtual reality may connect theoretical understanding with practical application, equipping students to confidently address real-world communication issues. This novel method fosters active learning and facilitates peer cooperation, enabling students to refine their language abilities in a friendly and dynamic environment. Collaborative settings can enhance motivation and retention since learners are more inclined to engage thoroughly with the topic when they perceive themselves as part of a community. This sense of belonging can motivate

students to take chances in their language usage, ultimately resulting in enhanced fluency and competency as they navigate various linguistic environments collectively.

It is essential to recognize the complex role of virtual reality in language acquisition. A significant benefit of VR, as indicated by Yuseon et al. (2024), is its capacity to immerse learners in virtual worlds that replicate authentic language usage. This immersion facilitates language acquisition by providing students with genuine, contextual experiences that extend beyond conventional classroom environments. For example, virtual reality allows learners to participate in interactive conversations in many contexts, such as purchasing food in an international restaurant or having business meetings. This experiential learning method corresponds with the tenets of communicative language education, prioritizing practical application above memory. Nonetheless, the meta-analysis conducted by Yuseon et al. (2024) emphasizes the necessity for bigger and more extensive research since their conclusions, while favorable, are constrained by the narrow scope of the six studies incorporated.

Peixoto et al. (2021) emphasize that VR not only enhances engagement but also substantially increases user motivation and enjoyment, hence cultivating a learning environment that promotes active student participation. This involvement is especially pertinent in language acquisition because learner motivation serves as a critical determinant of achievement. Peixoto et al. (2021) emphasize that the research environment is fragmented, characterized by inadequate sample sizes and literature gaps that restrict the generalizability of findings. Parmaxi (2023) highlights the technological and infrastructural hurdles encountered by educators in the use of VR. The lack of standardized technology frameworks in educational institutions sometimes leads to uneven implementation of VR, hence confounding the assessment of its efficacy across various situations. The infrastructure constraints, coupled with insufficient pedagogical guidance on the proper integration of VR into the curriculum, impede widespread adoption.

Furthermore, the results from Pinto et al. (2021) indicate that VR and gamification ought to be utilized as supplementary instruments rather than substitutes for conventional language teaching. This viewpoint is significant, as it frames VR not as

a groundbreaking solution but as an augmentation of current methodologies. The immersive and gamified aspects of VR can stimulate students' intrinsic incentives, enhancing the engagement and enjoyment of the learning experience. Pinto et al. (2021) assert that excessive dependence on VR, without meticulous integration with conventional approaches, may result in superficial learning outcomes, particularly in domains necessitating profound language analysis, such as grammar and syntax.

A persistent problem in several research is the short duration of VR treatments, which, as Hamilton et al. (2021) observe, hinders the assessment of long-term learning retention. In the realm of language acquisition, it is crucial to assess not just immediate engagement but also the long-term retention of vocabulary, grammatical structures, and communication methods by learners. Prolonging the length of VR-based therapies and integrating longitudinal research would yield more definitive insights into the durability of VR-enhanced learning outcomes.

VR Simulations Significantly Modify the Instructional Methodologies of English Language Educators

The use of VR simulations profoundly alters the instructional approaches of English language teachers by improving student engagement, enabling actual language use, and promoting the adoption of varied teaching tactics. Research demonstrates that VR generates immersive settings that enhance motivation and engagement, as evidenced by Peixoto et al. (2021), who identified a positive association between immersive VR experiences and user motivation, beyond that of conventional educational approaches. Moreover, Yuseon et al. (2024) assert that VR facilitates contextualized language practice, enabling learners to participate in genuine conversation situations, thereby enhancing experience learning. This transition prompts educators to integrate established pedagogies with contemporary technology, as asserted by Pinto et al. (2021), who support the use of VR as an adjunct rather than a substitute for conventional approaches. Furthermore, the adaptation of VR to many learning styles requires tailored education, as Bahari (2022) observes that VR applications frequently emphasize the enhancement of listening and speaking abilities. The effective integration of VR highlights the necessity for sufficient professional development to

prepare educators with the requisite abilities to manage these emerging technologies, an issue identified by Parmaxi (2023). The integration of VR in language instruction promotes a more participatory, pragmatic, and learner-centered pedagogical approach. This transition not only improves engagement but also equips students for real-world communication situations, connecting theoretical knowledge with practical practice. The capacity of virtual reality to provide immersive settings enables learners to practice language skills contextually, enhancing the relevance and effect of the learning experience. As educators adopt these revolutionary technologies, continuous research and cooperation will be crucial to enhance best practices and optimize the efficacy of VR in language acquisition. This dedication to ongoing enhancement will guarantee that VR technology develops alongside educational requirements, ultimately revolutionizing language acquisition and cultivating a generation of learners prepared for global communication.

The impact of VR simulations on English language instruction is substantial, indicating that this technology redefines classroom dynamics and necessitates a shift in pedagogical methodologies. Virtual reality creates an immersive learning environment that differs from traditional methods, which emphasize passive knowledge acquisition. Peixoto et al. (2021) highlight that the increased motivation and engagement provided by VR arise from its capacity to actively involve learners, converting them from passive observers into participants in genuine language-use contexts. This paradigm shift necessitates that English language educators reevaluate their roles, transitioning from mere knowledge transmitters to facilitators of meaningful and interactive learning experiences. Virtual reality facilitates a comprehensive learning experience, allowing students to utilize their language skills in contextually pertinent scenarios that reflect real-world communication challenges. Yuseon et al. (2024) indicate that contextualized language practice through VR improves both the comprehension of linguistic structures and the pragmatic application of language. This approach allows learners to understand nuances such as tone, body language, and cultural references, which are crucial for effective communication.

The incorporation of virtual reality in language education necessitates that educators implement a more adaptive and personalized instructional approach. Bahari (2022) indicates that VR tools are frequently developed to address particular language skills, including listening and speaking, suggesting that educators should customize their instructional approaches to accommodate varied student requirements. VR platforms are particularly effective for students who face challenges with traditional language learning methods, as they provide a multisensory and interactive experience that accommodates diverse learning styles. This customized approach poses challenges, especially regarding teacher preparation and professional development. Parmaxi (2023) highlights that the effective implementation of VR necessitates that educators possess both the technological and pedagogical skills required to utilize these tools proficiently. Inadequate training may leave educators unprepared to effectively integrate VR into their curricula, resulting in superficial applications of the technology that do not fully leverage its potential. Professional development and ongoing support are crucial to ensure that VR enhances traditional language teaching methods rather than merely supplementing them.

The integration of VR in English language instruction promotes a student-centered, participatory approach, transitioning the emphasis from teacher-led instruction to collaborative learning environments. Pinto et al. (2021) contend that the integration of gamification elements in virtual reality enhances community and cooperation among learners, enabling them to practice language skills in group environments that replicate real-world social interactions. The collaborative aspect enhances linguistic competency and builds students' confidence and social skills, which are essential for effective communication. The immersive characteristics of VR facilitate experiential learning, enabling students to participate in role-playing activities or problem-solving tasks that necessitate the use of the target language in significant contexts. This active involvement facilitates the connection between theoretical knowledge and practical application, enhancing the learning experience.

The Teachers' Perspectives on the Efficacy of VR Simulations

The perspectives of teachers regarding the effectiveness of VR simulations in enhancing their teaching methodologies indicate a complex but predominantly favorable view, as evidenced by systematic reviews.

Parmaxi (2023) observes that teachers regard VR as a crucial instrument for language acquisition; however, they face challenges concerning technological infrastructure and the necessity for enhanced pedagogical frameworks. This indicates that educators acknowledge the transformative potential of VR while also highlighting the necessity of adequate training and support for its effective integration into instructional practices. Peixoto et al. (2021) demonstrate that teachers view immersive VR experiences as significantly beneficial, especially in improving student motivation and engagement relative to conventional methods. This is consistent with the findings of Yuseon et al. (2024), who demonstrate that VR's capacity to enhance contextualized language learning and practical application is viewed favorably by educators.

Bahari (2022) notes that current research predominantly emphasizes the development of specific language skills, such as listening and speaking, rather than offering a comprehensive understanding of the broader implications of VR for teaching methodologies. This indicates that educators might possess a constrained view of the comprehensive advantages and difficulties linked to the incorporation of VR into their methodologies.

Systematic reviews indicate that teachers perceive VR simulations as effective for enhancing language instruction. However, they highlight the necessity for strong technological support, pedagogical training, and a comprehensive understanding of the application of these technologies across different language domains.

An analysis of teachers' perspectives indicates a complex understanding of the potential for VR simulations to improve instructional methods, reflecting both optimism and concerns regarding its implementation. Parmaxi (2023) indicates that educators perceive VR as a transformative tool for language acquisition; however, they frequently face substantial barriers concerning technological infrastructure and

pedagogical frameworks. These challenges indicate that, despite positive perceptions of VR's advantages, many educators feel inadequately prepared to effectively incorporate these tools into their instruction. The constraints of technical support within educational institutions and inadequate training programs contribute to the disparity between acknowledging the potential of virtual reality and its effective implementation in practice. The situation is exacerbated by the absence of clear guidelines for teachers on adapting traditional methodologies to VR-enhanced lessons, potentially resulting in fragmented or inconsistent application of this technology in educational settings.

Peixoto et al. (2021) emphasize that teachers recognize VR's potential to enhance student motivation and engagement. However, most research primarily examines the short-term effects of VR on student performance, neglecting its long-term implications for teaching methodologies. This aligns with Bahari's (2022) findings, which indicate that the current literature predominantly focuses on the development of specific language skills—mainly listening and speaking—rather than examining the wider impact of VR on pedagogical approaches. This emphasis on particular competencies may restrict teachers' understanding of how VR can enhance various aspects of language learning, including reading, writing, and grammar instruction. The absence of extensive research regarding the integration of VR into a comprehensive language curriculum may result in uncertainty among educators about how to fully utilize its potential across various language domains. Teachers acknowledge the immediate benefits of virtual reality in enhancing student motivation and fostering immersive learning environments. However, they necessitate additional research-based guidance and institutional support to effectively integrate these technologies into their pedagogical practices.

Conclusion

The incorporation of virtual reality (VR) in English language education signifies a significant development, with the potential to improve teaching methods and student learning results. Multiple studies, including those by Yuseon et al. (2024) and Peixoto

et al. (2021), indicate that VR enhances student motivation and engagement by providing immersive experiences that support contextualized language practice. This enhances the learning environment and promotes active participation, enabling learners to engage with real-world communication scenarios more confidently and competently.

The implementation of VR in educational settings presents several challenges. Educators acknowledge the necessity of a strong technological framework and thorough pedagogical training to successfully incorporate VR into their instructional methods.

Educators typically view VR positively; however, there is a clear necessity for further research to overcome existing limitations, including small sample sizes and a narrow focus on particular language skills. Future research should focus on developing standardized frameworks to enhance the integration of VR in language acquisition across various educational contexts. This dedication to ongoing enhancement will improve the effectiveness of VR tools and ensure their evolution in response to the changing requirements of language learners. Embracing VR technology enables educators to establish dynamic, collaborative learning environments that equip students for global communication, thereby transforming the field of language education.

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Chapters

Influence of Generative Artificial Intelligence on Blended Learning and Research in Institutions of Higher Education: Opportunities and Risks

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The Convergence of AI and Blockchain for Global Change

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Introduction

Artificial Intelligence (AI) is becoming a pervasive entity in modern developed societies. It is a significant factor in marketing, design, and entertainment, and is also increasingly present in institutions of higher learning. Many AI systems exist and are operating behind the scenes in large numbers affecting a variety of aspects in current civilization. According to Daniel *et al* (2024), a major development in AI occurred in the year 2022 when the San Francisco-based company OpenAI released to the public their Chat Generative Pre-Trained Transformer (ChatGPT). ChatGPT is classified as a Large Language Model (LLM) Chatbot that leverages Natural Language Processing (NLP) to create human-like responses to users' prompts. The study further argued that new technology has already had a significant impact on the education industry and has prompted an upward surge of other numerous generative AI tools. While only a few flagship smartphones can currently be considered GenAI phones, the uptake across the globe has registered a slow growth. Apple company is expected to add generative AI

features to some existing iPhones, meaning Apple could soon be the company that has the highest number of GenAI phones on the market despite having precisely none today. Counterpoint's research (2024) points indicate that while in 2024 only 11% of smartphone shipments are expected to be GenAI smartphones, by 2027, 43% of all smartphone shipments are expected to be GenAI smartphones. It is also expected that the number of GenAI phones in use in the world will exceed 1 billion devices for the first time.

According to Hu (2023), GenAI such as the ChatGPT tool was rapidly adopted by the general public and reached over 100 million users in the first quarter after its public release, hence making it one of its kind and above all the fastest-growing consumer application ever. The ultimate influence of AI cannot be predicted, at least for now. However, a study conducted by Bozkurt (2023) posits that GenAI has the potential to trigger transformative changes across the divide. Scholars from different disciplines including Thurzo, Strunga, Urban, Surovkova, and Afrashtehfar (2023) agree that GenAI is poised to have a more substantial influence than the introduction of electricity during the second industrial revolution era.

While generative AI has the potential to revolutionize education, some challenges need to be addressed. Glaser (2023) identifies some of the challenges such as accuracy and reliability of generated content. The study argues that generative AI models can produce realistic but inaccurate content. It states that it is important to develop mechanisms to ensure the accuracy and reliability of generated content, especially when it is used for educational purposes. The incorporation of generative AI in education increases ethical concerns and challenges which include but not limited to the potential for cheating, plagiarism, and teacher displacement (Al-Smad (2024); Adiguzel, Kaya., & Cansu. (2023); Dwivedi et al., 2023). In response to this concern, Susarla *et al.,* (2023) suggests that it is imperative to develop ethical guidelines to safeguard integrity in education and to educate students about proper ways and good use of generative AI.

Within the field of education at all levels, GenAI tools have recently caused industry-wide concern. Xiromeriti and Newton (2023) for example opine that ChatGPT has

been observed to be able to pass exams in medicine while Monahan, & Schwarcz, (2023) observed that the tool is in a position to distinctively answer law questions and English comprehension (de Winter 2023) as well as many other disciplines. On the same breadth, Walczak and Cellary (2023) asserts that AI-enabled tools of this type are not without fault and typically produce illusions that can only be considered as errors with deceptive plausibility and misalignment with truthful information. Regarding their comparative study of the reliability of three LLMs in presurgical planning, decision-making, and patient education, Seth *et al.* (2023) found that Google Bard delivered the most concise and understandable information followed by ChatGPT. Google Bard is an AI Chatbot which has been developed at Google to resemble human-like communication through the use of Natural Language Processing (NLP) and Machine Learning (ML).

When the education sector across the globe was only just beginning to grapple with the implications of GenAI, the current study attempted to ascertain the influence of engaging with GenAI on learning, teaching, and research in institutions of higher education in Kenya. The motivation behind the current study is to help understand the current perspectives of the lecturers with the ultimate goal of helping inform policy direction and begin to identify what best practices might look like when engaging with these emerging technologies. Lectures and students were surveyed regarding their experiences on the topical issue. This outcome of the current study will report on the perspectives observed in the respondents' survey and follow-up interviews to address the research question.

Statement of the Problem

Generative Artificial Intelligence (GenAI) has the potential to revolutionize higher education by offering powerful tools for content creation, personalized learning, and automated feedback. However, this transformative technology also presents significant challenges that require careful consideration. Generative AI is a new frontier for learning institutions. Within the education realm, most of the contemporary discussions occur in higher education and focus on policy development, pedagogy, and new content delivery methodologies. There is a serious lack of relevant studies on

what future education should be, particularly in institutions of higher learning in Kenya. Generative AI tools are emerging, interfering, and disruptive, thus offering opportunities and risks alike. (Yau *et al.,* 2023) argues that lecturers' perspectives are crucial for making sense of any innovative technology for learning, teaching, assessment, and administration. Through an empirical literature review on how generative AI influences education, Angelov *et al*. (2021) highlighted the shocking bias against using digits in numbers within generative AI tools. The key findings of this study show that the most popular numbers generated by generative AI tools like ChatGPT are also the most popular in human preference hence suggesting that there is a thin line between the two extremes. Many of the previous studies that have been done in the past have revolved around the influence of general AI in other critical sectors of diverse economies. Preliminary research has shown that there has been a limited focus on specialized AI technologies and in particular the generative AI tools in education. One of the unique approaches adopted by the current study is the constructivist theory of learning. This theory is employed as a framework to explain the merits of the technology in question. The central problem lies in harnessing the potential of generative AI to enhance learning outcomes in higher education while mitigating the associated risks. This requires a comprehensive approach that addresses ethical considerations, promotes responsible use, and fosters a future where AI complements, rather than replaces, human educators. Integration of GenAI tools into classrooms raises both exciting possibilities and significant challenges. This problem statement explores the multifaceted effects of generative AI on themes such as teaching methods, learning outcomes, assessment practices, academic integrity, and ethical considerations. By examining these questions, the study attempts to propose strategies to leverage the benefits of generative AI while mitigating potential risks. This will ensure that AI fosters a more effective and equitable learning environment for all students in the higher education sector. With this in mind, the current study was conducted to determine the influence of generative AI tools on teaching and learning in institutions of higher learning in Kenya.

General Objective of the Study

The general objective of the study was to determine the influence of generative AI on teaching, learning and research in institutions of higher education in Kenya.

Specific Objectives of the Study

i.   To determine the perspectives of lecturers and students regarding the influence of generative AI on teaching, learning, and research in institutions of higher education in Kenya.

ii. To ascertain the risks of generative AI on teaching and learning in institutions of higher education in Kenya.

Research Questions

i.   What are the perspectives of lecturers and students regarding the influence of generative AI on teaching and learning in institutions of higher education in Kenya?

ii. What are some of the risks associated with generative AI that affect the quality of teaching and learning in institutions of higher education in Kenya?

Literature Review

Theoretical Framework

Constructivist Theory of Learning

Qureshi et al., 2021 argue that the constructivist theory of learning is a widely accepted educational philosophy that significantly influences modern learning and teaching processes and models the traditional and virtual classrooms. The origins of constructivism can be traced back to the scholarly works of Dewey (1929), Bruner (1961), Vygotsky (1962), and Piaget (1980). Li (2022) and Qiu (2019) identify the definition of learning and the approach to learning as the two main essential components of constructivism learning theory. In support of the above statement,

Taber (2011) emphasized that these essential elements should be integrated into an optimal learning environment for students. According to this theory, learning is a dynamic process of knowledge construction shaped by students' needs, learning materials, tools, and the overall learning environment. According to Qiu (2019), it is worth noting that lecturers play a leading role in the teaching process by addressing students' needs, providing relevant learning materials as well as offering helpful tools. Ma and Tsai (2021) found that constructivist education emphasizes self-learning and study, while traditional teaching focuses on acknowledging lecturers' or teachers' experiences. Bada and Olusegun (2015) opine that constructivism is a theory rooted in observing and systematically investigating how individuals acquire knowledge, drawing inspiration from fields such as philosophy, psychology, sociology, and pedagogy.

Makewa (2019) clearly illustrates the relevance of constructivist theory in technology-supported knowledge transfer, be it eLearning or AI-driven teaching and learning. In support of the constructivism approach, Adar and Kandemir (2008) argue that technologies in the learning process enable students to manage their skills and knowledge to decide exactly what they require to address their knowledge gap. With this clarity therefore, the current study concludes that generative AI-powered tools have the potential to facilitate a constructivist learning experience for students in both traditional and virtual classrooms by enabling them to explore and experiment with ideas, ask questions, and receive immediate feedback that allows them to construct their understanding of knowledge. It is worth noting that the constructivism learning theory can be considered while discussing GenAI's benefits and risks in the higher education sector. According to Schunk (2012), the constructivist theory of learning emphasizes the importance of learners who are actively exploring and investigating new knowledge. In essence, the study argues that GenAI can facilitate the process in question. It is worth noting that by engaging students in conversation and encouraging them to participate in the learning process, GenAI can help synchronize their prior knowledge and experiences to help them construct new knowledge.

Geng and Razali (2020) believe that this feedback can help students find errors and guide them to improve, making GenAI a great tool in education. In his early education studies, Wiggins (1990) noted that constructivism theory places greater emphasis on the importance of authentic assessment that measures students' ability to apply their knowledge and skills to the real world. Integrating GenAI into digital teaching, learning, and assessment processes can help students construct knowledge. GenAI tools can provide personalized feedback by modeling students' experiences and experiences, guide students to complete remediation, and help them identify errors in their work. This feedback acts as an MKO that supports the development of new knowledge. Another outcome is adaptive learning. Schunk (2012) believes that transfer of learning is an important idea of constructivist theory, which believes that learning is built upon prior knowledge. Shiu (2012) defines adaptive learning (AL) as a learning method that adjusts learning to the specific needs of students through feedback and resources. Kerr (2016) defines adaptive learning in an online learning environment as a method of presenting learning materials in which the student interacts with previous content to determine the nature of the material that is then delivered. Adaptive learning uses computer algorithms and technology to provide self-help and learning activities. However, Peng et al. However, the current study points out that through the transformation of education taught by Deng and Yu (2023), the transformation transforms students from beneficiaries to collaborators. From the theoretical background, it is clear that learning is based on prior knowledge, and knowledge based on prior knowledge leads to the construction of new knowledge. For example, by integrating GenAI's application programming interface (API) into a school's Learning Management System (LMS) in a virtual learning environment, instructors or lecturers can create student-centered and proactive personalized learning based on students' prior knowledge. This claim is supported by a study by Chen *et al.,* (2023). More importantly, many studies show that students receive personalized, immediate feedback from GenAI tools, rather than simply providing easy-to-understand explanations, while also supporting exploration of relationships between models and providing access to learning and content needs. As a result, teachers can create customized lesson plans through GenAI tools such as ChatGPT, thus

encouraging more thinking and knowledge creation. On the other hand, Stapleton and Stefaniak (2019) and Rudolph *et al.*, (2023) reiterate that discussions of generative AI tools not only help students develop their skills as they continue to study, but also encourage them to experiment and try. Learning from such experience is an important part of creating knowledge.

Bearman, Ryan, and Ajjawi (2023) noted that the rapid developments of AI in higher education is influenced by three important factors: the introduction of Open AI's ChatGPT and the COVID-19-induced phenomenon has increase the usage of virtual learning, including skills adoption. This is more important in developing countries (Al Dhaen, Stone, & Mahmood, 2022). Adamopoulou and Mousiades (2020) discuss the use of cognitive skills in traditional classrooms in general. How artificial intelligence can be used for learning purposes and its impact on teaching and learning in higher education using the ODeL model is still unclear to many instructors, especially those in the African continent. The study authors have somehow managed to evaluate how AI is changing teaching and learning and how they report their successes and failures. There is also some debate about the benefits of artificial intelligence in traditional classrooms and virtual classrooms and specific methods of improving artificial intelligence teaching (Jungwirth & Haluza, 2023). Boateng and Tindi (2022) investigated the results of teaching artificial intelligence in the classroom in their study. In this study, phenomenology, a qualitative method to evaluate participants' opinions in various environments, was used. The result shows that the introduction of artificial intelligence into the classroom can bring many advantages and disadvantages for students and instructors. Some tips are shown on how to use the best technology and avoid the consequences it may cause. While most participants agree with AI, some educators and researchers are concerned about what it will mean for their businesses. However, engineers see artificial intelligence as a tool that will improve quality and benefit everyone in education. At the same time, lawyers and legal professionals are more concerned about the potential problems of intellectual property in law and education (Mamani, *et al.,* 2022).

On the flipside, the utilization of learner-centered generative AI tools such as Deep Tutor and Auto Tutor, has been shown to cultivate custom and personalized content based on the learners' ability and requirements, thereby enhancing the learning experience, and potentially leading to more successful learning outcomes for students studying online (Johnson, Nadas, & Bell, 2010). Furthermore, Sharma., Kawachi., and Bozkurt (2019) argue that the advent of ODeL education has given AI the ability to develop enhanced learning tools for educators and to optimize outcomes for students across geographical boundaries, using AI-based language translators such as Google Translate. The use of AI in education is becoming modus operandi, and its encroachment and influence on online teaching and learning is a topic of interest for researchers, lecturers, and students. ChatGPT is one such generative AI tool that has been trained on big data to generate human-like responses to questions and prompts. Using the theory of disruptive innovation as a foundation for the current study's argument, the study explored the potential and possible disruption of generative AI tools in online teaching and learning. Naidu and Sevnarayan (2023) contend that while the use of AI in online teaching and learning presents a myriad of possibilities and limitations, it is crucial to approach its use with caution and consider the ethical implications of academic integrity in digital learning.

Chang *et al.* (2021) dug more into this technology and the breadth of AI in various fields, emphasizing its application in education. The study discusses its definition, search tactics, developments, and future. In analyzing the results of various experimental instantiations, reported in more detail elsewhere, Chang and Kuo (2021) hinted at some of the more speculative answers, first in principle, then in implementation. In support of the study done by Harper et al., (2003), the current study finds its preposition valid because AI is fundamentally different from human intelligence in how it operates and what it accomplishes, and it will never assume the role of a lecturer in the context of electronic computing techniques developed in the past. The scope of the limitations considered by the current study may have the potential to change education in ways that make it more acceptable in terms of its usage. According to Fadhil and Villafiorita (2017), there is a two-standard-deviation improvement in performance between students who receive private tutoring in digital

space and those who use more conventional teaching methods, as reported by Bloom's taxonomy in 1984.

In their study, Flanagin *et al.,* (2023) and Thorp (2023) observed that many institutions of higher learning, particularly Universities, have started exploring how to incorporate this AI-driven solution into their pedagogical approach, recognizing its potential to transform new teaching methods such as ODeL thus enhancing student involvement, and fostering customized educational experiences. However, some academics and researchers express concerns regarding the potential ethical consequences of using GenAI in educational environments, such as information privacy, algorithmic bias, and the possible reduction of human interaction, among others. Consequently, the current study is actively investigating the most efficient and responsible methods to integrate generative AI tools into digital teaching and learning.

According to Bearman *et al.,* 2023, institutions of higher learning have a responsibility to provide their students with the latest, efficient, and relevant learning tools. These institutions also have a responsibility to respond to the rapidly changing technological landscape, which includes AI as an increasingly prominent feature. Thurzo *et al*., (2023) observed that to prepare students for industry, it is imperative to have learners understand at least basic principles and terminology regarding AI technologies). In support of this premise McGrath, Pargman, Juth, and Palmgren (2023) affirm that institutions of higher learning also have a responsibility to provide equitable education to all students in both the traditional and virtual classrooms, and as such, GenAI is seen as being able to assist in such provision. In a rather interesting thought, Thurzo *et al.,* (2023) suggest that curriculum content and pedagogical practices at institutions of higher learning need to be revised and updated in light of the recent AI revolution.

According to McGrath *et al.,* (2023), educators in institutions of higher learning are typically slow to adapt to new technologies due to resistance to changing teaching practices. For many academics, GenAI is as much a threat as an opportunity. A common theme among the conversations around AI in education is a fear that AI could, or even will, replace educators. Bearman *et al.,* (2023) describe this as just one aspect of a "dystopia-is-now" perspective on artificial intelligence technologies in institutions

of higher learning. A major concern regarding artificial intelligence technologies in institutions of higher learning is the potential for students to plagiarize its products (Alhaidry, Fatani. Alrayes, Almana & Alfhaed, 2023). This process even has been christened "AIgiarism" (Murugesan & Cherukuri, 2023). Further predisposed predictions include undermining scientific pursuits (Bozkurt, 2023; Dergaa, Chamari, Zmijewski, & Ben Saad, 2023), privacy and ethics concerns (Lodge, Thompson, & Corrin, 2023), perpetuating biases (Cooper, 2023) and spreading false information (Murugesan & Cherukuri, 2023).

Chiu and Chai, (2020), opine that many instructors either do not know how to use GenAI as a teaching tool or are simply opposed to using it in their classrooms. Crawford *et al.,* (2023), suggest that one of the main drivers for this lack of interest is the fact that additional hours will need to be put in learning how to adequately use GenAI. According to research, educators all over the world seem to rely more on incentives or rewards like recognition, promotion, and financial rewards and not on incentives like happy teaching and learning, better learning, and improvement of the quality of teaching. As such, they often and cautiously approach AI subject. In support of this premise, McGrath *et al.,* (2023) argue that many educators feel GenAI tools are still too early in their development and not accurate enough in their information retrieval or delivery to be used in learning and teaching contexts. There are also differences across user types when it comes to adopting AI tools. For example, women report less knowledge about AI than men (McGrath et al., 2023). Wang *et al.* (2023) pointed out that some AI-based speech recognition and dictation tools may put at a disadvantage some students who do not speak their native language or who have very strong accents, which could lead to accent and dialect-related misunderstandings or misinterpretations.

However, all is not lost. Among the divergent views in the academic divide is the ability of AI tools to positively influence students' creativity and self-efficacy (Wang, Sun, & Chen 2023) and personalize learning (Bozkurt, 2023). Mogali (2023) explains that personalized content has been demonstrated to enhance the learning experience and lead to more successful outcomes for students. GenAI such as the ChatGPT was

also observed to assist in medical training by surfacing novel and non-obvious concepts that may not be in learners' sphere of awareness (Kung *et al.,* 2023). Data collected from respondents by McGrath *et al.,* (2023) revealed that students from vulnerable groups, including those with learning disabilities, could benefit from AI assistance. AI has an impact on what it means to be an educator (Firat, 2023) and is changing how we see the job of human instructors (Bozkurt 2023). Chiavaroli, (2023) argues that educators in institutions of higher learning context should adjust both teaching and modes of assessments to enhance the students' outcomes while simultaneously safeguarding against unethical use of generative AI. For this to occur, Bearman *et al.,* (2023) recommend that institutions of higher learning need to set strong policies and support continuous research agendas that are capable of addressing AI concerns including ethical implications.

Method

Mugenda and Mugenda (2012) describe research methodology as the plan of how the study is going to be conducted. This chapter describes the research design and the methodology that will be used in the study. It describes the methodological framework to be used to attain the objectives of the study. The research approach adopted in this study comprises four key stages; research design, data collection, data analysis, and report writing, all of which adopted a mixed method research approach. Qualitative research methodology aimed at comprehending the decision-making processes and actions of individuals or groups and explaining the occurrence of specific phenomena as suggested by Siripipattanakul *et al.,* (2022) and Viphanphong *et al.,* (2023).

Research Design

Kothari (2014) states that a research design serves as a blueprint, guide, and framework for a research strategy to address a research question. It forms the basis for all research endeavors. On the same breadth, Creswell (2017) defines research design as a structured plan of investigation aimed at obtaining answers to research questions. This study leveraged descriptive research and correlation survey research designs respectively to collect both qualitative and quantitative data. According to Kombo and

Tromp (2016), descriptive research design is concerned with the systematic collection and analysis of data with the ultimate goal of describing the current state of affairs. It involves measurement, classification, analysis, comparison, and interpretation of data. This survey is designed to elicit both qualitative and quantitative data. Surveys were circulated amongst, and modified by the researcher to ensure face validity. No questions were compulsory, and there was an average response rate of 99.7%.

Population

Mugenda and Mugenda, (2019) define a population as a complete set of individual cases or objects with some common observable characteristics. Yin (2017) describes a population as the set of sampling units or cases that the researcher is interested in. In summary, all the above scholars agree that a target population is the whole set of units from which the survey data is to be used to make inferences. For this study, the unit of analysis was selected institutions of higher learning in Kenya from which the lecturers and students who participated in the study were derived from.

The respondents were selected using purposive sampling, considering their characteristics and experiences relevant to the study. The study utilized technique to select 300 key informants (150 lecturers and 150 students), a widely recognized qualitative research method that involves deliberately selecting a sample based on the researchers' expertise that best suits the study's objectives. According to Zickar and Keith (2023), this approach aims at gaining an in-depth understanding about the population or phenomenon under study. The presences of the lecturers from the higher learning institutions were due to their experience and expertise as well as familiarity with the subject under study.

Data Collection Instrument and Procedure

According to Creswell (2002), information gathering is the method by which data is acquired from the chosen subject of an examination. This study gathered information using closed and open-ended online questionnaires with the help of a SurveyMonkey

online instrument. A questionnaire is a tool designed for the collection of data, usually measuring certain aspects. Dawson (2016) observes that there are three basic types of questionnaires which include close-ended, open-ended, or a combination of both. Close-ended questionnaires are used to generate statistics in quantitative research while open-ended questionnaires are used in qualitative research. Orodho (2009) observes that questionnaires have the major advantage of time efficiency and anonymity. A total of 300 questionnaires were disbursed. Informed consent was obtained from the respondents, and the researchers scheduled and conducted interviews in comfortable settings, respecting the respondents' preferences. Open-ended questions provide the opportunity for self-expression openly and honestly thus representing different responses in reference to interaction with any of the GenAI tools. This research employed the data randomly collected from charted Universities in Kenya. The data was refined in Microsoft Excel and imported to SPSS for further analysis and descriptive statistics.

Results

Response Rate

Morton, Bandara, Robinson, and Carr (2019) define response rate as the total number of completed interviews about the total number of participants with whom contact is made, or the number of all possible interviews. As stated earlier, a total of 300 online questionnaires were administered, out of which 299 were properly filled, submitted back, and were therefore found suitable for analysis. This represented an overall response rate of 99.7% as shown in Table 4.1.

Table 1. Response Rate

Response	Frequency	Percentage
Received responses	299	99.7
Unreturned responses	1	1.3
Total	**300**	**100**

According to Bonevski, Magin, Horton, Foster, and Girgis (2018), a response rate of 70% and above is adequate for analysis and reporting in survey studies. This view is supported by Fincham (2022) who advocates for a minimum of 60% and Mugenda and Mugenda (2018) recommend a minimum of 50%. Based on the foregoing, the 99.7% response rate that was attained in this study and as such, it was found to be above the recommended minimum and therefore it was adequate for making inferences concerning the characteristics of the population under study.

Reliability of the Data Collection Instrument

Cronbach's coefficient alpha was used to determine the internal reliability of the research instrument used in this study. Sekaran and Bougie (2016) argue that the alpha values range between 0 to 1.0. The value 1.0 indicates perfect reliability, and the value 0.70 is considered to be the lower level of acceptability. The reliability values for each of the variables are presented in Table 4.2 where it is evident that Cronbach's alpha values for each of the study variables were well above the lower limit of acceptability of 0.70. The findings indicated that lecturers' and students' perspectives on GenAI had a coefficient of 0.834, and risks posed by GenAI had a coefficient of 0.833, and teaching and learning had a coefficient of 0.812. The results therefore showed that the questionnaire used in this study had a high level of reliability.

Table 2. Reliability of the Data Collection Instrument.

Variable	Cronbach's Alpha
Lecturers' and students' perspectives of GenAI	0.834
Risks posed by GenAI	0.833
Teaching and learning	0.812

Descriptive Analysis

The current study presents findings using the Likert scale tool. The respondents were asked to give the level to which they agreed or disagreed with statements on each variable. A 5-point Likert scale was organized as follows; 5 = Very Frequently; 4 = Frequently, 3 = Neutral; 2 = Less Frequently; 1 = Very Infrequently. The results

provided by the respondents were analyzed and the findings were interpreted using means and standard deviation values.

Lecturers' and students' perspective of GenAI on Teaching, Learning, and Research

Respondents gave their considered opinions on statements relating to their perspective of GenAI on teaching and learning and the results obtained are presented in Table 4.3

Table 3. Lecturers' and students' perspective of GenAI on Teaching, Learning, and Research

Statement	VF	F	N	LF	VINF	Mean	Std Dev.
I am using, or planning to use, generative AI in teaching duties, research, and administration	4.8	1.6	4.8	69.3	19.5	3.967	1.169
I am using, or planning to use, generative AI research duties	3.3	3.3	8.1	73.1	12.2	3.878	1.224
I am using, or planning to use, generative AI in administration duties	1.6	4.8	8.9	77.2	7.3	3.837	1.305
I am using, or planning to use, generative AI in my research and studies (students)	5.7	3.3	9.8	70.7	10.6	3.772	1.176

n = 300 (VF = Very Frequently; F = Frequently; N = Neutral; LS = Less Frequently; VINF = Very Infrequently) *Mean = (VF = 1 – 1.8; F = 1.8 – 2.6; N = 2.6 – 3.4; LF = 3.4 - 4.2; VINF = 4.2 – 5.0)

Results in Table 3 show that the standard deviation values are small (<2) which suggests that the respondents did not have differing opinions. The findings further show that the respondents stated that they are either using or planning to use generative AI in teaching duties, research, and administration (M=3.976, SD=1.243).

Overall, the principal findings from data analysis indicate that 84% of the respondents find GenAI to be an educational tool par excellence, enhancing learning, teaching, and research. This is coupled with increased productivity, enhanced motivation, and better organization, which provides time management and facilitates a more effective and

collaborative learning environment. Current research shows that most lecturers are fairly educated on the appropriate use of GenAI. This is the reason why 59% of the respondents answered in the affirmative. It was noted that such narratives as responsible use, and targeted use following the principles of ethics do not disturb student learning at all since 54% of the respondents gave an affirmative response for this. Finally, 33% of the lecturers showed skeptical attitudes and were afraid that students need to be educated, and there could also be problems with the long-term use of GenAI. In contribution, the current study presents the outcome of our qualitative and quantitative content data analysis as follows.

The Influence of GenAI on Teaching and Research Domains

Respondents were tasked to indicate whether they were using, or were planning to use, generative AI in three respective fields of the University ecosystem, that is; administration teaching, research, and learning. The most common of these four areas was teaching, in which 43.3% (n = 130) of participants indicated they were using GenAI. Administration tasks were less frequent (26.7%, n = 80), research tasks were less infrequent (20.0%, n = 60), and learning activities (students) were very infrequent at n 10.0%= 30. None of the respondents stated they had used AI in any significant mode in research. Most of them had tested GenAI's ability to complete assessment tasks. Survey participants were asked to indicate, via a 5-step Likert scale, how frequently they use GenAI to support their work. Only 10 respondents indicated they had never used generative AI. twenty respondents indicated they used AI daily. The most typical response was "Very Infrequently (a few times a semester/year, or less)" with 38.5% (n = 5) of respondents selecting this measure.

When asked to list the GenAI tools they have used in the last year(s), all respondents (n = 130) listed ChatGPT. Other AI applications listed by respondents include Bing AI, Midjourney, Dall-E (an AI system that can create realistic images and art from a description in natural language.), Grammarly, Research Rabbit, Otter, Elicit, Jenni and Gemini. Figure 4.1 shows the summary number of respondents using each tool listed.
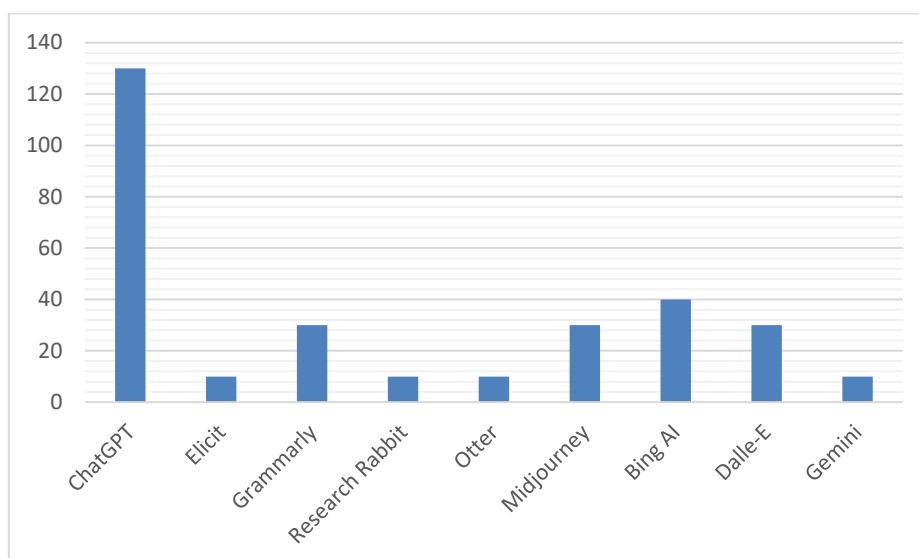
Figure 1 Summary number of respondents using different GenAI tools

ChatGPT's supremacy as **a prominent** generative AI tool has been **corroborated** by data collected from the respondents. When asked how they have engaged with AI, respondents, particularly in the fields of Arts, Business, Law, and Economics stated that they have always been leveraging ChatGPT GenAI as their best choice. Respondents from other academic departments agreed to this premise. 6.7% of the respondents further stated they had also experimented with Bing AI. Demonstrating a strong feeling of comfort regarding the use of AI, 30% (n = 90) of the respondents indicated that they were either somewhat, or extremely comfortable using generative AI-based tools to support their work. No respondents were extremely uncomfortable and only two (15.4%) indicated they were somewhat uncomfortable. No interviewees expressed discomfort regarding engaging with GenAI. In general, the respondents had positive experiences regarding the influence of using AI, often around the concept of saving time or mental effort.

The participants were further instructed to indicate tasks where they had used AI assistance. The most common response of 33.3% of the total respondents (n = 100) was to test AI's capabilities to complete their assessment tasks. The next most common responses were to assist in administration tasks 20.0% of the total respondents (n = 60) and generate new assessment tasks 16.7% of the total respondents (n = 50). The

respondents were further requested to list other activities. 3.3% of the total respondents (n = 10) stated that they use AI to format reference lists, however, they did not demonstrate which application they used for this particular task. The current study made reference to the study findings of Alkaissi and McFarlane (2023) which argued that the ChatGPT AI tool is known to perform poorly at such kinds of tasks. Other tasks mentioned by respondents included using GenAI to generate code and paragraphs for bureaucratic reports. These data suggest the influence of AI is broad, adding further challenges to policy design in institutions of higher learning.

The Influence of GenAI on Skills Development Domain

The respondents were asked to indicate to what extent they feel their respective University has equipped them with the necessary knowledge and skills to effectively use AI in general. Moreover, they were tasked to indicate whether or not they would like support in learning how to use generative AI. 20% of the total respondents (n = 60) agreed that the university has sufficiently equipped them while 70% (n = 210) indicated that they would like support. The responses regarding the kind of support the staff would like to be given were varied. They confirmed that the management should conduct a series of trainings on ethical ways of using GenAI to design, conduct, and write up research, how to do so appropriately and efficiently, and get more of a sense of the breadth of teaching activities that GenAI can support. There was a general sense of unknown among the responses with no specific detailed explanation of the type of support they felt they needed. Demonstrating the existence of a gap in the training and support currently offered by the university, 70% (n = 210) of the total respondents specified that they believe, or strongly believe that the generative AI-based tools can enhance their work. Figure 4.1 illustrates this gap.
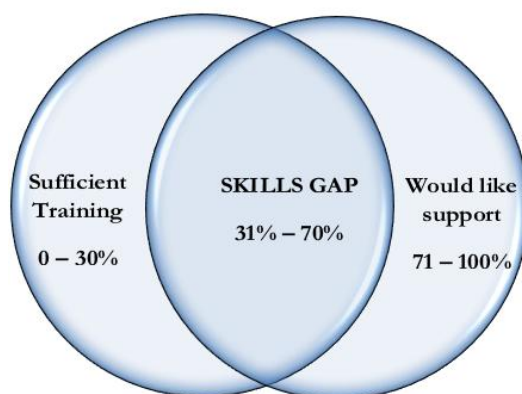
Figure 1. Gap between adequate training and desired support

On the question of capacity building, 20% of the total respondents (n = 60) indicated they have undertaken some professional development regarding GenAI tools. However, when asked to what extent they feel they have the necessary knowledge and skills to effectively discuss the use of GenAI-based tools and technologies with their students, only 33.3% (n = 20/60) selected either 'agree' or 'strongly agree' from the 5-point Likert scale. Only 16.7% (n = 10/60) of the respondents who indicated they have undertaken professional development also selected either 'somewhat agree' or 'strongly agree' that they have the knowledge and skills. This indicates that professional development has not been principally successful. Figure 2 illustrates this gap in professional development and its success.

Figure 2. Professional Development in GenAI

This was also a common thread among the respondents who typically felt they needed more training and to spend more time engaging with GenAI tools to get used to such.

Effect of GenAI on Students' Learning Domain

The respondents were tasked to indicate using a 4-point Likert scale tool, how often they believed students were using GenAI in their learning activities. Notably, none of the respondents selected 'never'. The majority (70%, n = 210) indicated they believed students were using AI either at least once a month or once a week. Figure 4.3 shows the frequency the lecturers believe students to be using the GenAI tools.
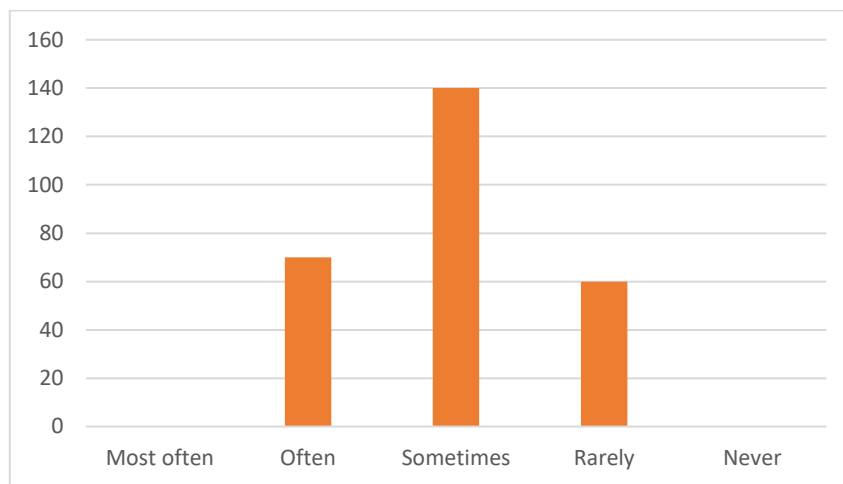
Figure 3. Perspective on the use of GenAI tools by Students' Domain

Respondents particularly from departments of Sciences expressed multiple concerns regarding the use of GenAI tools by Students. They argued that some of the students use the Grammarly GenAI tool so much that in the end, it's almost not their work. They also noted with concern that a couple of students have come forward to inform them that their student colleagues were using it during tutorial activities. They further confirmed that these students expressed their regrets and that they were uncomfortable that other students were doing so. However, data suggests that lecturers may have been overestimating the student use of GenAI tools. From the students' perspective, 33% (n = 99) of students who participated in the current study stated they had never used AI, and 25.7% (n = 77) had used it very infrequently which means either a few times a semester, or a year or even less. Some of the lecturers participating in the study were tasked to poll their respective students and surprisingly, they found out that more students than they expected indicated they had not used any of the GenAI tool(s). A

lecturer in the Business and Economics departments recalled a workshop they recently attended where students expressed their reservations about the use of GenAI tools as they feel that leveraging such tools may diminish the value of their degree certificates. A lecturer in the Department of Social Sciences observed that students in their 2nd, 3rd, and 4th year of university already had the skills to write assignments, essays, projects, or thesis and that they didn't need to access any of these GenAI tools. A lecturer in Molecular Biology argued that they have advised their students that they can use GenAI tools in exceptional cases and suggested that there needs to be a focused part of the inductions for first-year students to inform them of the opportunities and risks as well as correct use and management of GenAI tools. These data suggest that the influence of GenAI on student outputs may be smaller than expected. A glaring theme among the respondents of the current study when discussing student use of generative AI was one of transparency. Some lecturers asked their students to make sure they know why they are using GenAI tool(s) and also be in a position to demonstrate how they have used it if at all they're going to use it/ them. Similarly, other lecturers asked their students as part of the rules of engagement of using GenAI such as ChatGPT in their course to be transparent.

Influence of GenAI on Curriculum Design

The respondents were asked to indicate whether had modified their course design at some point in time in light of the generative AI. The observation made demonstrated a near 50% split (*Yes*: 48.1%, n = 130; *No*: 51.9%, N = 140). A common narrative that featured was modifications to assessments using a variety of assessment methods, new assessment questions, and application of knowledge assessment tasks. Other shrewd responses included changing essay topics to ones that rely more heavily on fieldwork and using GenAI tools to generate poor-quality written drafts with students then tasked to improve the content. However, nearly two-thirds of the respondents (63%, n = 170) indicated they had not provided information to students about how to use generative AI. All of the respondents reported having discussed with their students the proper use of GenAI tools and what they could and could not do, with an emphasis on caution and integrity.

For in-depth analysis, respondents were asked to show if they have modified assessments to increase resilience to GenAI at any given stage. Some respondents indicated that they were not concerned about this because according to them, the whole process proves to be broader and that it appears a fairly significant issue simply because course summative assessments no longer work. Forecasting a positive engagement with GenAI, the respondents concluded that they are going to have to think about how they will re-focus the assignments much more significantly to more explicitly enable them and support them to engage with GenAI. Some commented that they are torn between two extreme worldviews and will wait to see what happens with their subsequent first-year students, observing the first-years are probably a lot more adept and in touch with such kinds of technologies. Another influence on assessment designs includes minor developments. One-third of the respondents remarked that being much clearer about the types of references that are required can reduce the percentage of that assessment and bump up others. They also felt that more focus on the value addition of what it is that human-generated content can add. Some lecturers have either made more dramatic changes or intend to shortly.

While discussing assessments, the topic of GenAI detection tools was often raised by the respondents. 50% of the respondents expressed little trust in Turnitin as an AI detection tool and none gave positive feedback. They observed that the technology is changing so rapidly in all spheres that any detection tool that is developed would be outdated within months. This is evidently an issue that has not been sufficiently addressed and will undeniably influence future curriculum design and assessment practices as educators implement practical measures to avoid this problem.

Perceived Risks Associated with GenAI on Teaching and Learning in Institutions of Higher Education.

The most notable question in the questionnaire required the respondents to state whether they have any concerns with the use of generative AI in learning, teaching, and research. The overwhelming majority translating to 89% of the total respondents (n = 240) selected 'yes' which then allowed them to explain their considered concerns. Prominent across the responses were concerns related to plagiarism and the accuracy

of AI content. Other concerns raised include the potential to limit/displace student learning, avoiding experiential learning processes, and implicit bias in data sources used to train GenAI. Others stated that over-relying on such tools can change authentic practice in almost every discipline.

Worries and concerns about GenAI were the most frequently populated code from the scheduled interview data. However, there was no homogeneous theme among the concerns with the respondents expressing a variety of issues including copyright and ownership, student use of GenAI tools, lack of regulation, inaccuracy of GenAI tools, and literacy abilities. Some respondents asserted that people only get better at things the more they do them and stated and argued that if they all start using AI to help them with their writing, then their general ability to write as a population will start to drop. Other respondents noted that average multiple-choice test scores had risen sharply for the Class of 2023 and said they were concerned because the average multiple-choice test score seemed to have held fairly constant over several years. To justify their premise, they observed that the average score used to be between 69% and 76% but now the average scores this time round range between 80% and 90%. According to them, such statistics indicate that their students seemingly use GenAI tools to assist them with the assessment(s).

One-third of the respondents were concerned because they do not think governments and other policymakers are keeping up with the speed at which AI-enabled applications are developing. They expressed a concern that they do not know what happens to their data which they feed into GenAI tools. However, they then demonstrated another common issue, that of not knowing enough about GenAI. This unknown element is echoed in almost all responses put forward by the respondents. Lecturers remarked that Universities in the world are graduating students and sending them into industry with a parchment that says the University thinks this student is competent in this, and has deep discipline knowledge in this field. Majority of the respondents feel that generative AI is too easily accessed and predicts over the next two to three years' time students will become increasingly adept at the use of GenAI tools beyond even what they are capable of. Concerns of this kind were shared by the

skeptical lecturers within the current study, stating that at some future point in time, their students, who currently take up more time than such tasks actually deserve, would actually outperform them. They are concerned that educators may be left behind because they have not caught up on the technology as much as others or are afraid to engage with it. Respondents are certain that a gradual creep of GenAI into academia will remove a little bit of autonomy without the authorities really realizing in a sense. In the broader social and political contexts, majority of the respondents believe that GenAI can turbocharge a lot of the problems that are already created by social media.

Perceived Benefits of GenAI on Teaching Learning and Research in Institutions of Higher Education.

Respondents were asked to explain their expected potential benefits as a result of the use of generative AI technologies. 50% of the respondents (n=150) highlighted key areas as efficiency, time-saving, and reducing their workload. Other notable responses included accurate marking, brainstorming ideas, and developing potentially researchable questions for essays, projects, and theses. Majority of the respondents suggested that GenAI technologies offer the opportunity to work at higher levels of abstraction. The use of GenAI as a writing tool was also prominent in the findings. The concept of saving time and GenAI tools was strongly reflected in the data collected from the respondents. The respondents further expressed that if GenAI is used wisely, it could be a great time saver. On the same breadth, they also noted that they could potentially lead to people being sheepishly slothful. Other potential benefits listed by the respondents include speeding up the processing of data, and designing multiple choice questions to "free us up for doing more of the higher order stuff. Another respondent recalled occasions where they might ask a colleague to proofread work or examine a rubric design because they might look at it slightly differently. They suggested that GenAI could stand in for that colleague. Speaking about the potential benefits for students interacting with GenAI, the management science lecturers argues that students who learn how to use such a technology as a true learning tool will always have their horizons and potential dramatically expanded. However, they also warned that students who use GenAI to dumb themselves down will succeed in doing so.

Interview questions about the future influence of generative AI in institutions of higher education returned mixed responses with both positive and negative connotations. 63% of the total respondents (n = 190) indicated they do not think the use of generative AI in teaching, learning and research could lead to a dehumanization of education. However, 70% of the respondents (n = 210) remarked that they were concerned that its use in teaching, learning and research could lead to students becoming overly reliant on technology. The respondents were then asked demonstrate to what extent they think the growing use of generative AI in institutions of higher education can influence the future of work and employment within the universities. Indicating a complete lack of any coherent consensus on the subject matter, responses were as varied. Slight minority felt that there no changes in the whole gamut while the majority proclaimed that there is indeed enormous influence on content, assessment, process, jobs, academic roles and equity. These observations can be better summarized by unpredictable future and unforeseeable realities of the GenAI tools.

Some of the more insightful responses regarding the future influence of GenAI in institutions of higher education included rejoinders like there is a likelihood of rapid access to information that is likely to be exacerbated by GenAI and that current generations of generative AI tools may be redundant in as little as a few months' time. Or it could collapse, retreat to a certain extent, and again move forward in another form at some point in the future. Majority of the respondents believe that GenAI can enhance learning if students are taught to use it properly. However, others believe that universities will struggle to ensure academic standards. Another commonly held belief was that general artificial intelligence would not be much different from a host of other technological developments taken from the past, such as calculators, laptops, or the internet. They contended that It will become another tool to extend thinking. Others however argued that the tools will need to be managed by humans, which will lead to new employment roles, including handling increased academic integrity issues. Perhaps the most useful response was from the lecturer of computer sciences who commented that it is dangerous to make predictions based on current conditions

thought in relation to what they currently know and/or what they already have at their disposal.

When asked about the future influence of GenAI in institutions of higher learning, and in their respective disciplines, interviewees returned a range of both optimistic and pessimistic outlooks. Respondents argued that GenAI might allow them to think slightly differently about problems. 20% of the respondents wondered whether sufficient research might help them to identify ways in which they leverage GenAI that they haven't thought about yet, that would then lead to new innovations. However, they also observed GenAI is already being used in the biomedical field for tasks including experiment design, speeding up repetitive tasks in analysis, and looking for patterns in data samples. They stated that there are real dangers there and they have to be aware of them. However, they went on to argue that institutional governance will be too slow to respond to the GenAI phenomenon and concluded that they have enormous potential now to actually just get on with stuff and to take the initiative.

The final question in the survey provided the participants with an opportunity to discuss any additional comments they would like to make. Some of the respondents observed that most academics are not ready to embrace GenAI in their teaching and suggested that more mandatory professional development should be provided. Others suggested that the majority of discourse contains mostly negative connotations and feel that there is need for more positive discussion. 60% further suggested that if GenAI can make parts of their job easier or less time consuming, then maybe more time can be dedicated to working on strategies to engage students. Other concepts highlighted by the respondents include exploring GenAI together with the students. They indicated that they always explore with students in the courses and that they think they are doing their best to incorporate the students in this conversation.

Despite individually, a third of the respondents demonstrated a common approach to engaging the students with GenAI. In spite of marginal indifference in details, there was a common pattern of either allowing the students to draft an essay using GenAI such as ChatGPT and Gemini, or supplying students with one already drafted by GenAI. The students' first task, formatively assessed, was to critique the draft, this

could include grading and commenting. Then the students were to use that draft, respond to their own critique, and create a final assignment. This is a mode the lecturers see as a way of positively, productively, and appropriately engaging students with GenAI with full transparency. Methods of ensuring sufficiency of students' own work in the final product include appendices with prompts and responses from interactions with ChatGPT, drafts with track changes, reflective summaries of use of GenAI, and making the word count dramatically different.

Future Predictions Regarding the Influence of GenAI on Teaching, Learning and Research in Institutions of Higher Education.

The results show that there is little consistency among the themes related to the use of GenAI in higher education institutions' teaching, learning, and research. One overarching trend did surface, though: it appears that everyone believes technology will advance. Both the findings of the current study and the empirical literature support issues of inaccuracy with ChatGPT and Gemini outputs. This premise is supported by study findings by Surameery and Shakor (2023) who observed that the accuracy of ChatGPT in reasoning categories was unreliable. They found that the phenomenon is more prevalent in inductive reasoning than it does in deductive and it is prone to illusionary problems. As a cautionary measure, Biswas (2023) suggests that the results of ChatGPT analysis should be interpreted with caution. However, the accuracy of ChatGPT was often observed to be passable or potentially in the range of scoring significantly. The general feeling was that it was not deep enough for high scores or advanced courses. Opinions showed that ChatGPT can't provide it at the level of scientific knowledge that students should be able to demonstrate. Respondents also noted that GenAI could not deliver detail specific to the individual course content.

There was a common thread in the responses in that as generative AI tools continue to develop, they will improve in quality and accuracy of output and thereby have ever increasing influence in the industry. Respondents stated that the key for them is to stay abreast of new developments in GenAI and AI in general, accept the fact that technology is going to continue to advance and be fully involved and entangled with education. This theme was also ubiquitous as espoused by data provided by the

respondents. A third of the respondents stated they are really curious as to how fast GenAI is going to evolve to be that more authoritative instrument. Some respondents indicated that they have previously tested ChatGPT against an assessment at the beginning of semesters one and two, and observed the later outcome was significantly more complex and subtle. These sentiments are supported by the empirical literature. For instance, in a pattern recognition task, ChatGPT made a mistake on a query that it was correct in the previous episode. It also reduced its accuracy in identifying prime visa a viz composite numbers from 85% to 50% accuracy. Southern (2023) argued that ChatGPT users were complaining that the tool had become prone to more mistakes or nonsensical answers at some point in time. The study indicates that the traffic on Open AI's website reduced by approximately 9.91% during the course of the current study. The decline in usage hints that the initial enthusiasm for GenAI might wane as their shortcomings became clearer. Ortiz (2023) describes this particular phenomenon as AI drift. The study suggests the reason for AI drift as an attempt to improve parts of complicated AI models that cause other parts to perform worse.

Discussion

The influence of the recent developments in GenAI have had on teaching, learning and research in institutions of higher education is apparently quite dramatic. First, the integration of generative AI models in education offer a wide range of potential benefits, including improved productivity, enhanced creativity, and personalized learning, providing timely feedback and support, and automating tasks The findings of the current study suggest the greatest concern is around students using GenAI to produce assessed material and lecturers are facing new challenges including not being able to rely on traditional assessment strategies and tools. A fraction of lecturers is also not in a position to fathom how to create new reliable assessment regimes that are in sync with the current trends in the education sector. However, one of the respondents admitted to have structured his final exam so that the students would generate ChatGPT response with a prompt and correct the text in a way that only a human well-versed in the topic could do. At one of the faculty of business schools from the universities which participated in the current study, some of the lecturers are actually

experimenting with TA Chatpots that will help answer logistical questions about class syllabus. As is often the case with emerging technologies, there are fears about understanding what technology to leverage, how it should best be utilized and what training and support will be required to ensure competent responses to GenAI use. Quick analysis of the responses among the University staff show kneejerk reactions threads to GenAI uptake thus leading to attempts by many learning institutions to ban it, through to well thought out modes of transparently engaging with GenAI. On the flip side, analysis show that the educators can't completely prohibit the use of GenAI tools and neglect to teach it, but they also can't allow their use without constraints. Both the academic and administrative staff seeking to integrate GenAI into their curriculums are left with a big question: How? University-wide policies are slowly taking shape. Most of the universities surveyed are still developing appropriate guidelines with the of addressing the issue in question. Majority of the academic staff feel that transparency and accountability are very important in this regard and are keen to engage with students in such developments. However, although there are a few ideas, the findings show that there is little consensus regarding what that would look like. From the themes identified in findings of the current study, there are clear commonalities as far as usage of GenAI is concern.

The Supremacy of ChatGPT GenAI

In current dispensation and in the 21st century education in all the levels, the employment of GenAI is unavoidable. Although some of the academic staff members admitted leveraging other GenAI tools in the surveys including Bing AI, Dall- E, Grammarly, and Midjourney, the ChatGPT tool dominated the discourse and was the most discussed GenAI application across the board. Only three GenAI tools were mentioned by name by the respondents. Majority of the student respondents intimated that ChatGPT single-handedly improved their grades in various courses and noted that the tool was extremely helpful. ChatGPT can be used as a very productive tool allowing for great Lewandowski, *et al*, (2023) noted that the accuracy of ChatGPT in answering questions in Dentistry tests had a significantly better performance compared with the lower versions of ChatGPT. On their part, Ram and Verma (2023) predicted

that ChatGPT and other large language models (LLMs) will continue to improve in terms of accuracy and responsiveness. In support to the above prediction, Stokel-Walker and Van Noorden (2023) reiterates that this phenomenon will transform very quickly due to the fact that the technology behind generative AI is moving so fast that innovations emerge every month and in compliance to Moore's Law which states that by focusing on strategic alignment and readiness to adapt, Organizations can navigate the fast-changing AI innovation landscape by leveraging the power of AI to achieve meaningful impact without being overwhelmed by the flow of change. Fundamentally, navigating the rapid evolution of AI is a matter of strategic choice, embracing adaptability, and committing to continuous learning. These strategies will not only allow organizations to keep pace with technological advances, but also use AI to enhance their mission and impact in the digital age. Majority of the respondents agreed that the goal should not be thinking about backwards but rather everyone in the industry should be racing against the clock continuously.

Cooper (2023) explored the potential of using ChatGPT to transform science education through investigating three main areas: ability to answer science education questions, ways for educators to use ChatGPT in their science pedagogy, and lastly, how ChatGPT was used as a research tool in this study. The authors found that on a wide range of questions, ChatGPT is capable of returning an adequate and informative answer pertaining to science education. The results often fit major topics of research. Moreover, the study suggests that educators can use ChatGPT to generate personalized learning materials, create interactive learning activities, provide students with feedback and support, and assist with the design of science units, rubrics, and quizzes. However, the authors used ChatGPT to edit and improve the clarity of the research script. They found that ChatGPT was a valuable tool for this purpose, but emphasized the importance of critically evaluating and adapting AI-generated content to the specific context. But they also highlight ethical considerations surrounding the use of GenAI in education, learning, and research, pointing out the risks of assigning tools like ChatGPT ultimate authority and the potential for copyright infringement. The study further argued that it is important for educators to adopt responsible approach for using such GenAI tools as ChatGPT, prioritize critical thinking through focusing

meta-cognitive skills in their provided learning activities, and clearly communicate expectations to their students.

However, there is also discourse derived from the recent research which suggest the opposite. Chen, Zaharia, and Zou (2023) conducted benchmark tests comparing the accuracy of GPT time-saving measures for both the academic staff and students. It was reveald that the academic staff are also using it to improve efficiency in data analysis, especially with Big Data. It is also being used to draft assignments and reports, within ethical constraints. However, there is little discussion around what can then be done with the time saved by leveraging GenAI. The influence of ChatGPT for instance is an industry wide bustle of development in generative AI mantra, and the influence particularly on education has been a variety of knee-jerk reactions to the unknown. A common practical response would seem to be to allow or encourage the use of GenAI by including transparent records in evaluation applications.

However, for the effective implementation of ChatGPT, it's vital to provide appropriate training to teachers. They need to acquire the necessary technological knowledge to use this tool effectively in the educational environment. Teachers should not only learn how to use the technology but also understand its capabilities, limitations, and the associated ethical and pedagogical challenges. The implementation of ChatGPT should be approached thoughtfully to ensure a responsible classroom environment. It should not replace important skills, and precautions need to be taken to avoid academic misuse for dishonest or unethical purposes. It's also worth noting that ChatGPT's knowledge is limited and hasn't been updated beyond 2021. As a result, its responses may not always be accurate or reliable, especially for specialized topics and recent events. This limitation can pose challenges for students who rely on ChatGPT for information in their learning process, and there's a phenomenon known as "hallucinations." Hallucinations refer to responses that sound plausible but are actually incorrect or nonsensical, which can be problematic in an educational context.

The need for institutional support

On behalf of the entire academic fraternity, the respondents feel that there is a tenacious need for adequate training, however, they also typically feel that the Universities are too slow and bogged down with corporate control to be able to respond to the phenomenon adequately. This argument extends to the whole education industry, particularly around concepts of intellectual property. The concept of GenAI as a tool extended beyond simple time saving measures to identifying patterns in data, improving modes of expression, and adding perspectives on a variety of types of content. The current study reveals a general feeling of uncertainty regarding the influence of GenAI on teaching, learning and research in institutions of higher education in the future with mixtures of optimism and pessimism, often concurrently within each academic staff member. Further research, and perhaps professional development is needed in relevant and appropriate modes of engaging with GenAI, for both staff and students. Further dialogue is also needed in ethical considerations, and limitations, of engaging with GenAI.

The significance of engaging with students

A very important concept highlighted by the respondents in the current study is engaging with the students in conversations on the subject of GenAI. The focus needs to be about the students' education, as they are the primary stakeholders of any institution of higher learning. Looking beyond education and forward to the industry level where the students will eventually be working, the University officials should continuously observe how GenAI is being engaged. This initiative will be an important informative process for educators and other related stakeholders. The respondents expressed how GenAI is being used in fields as diverse as journalism, health sciences, computer sciences, business studies, social and political sciences. It is the prime duty of institutions of higher learning to now ensure that the students are prepared for digital age industries which will inevitably be influenced by GenAI in ways yet unpredictable. In addition, the Universities are obligated to best prepare students to critically, and ethically, engage with industry practice. To achieve this, educators must stay current on the theory, contemporary pedagogy, and practical applications of GenAI in both

education and industry. The study has found that GenAI can provide quick and accurate answers to specific questions, offering access to relevant and up-to-date information, which benefits students in their inquiry and understanding of various subjects as well as the ability to enhance student academic performance and stimulate critical thinking. Additionally, GenAI adapts to individual learning paces, enhancing student motivation and engagement while allowing educators to focus on interactive tasks and constructive feedback. However, ethical considerations and challenges, such as student data privacy and the reliability of GenAI responses, must be taken into account. The present status of the current study considers variables like socio-economic, cultural, institutional, and technological environments. What is coming out clearly is that GenAI can help institutions of higher learning to manage and allocate learning resources intelligently, improve the utilization of educational resources, enhance education quality and efficiency, offer better learning services, and prepare students for future societal needs. This overview of emerging research trends highlights the transformative potential of GenAI in education and underscores the importance of conducting further research to fully understand and maximize its influence.

Conclusion

It is envisaged that generative AI models, by personalizing learning, providing feedback and support, and automating tasks, would have the potential to turn a completely new page in education. However, there are also several challenges that must be resolved before they can be widely applied within traditional and virtual classrooms. The utilization of generative AI models in academia has become notably a highly debated topic within the education spectrum. For instance, a GenAI tool like ChatGPT offers numerous benefits that are not limited to enhanced students' learning and engagement, collaboration, learning accessibility among others. However, its implementation also raises concerns regarding academic integrity and plagiarism as cited by several studies that contributed to the success of the current findings. Data alysis revealed there is no homogenous narrative among the academic staff concerning the influence of GenAI on teaching, learning and research in institutions of higher

learning and a great deal of indistinctness regarding the best practices in response to the recent technological developments in question. The greatest concerns among staff revolved around the concepts relating to GenAI's potential influence on academic integrity, however these concerns may be overstated.

In this sense, although artificial intelligence is not something new, the emergence of GenAI has generated debate in the education sector, questioning aspects such as traditional tasks, methodology and evaluation. Further research into the potential and effects of these tools is needed, with a view to didactic and scientific aspects, in order to integrate GenAI ethically and responsibly into educational practice. The main limitation of the current study lies in the limited amount of literature included in the analysis. This is because, so far, not enough studies that address the specific use of GenAI in higher education institutions have been conducted especially in developing countries. Educational technology is a constantly developing and evolving field, and its implementation in higher education may be relatively new and therefore less researched compared to other levels of education. Despite this limitation, the current study provides an overview of how GenAI has influenced the university level. As more research is conducted and knowledge about the use of GenAI in higher education expands, It would be useful to extend the research to better understand its impact and benefits at this particular educational level.

It is now becoming clearer to argue that GenAI has had a dramatic influence on teaching, learning and research in institutions of higher education in recent past. It is imperative that educators, and management, stay abreast of developments and continue to invest heavily on the ongoing research and discourse regarding responses to GenAI, keeping in mind the University's obligation to serve the students in preparing them for the industry. Additionally, the current study highlights that educators can use GenAI tools like ChatGPT to create personalized learning materials, create interactive learning activities, provide feedback and support to students, and help design science sections, rubrics, and tests. The study also observed that the authors at some point leverage ChatGPT to assist with editing and improving the clarity of their research narrative. The study has underscored that ChatGPT is a

valuable tool for this purpose, but stress the importance of critically evaluating and adapting GenAI-created content to the specific context. However, the respondents also highlighted the ethical considerations associated with the use of GenAI in education, such as the risk of such tools as ChatGPT, Gemini and others positioning themselves as the ultimate authority and the potential for copyright infringement. The respondents continued to argue that it is important for lecturers to embrace responsible behavioral approach for using GenAI tools, prioritize critical thinking through focusing metacognitive skills in their provided learning activities, and clearly communicate expectations to their respective students.

Recommendations

It emphasizes the establishment of policies, guidelines, and safeguards to protect data privacy, ensure ethical AI practices, and promote responsible use of AI technologies. The Operational dimension of the framework addresses practical concerns, like infrastructure and training. It emphasizes that a proper technological infrastructure, with sufficient technological support for GenAI, has to be in place if GenAI is to work successfully in the higher education realm. Additionally, it emphasizes the need for training programs to equip the academic staff with the competences required to effectively use AI technologies. This study underscores the potential applications of generative AI models, specifically Gemini and ChatGPT, in areas such as personalized learning, language instruction, and feedback provision.

The findings showed that lecturers and GenAI can work together effectively to revitalize learning, teaching and research. Lecturers need to use their teaching expertise to incorporate GenAI tools into their instructions. The current study provided valuable insights into how large language model GenAI could be employed in education in the future and why it is important for lecturers and GenAI to work together. The study stresses on the necessity of enhancing GenAI such as the popular ChatGPT's capacity to distinguish between queries it can properly answer and those that should be handled by human experts. They also outlined the gains realized from the use of generative AI models in education. Principal among them was better

learning outcomes, improved productivity, and increased engagement of students through tailored education, feedback, and support.

Concerning the perceived risks, the study recommends shared responsibility and collaboration among developers, subject matter experts, and human factors researchers to consider effective counter measures to misuse of generative AI models such as ChatGPT. The current study is alive to the fact that the ethical and practical challenges that arise when implementing GenAI in education are real. Key concerns include potential bias in the relevant algorithms and the need for adequate lecturer/student preparation and support. Based on their experiences, this study has found that GenAI such as ChatGPT can be used effectively to teach and learn active and case-based learning activities for both students and instructors in social psychiatry. However, it acknowledges the limitations of some of the GenAI tools, such as the potential for misinformation and biases. The study observes that these limitations may be temporary as technology continues to advance. It argues that with appropriate caution, generative AI models can support social psychiatry learning, teaching, and they encourage further research in this area to better understand their potential and limitations. The findings demonstrated the potential applicability of GenAI in writing pedagogy, highlighting its affordances as a tool for composing writing efficiently. However, participants also expressed concerns about the tool's implications for academic honesty and educational equity. Specifically, there were concerns about plagiarism, or a need to redefine what is considered plagiarism with generative AI technology. In light of this therefore, the study recommends the development of regulatory policies and pedagogical guidance to ensure the proper utilization of GenAI in educational settings.

Regarding the perceptions of the users, the public discourse on social media reflects increased interest for GenAI particularly using ChatGPT in teaching several subjects including mathematical concepts. However, there are also cautious voices about its educational use. The findings of this study recommends further research to ensure the safe and responsible use of GenAI, particularly ChatGPT, into mathematics education and learning. The research also highlights the need for continued exploration and understanding of how GenAI tools can be effectively integrated into educational

settings. Overall, this study illuminates the use of ChatGPT in education by providing information on public discourse, various aspects of implementation, and user experience. The findings emphasize the importance of considering ethical implications and ensuring responsible adoption of GenAI in learning, teaching, and research. The study recommends that the Universities should consider the capabilities and limitations of the technology, as well as how humans perceive and interact with these GenAI systems to inform the policy direction.

Implications for theory and practice

The findings have important implications for the models developers, teaching fraternity, and universities as they work to accelerate the adoption of them in educational contexts. The study is rallying the stakeholders to consider fostering institutions of higher learning to have a safe and responsible adoption of such technologies in education. Hypothetically the study has shown a strong nexus of its findings and the ideas such as connectivism. GenAI is likely to see a resurgence in interest in this philosophy and as consequence, strong frameworks relating connectivism to student interaction with GenAI for invoking yet another aspect of technology to consider. Practically, there are grey areas that will warrant closer attention. Notably there are significant training issues for both staff and students in the use of GenAI coupled with the confusion in what tools are appropriate to be used. Insufficient or lack of training can lead to communication issues and misunderstanding about what is and isn't acceptable in individual assessment tasks hence spiraling to significant implications around academic integrity. The current study notes this as a key area to explore in future research.

The study was conducted at selected Universities drawing 300 respondents. As the sole researcher in this particular study, it's prudent to state that the results of this study are reflective of the national mood in the region as indicated by a series of workshops and presentations at conferences and a national statement on the use of GenAI in education. The current study offers a detailed snapshot of one specific case study where most users were mainly aware of several GenAI tools. Whilst GenAI tools such

as ChatGPT have strong current hold today, funding models, privacy concerns and copyright issues will provide important issues for Universities and governments within the region to contend with hence hampering its adoption. The timelines for responding to these issues are quite brief, because students will not wait for policy revisions while they interact with generative AI tools. Policy designs will need to be flexible and adaptable to accommodate rapid developments in AI technologies which may be problematic in large, slow-moving institutions.

The findings from this study may be regional-specific and therefore may not be indicative of the general global perspective. It does, however, provide a context for future research and provides a detailed and specific example relevant to the overall discourse on the influence of generative AI on learning, teaching and research in institutions of higher education. The findings emphasize the need for Universities to adapt their practices to ensure academic integrity and monitor the quality of student learning. The study's results have important implications for University managers, regulators such as Commission for University (Kenya), Tanzania Commission for Universities (TCU), National Council for Higher Education (Uganda)among others, Universities' Senates, academic staff and students, as they navigate the integration of GenAI tools in the educational landscape that is dynamically changing very fast. With the wide usage of GenAI tools from students' perspective, it has become crucial for academic programmes designers to understand the implications of using GenAI-based tools on the results of evaluating students' achievement of the learning outcomes. Findings of this study underscore the need for further research, regulatory policies, and pedagogical guidance that is compliant to Competency-Based Education (CBE) that is being currently implemented in Kenya, to navigate issues related to academic integrity and equity in the era of GenAI enhanced learning. The irresponsible implementation of generative AI models in education have ethical and legal consequences that must be considered and mitigating measures be put in place to address them before they compound to major problems.

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The Convergence of AI and Blockchain for Global Change

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Introduction

In recent years, two technological innovations have emerged as pivotal drivers of global change: artificial intelligence (AI) and blockchain technology. Individually, these technologies have demonstrated their potential to transform industries, enhance efficiency, and address complex challenges. However, their convergence promises to catalyze a paradigm shift, offering unprecedented opportunities for innovation and impact.

Artificial intelligence, with its ability to process and analyze vast amounts of data, has revolutionized decision-making processes and automation across various sectors. Meanwhile, blockchain technology has redefined the concepts of transparency, security, and trust in digital transactions and data management. The integration of AI

and blockchain holds the promise of addressing some of the most pressing global challenges by enabling smarter, more secure, and transparent systems.

This article explores the synergistic potential of AI and blockchain convergence across different domains, including finance, healthcare, supply chain management, and environmental sustainability. We discuss how this technological synergy can enhance data security, foster trust and transparency, enable decentralized ecosystems, and facilitate automated decision-making. Additionally, we examine the implications of this convergence for global governance, financial inclusion, and sustainable development.

Literature Review: The Convergence of AI and Blockchain for Global Change

Trust and Transparency

The convergence of AI and blockchain is pivotal in enhancing trust and transparency, two critical components in various sectors. De Filippi, P., Mannan, M., & Reijers, W. (2020) discuss the role of blockchain as a "confidence machine," stating that Blockchain technology, as a confidence machine, offers a solution to the pervasive problem of trust by providing a transparent and immutable record of transactions. This transparency is crucial in ensuring the reliability of AI algorithms, where data inputs, outputs, and decision-making processes must be securely recorded and verified.

Furthermore, Casino et al. (2019) emphasizes the impact of blockchain on business, noting that the disruptive potential of blockchain lies in its ability to increase transparency and security, thereby fostering trust among business participants. This aspect is particularly significant in AI applications, where the integrity of data and algorithms is paramount.

In the industrial context, Kshetri (2018) highlights the importance of blockchain in ensuring data integrity, stating, that the proposed blockchain architecture for industrial applications ensures data integrity and transparency, which are crucial for building trust in AI-driven decision-making processes. This statement underscores the role of

blockchain in enhancing the trustworthiness of AI algorithms by providing a secure and transparent mechanism for recording and verifying data.

By integrating AI with blockchain technology, we can achieve a higher level of trust and transparency, essential for the widespread adoption and effectiveness of AI systems across various domains.

Data Security

Data security is a paramount concern in the digital age, and the integration of AI and blockchain offers robust solutions to protect sensitive information. Yang et al. (2021) address the enhancement of data security in semantic search systems, emphasizing that their scheme leverages blockchain's encryption techniques to enhance the security of semantic search systems, protecting sensitive AI data from unauthorized access and tampering. This approach highlights how blockchain's encryption methods can safeguard AI data, ensuring its confidentiality and integrity.

The protection of AI-generated content in virtual environments is also crucial. Lin et al. (2023) discuss the security of AI-generated content in the metaverse, highlighting that Blockchain technology plays a crucial role in ensuring the authenticity and integrity of AI-generated content, thereby fostering trust and transparency in semantic communication within the metaverse. This underscores the importance of blockchain in securing AI-generated content, preventing unauthorized modifications and preserving its authenticity.

Furthermore, Wang et al. (2020) emphasize the significance of blockchain in healthcare data security, underlying that their Blockchain-based framework ensures the privacy and security of data during the training of AI models for disease diagnosis, enhancing the transparency and trustworthiness of the decision-making process. This highlights the role of blockchain in securing medical data used in AI-driven healthcare applications, protecting patient privacy and ensuring accurate diagnoses.

By leveraging blockchain's encryption techniques and immutable ledger, the convergence of AI and blockchain enhances data security across various sectors, from semantic search systems and virtual environments to healthcare applications.

Enhanced AI Models

The amalgamation of AI with blockchain technology not only bolsters security but also substantially enhances AI model development. As Wang et al. (2020) assert, that Blockchain technology ensures the reliability and traceability of data used in our multiparty learning framework, leading to the enhancement of AI models. This integration fosters the creation of robust AI models by providing a dependable data source that is both accurate and tamper-proof.

Lin et al. (2023) further elucidates the benefits of this synergy in the realm of semantic communication for AI-generated content. Indeed, integrating AI with blockchain-based smart contracts allows for the automation of decision-making processes in semantic communication, enhancing transparency and efficiency. The blockchain thus serves not only as a secure data repository but also as a facilitator for the automated improvement of AI models through smart contracts.

The impact of enhanced AI models is particularly profound in the healthcare sector, where the accuracy and reliability of models are of utmost importance. Wang et al. (2020) discuss the implications for disease diagnosis, stating, that their blockchain-based framework ensures the privacy and security of data during the training of AI models for disease diagnosis, enhancing the transparency and trustworthiness of the decision-making process. Such enhanced AI models are pivotal in making more informed and reliable healthcare decisions, underpinning the potential of AI and blockchain in transforming medical diagnostics and treatment plans.

The convergence of AI and blockchain stands as a testament to the potential for collaborative and incremental advancements in AI model development, promising a future where AI's decision-making process is enriched by blockchain's integrity and security features.

Decentralized AI Ecosystems

Decentralized AI ecosystems represent a fusion of collective intelligence and distributed ledger technology, ushering in a new era of collaborative innovation. Harris and Waggoner (2019) articulate the transformative nature of such ecosystems, stating, showing that Blockchain facilitates the creation of decentralized AI ecosystems, enabling secure and transparent collaboration in the development and monetization of AI models. This model of decentralized development paves the way for diverse contributions to AI, democratizing the field and accelerating advancements through collective effort.

Furthermore, the integration of blockchain within these ecosystems ensures not only collaboration but also the protection of intellectual property, as AI models and data are shared across a secure network. Salah et al. (2019) observe that AI and blockchain together can provide a secure framework for collaborative development, allowing for the sharing of resources without compromising on individual data rights and security. This is crucial in incentivizing participation and ensuring equitable distribution of benefits within the ecosystem.

These ecosystems are particularly conducive to innovation in fields where data sensitivity is paramount, such as personalized healthcare and financial services. By leveraging blockchain's capabilities for secure, anonymous data sharing, AI can be trained on a wider array of data, enhancing its accuracy and applicability. Wang et al. (2020) expound on this, noting that their asynchronous blockchain-based privacy-preserving training framework enables the collective development of AI models while maintaining the utmost privacy standards. Such frameworks are instrumental in fostering trust among stakeholders, crucial for the adoption and scaling of decentralized AI ecosystems.

In summary, decentralized AI ecosystems, underpinned by blockchain technology, hold the promise of a collaborative future where innovation is no longer siloed but is a collective pursuit, offering a pathway to more rapid, inclusive, and secure advancements in AI technology.

Smart Contracts for Automated Decisions

Smart contracts in the blockchain are pivotal in automating decision-making processes, providing a reliable, tamper-proof framework for AI to execute complex tasks with enhanced efficiency and reduced need for intermediaries. As noted by Lin et al. (2023), the fusion of AI and blockchain-based smart contracts paves the way for autonomous decision-making systems, streamlining operations and enforcing agreements in a trustless environment. This convergence enables the execution of contracts to be directly controlled by logical stipulations embedded within the blockchain, reducing human error and bias.

Harris and Waggoner (2019) elaborate on the potential of smart contracts to transform industries: smart contracts driven by AI can autonomously conduct transactions and operations, revolutionizing industries from finance to supply chain with increased speed and precision. This technology allows for a significant shift in how contractual obligations are managed and fulfilled, opening new avenues for innovation and efficiency.

Moreover, the self-executing nature of smart contracts facilitates a more transparent and fairer ecosystem, where all parties can be assured of the outcome without disputes. This is particularly advantageous in scenarios where multiple stakeholders are involved, and trust is paramount. The capability of smart contracts to function without the need for central oversight or third-party validation exemplifies the decentralized ethos of blockchain technology, fostering a new standard for decision-making in the digital age.

In sum, the integration of AI with smart contracts on the blockchain not only augments the reliability and efficiency of automated decisions but also redefines the landscape of digital agreements and transactions, heralding a future where AI's analytical prowess is seamlessly integrated with the immutability of blockchain contracts.

Supply Chain Optimization

Optimization of supply chains through the integration of AI and blockchain technology stands as a significant innovation, promising to redefine logistics and operations management. This convergence offers a powerful tool for analyzing large datasets and enhancing traceability and accountability throughout the supply chain. Kshetri (2018) underscores the transformative impact on supply chain management: the implementation of blockchain in supply chains enhances transparency, enabling AI to effectively analyze operational data and optimize processes.

The fusion of AI's analytical capabilities with blockchain's immutable record-keeping introduces an unprecedented level of efficiency and reliability. AI algorithms can predict supply and demand, optimize routing, and manage inventory with heightened accuracy, while blockchain ensures the integrity of the data utilized. As Casino et al. (2019) note, "Blockchain's role in supply chain optimization goes beyond mere record-keeping; it enables the creation of a responsive and adaptive supply chain fueled by AI-driven insights."

Furthermore, smart contracts can automate many of the transactions and agreements within the supply chain, leading to reduced delays and errors. The reliability of these automated processes is critical, as highlighted by Harris and Waggoner (2019), who observe that smart contracts within blockchain-enhanced supply chains execute decisions based on AI analyses, ensuring timely and accurate fulfillment of contractual duties.

In essence, the synergistic combination of AI and blockchain technologies in supply chain management offers a scalable solution for meeting the complex demands of today's global market. It not only improves operational efficiencies but also strengthens the resilience of supply chains against disruptions, setting a new standard for the industry.

Financial Inclusion

Financial inclusion remains a key global challenge, and the amalgamation of AI and blockchain stands as a cornerstone in addressing this issue. AI, with its capacity for complex data analysis, can extend the reach of financial services, and when paired with blockchain's inherent security features, it provides a strong foundation for extending credit and other financial products to previously unbanked populations. Salah et al. (2019) capture this potential: the collaboration between AI and blockchain represents a substantial leap towards financial inclusion, with decentralized finance (DeFi) platforms leveraging AI-driven credit scoring to expand access to financial resources.

The transformative power of blockchain AI in financial services is further emphasized by its ability to create trust in transactions and establish transparent credit histories for individuals. As highlighted by Casino et al. (2019), Blockchain's immutable ledger plays a pivotal role in developing trust mechanisms that, combined with AI's predictive analytics, can open up new possibilities for financial participation. This combination enables individuals who lack traditional banking histories to participate in the financial ecosystem through credible and secure means.

Moreover, smart contracts automate and streamline financial transactions, making them more accessible and cost-effective. Harris and Waggoner (2019) note the efficiency brought about by smart contracts: by automating financial agreements with smart contracts, AI and blockchain eliminate intermediaries, reducing costs and barriers to financial entry.

Thus, the convergence of AI and blockchain has the potential not just to reform but to revolutionize financial inclusion, democratizing access to financial services and empowering individuals with the tools for economic participation and growth.

Healthcare Innovations

Healthcare is undergoing a radical transformation through the integration of AI and blockchain, leading to groundbreaking innovations in medical data analysis and patient care. The convergence of these technologies enhances personalized treatment options

and ensures the security and privacy of sensitive health records. Wang et al. (2020) discuss the pivotal role of blockchain in securing AI-driven healthcare applications, asserting, "Our blockchain-based framework ensures the privacy and security of data during the training of AI models for disease diagnosis, enhancing the transparency and trustworthiness of the decision-making process." This framework not only protects patient data but also empowers AI algorithms to deliver more accurate and personalized healthcare solutions.

The ability of AI to sift through and analyze complex medical datasets is significantly augmented by blockchain's capacity to maintain an immutable record of medical transactions and patient histories. As Salah et al. (2019) note that Blockchain AI systems provide a robust platform for managing patient health records, fostering an environment where data integrity is paramount. This integration allows healthcare providers to make informed decisions, track medical interventions, and provide care based on comprehensive, untampered data.

Moreover, the implementation of smart contracts in healthcare operations can automate and streamline administrative processes, reducing costs and increasing efficiency. Harris and Waggoner (2019) recognize the potential of this technology, stating, "Smart contracts can revolutionize healthcare administration, allowing for automated, transparent, and error-free processing of medical claims and other procedures." These advancements are essential for improving the overall efficiency and responsiveness of healthcare systems.

In essence, the union of AI and blockchain in healthcare represents a significant leap forward in medical innovation, offering the promise of enhanced data security, optimized treatment plans, and a more efficient healthcare system.

Sustainable Development

The convergence of AI and blockchain technology is a powerful ally in the pursuit of sustainable development. By leveraging AI's analytical capabilities and blockchain's unalterable ledger system, we can foster more efficient resource management and greater transparency in environmental initiatives. Casino et al. (2019) acknowledge

this potential, noting, "Blockchain's ability to provide a tamper-proof ledger, combined with AI's predictive analytics, can significantly reduce waste and promote sustainability practices in various industries."

Moreover, smart contracts on blockchain networks can ensure the enforcement of environmental standards and policies. Harris and Waggoner (2019) illustrate this capability, "Smart contracts coded with sustainability criteria ensure that environmental protocols are adhered to, allowing for automated compliance and reporting." This automation not only streamlines the process but also holds parties accountable without the need for intensive manual oversight.

The application of AI in analyzing environmental data, from monitoring deforestation to tracking carbon footprints, becomes even more potent when combined with blockchain. Wang et al. (2020) emphasize this integration in healthcare, which can be extrapolated to environmental health, "Our blockchain-based system enhances the data security and integrity of AI applications, crucial for reliable environmental monitoring and management."

Thus, the intersection of AI and blockchain stands to greatly support the Sustainable Development Goals (SDGs) set by the United Nations, offering innovative solutions to ensure a sustainable and resilient future.

Global Governance

The convergence of AI and blockchain holds profound implications for global governance, offering tools to enhance public service efficiency and transparency while reducing corruption. Blockchain's distributed ledger provides a foundation for incorruptible data storage, which, when analyzed by AI, can lead to more informed policy decisions and better resource allocation. Casino et al. (2019) highlight the transformative impact of blockchain on governance, stating, "The immutable and transparent nature of blockchain can significantly diminish the avenues for corruption, fostering a culture of accountability in public administration."

AI's capacity for handling big data can be harnessed to optimize governance mechanisms, predict societal trends, and streamline public service delivery. This is

amplified by blockchain's decentralized nature, which allows for secure, peer-to-peer transactions and record-keeping. Harris and Waggoner (2019) recognize the potential efficiencies brought by this convergence, "AI-driven smart contracts on blockchain can automate governmental processes, from tax collection to benefit distribution, reducing the bureaucratic overhead and potential for misuse of funds."

Moreover, the global aspect of blockchain matches the transboundary nature of today's governance challenges. As Wang et al. (2020) suggest in the context of healthcare, which is equally applicable to governance, "The borderless nature of blockchain combined with the analytical power of AI can facilitate cross-border collaboration and data sharing, crucial for addressing global challenges."

In summary, the union of AI and blockchain is not just a technological advancement; it is a catalyst for reshaping global governance structures, making them more resilient, equitable, and transparent for the future.

Method

Our research adopts a methodology of exhaustive literature review, complemented by thorough documentary research. This approach involves meticulous analysis of knowledge and expert opinions available in the public domain to systematically explore, evaluate, and synthesize existing research on the convergence of AI and blockchain for global change. The objective is to elucidate future directions and possibilities in leveraging these technologies for maximum impact.

To achieve this objective, we have conducted an extensive review of digital content, including academic articles, research reports, specialized blogs, and podcasts, to gather diverse and relevant perspectives on the topic. We critically analyze and confront the perspectives of different authors, aiming to understand the limitations of current research and provide insights through scientific methods.

The research design is qualitative, interpretative, and comparative, relying on primary data sources such as academic journals, conference proceedings, industry reports, and authoritative online databases. Inclusion criteria for the literature were carefully

defined to focus on recent articles published within the last decade, ensuring relevance and timeliness in the rapidly evolving landscape of AI and blockchain technologies.

Results

The synthesis of literature on the convergence of AI and blockchain for global change reveals a transformative potential across various domains. In the area of trust and transparency, blockchain's decentralized ledger enhances the credibility of AI algorithms by securely recording and verifying data inputs, outputs, and decision-making processes (Yang et al., 2021). This ensures that AI-driven decisions are based on reliable and tamper-proof data, fostering trust among stakeholders (Lin et al., 2023).

Regarding data security, the integration of AI with blockchain encryption techniques enhances data protection, safeguarding sensitive AI data from unauthorized access and tampering (Yang et al., 2021). This synergy ensures the confidentiality and integrity of AI data, critical for maintaining data security in various applications (Lin et al., 2023).

In the context of enhanced AI models, blockchain provides a reliable data source for training and decision-making, ensuring that AI models are based on accurate, tamper-proof, and traceable data (Wang et al., 2020). This integration enhances the reliability and robustness of AI models, enabling more accurate predictions and decisions (Lin et al., 2023).

Moreover, decentralized AI ecosystems facilitated by blockchain enable secure and transparent collaboration in AI model development and monetization (Harris & Waggoner, 2019). This model democratizes AI development, allowing diverse contributions and accelerating advancements through collective effort (Salah et al., 2019).

Also, smart contracts on blockchain automate complex decision-making processes in AI, ensuring transparency and efficiency in executing decisions (Lin et al., 2023). This automation streamlines operations and reduces the need for intermediaries, enhancing the efficiency of AI-driven processes (Harris & Waggoner, 2019).

In supply chain optimization, AI analyzes data to optimize logistics and operations, while blockchain provides a secure and transparent record of transactions, enhancing traceability and accountability (Casino et al., 2019). This integration improves supply chain efficiency and transparency, reducing costs and mitigating risks (Kshetri, 2018).

When it comes to financial inclusion, it is revolutionized by the combination of AI and blockchain, providing access to credit and financial products for unbanked populations through decentralized finance (DeFi) platforms (Salah et al., 2019). This integration enhances financial inclusion by leveraging AI-driven credit scoring and blockchain's secure transaction capabilities (Casino et al., 2019).

In healthcare, AI analyzes medical data for personalized treatment, while blockchain secures patient data and enables secure sharing of medical records across institutions (Wang et al., 2020). This integration improves healthcare outcomes by ensuring the privacy and security of patient data (Salah et al., 2019).

For sustainable development, AI and blockchain support efficient resource management, reduce waste, and promote transparency in environmental initiatives (Casino et al., 2019). This convergence enables the development of sustainable practices by leveraging AI's analytical capabilities and blockchain's transparency features (Kshetri, 2018).

In global governance, AI and blockchain enhance public service efficiency and transparency, reducing corruption and improving decision-making processes (Harris & Waggoner, 2019). This integration fosters a culture of accountability in governance through transparent and secure data management (Casino et al., 2019).

Overall, the integration of AI and blockchain presents significant opportunities for addressing global challenges and advancing sustainable development.

Discussion

These applications all show that the user satisfaction is strong and the results are bringing concrete positive results on the field, but they should be maintained through time with a continued use of these technologies. This falls exactly under the ECM theory. Indeed, incorporating the Expectation-Confirmation Model (ECM) theory on the integration of blockchain and AI could provide valuable insights into user acceptance and adoption. The ECM theory suggests that users' satisfaction and continued use of a technology are influenced by their initial expectations and the confirmation of those expectations through their experience.
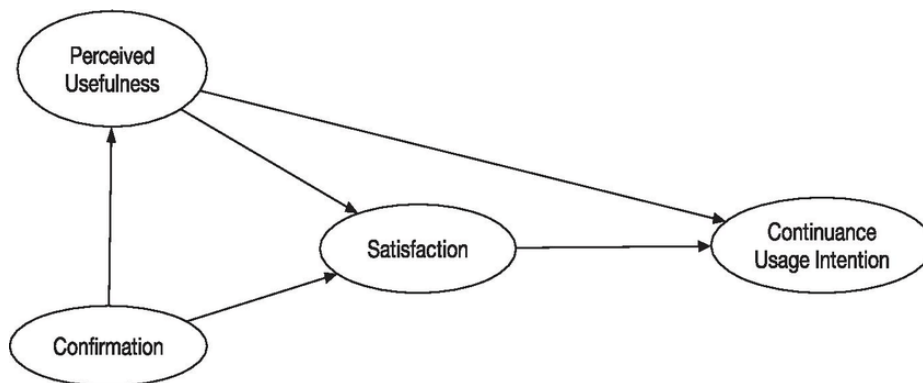
Figure 1. The Expectation-Confirmation Model (ECM) theory
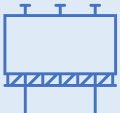
CONVERGENCE MATRIX Based on ECM Theory	Trust and Transparency	Data Security	Enhanced AI Models	Decentralized AI Ecosystems	Smart Contracts	Supply Chain Optimization	Financial Inclusion
Technical Challenges	Ensuring the accuracy and integrity of data on the blockchain through consensus mechanisms and data validation processes.	Encrypting sensitive data on the blockchain using robust encryption algorithms and managing encryption keys securely.	Improving data quality by identifying and mitigating bias in AI training data.	Implementing transparent governance mechanisms to ensure fair and democratic decision-making processes.	Ensuring that smart contracts are legally enforceable and comply with relevant laws and regulations.	Integrating blockchain and AI technologies to optimize supply chain processes and improve transparency and traceability.	Ensuring that AI-driven financial services are accessible to underserved populations and comply with regulatory requirements.
Data Privacy	Balancing the transparency of blockchain with data privacy regulations and individual rights through privacy-enhancing technologies.	Implementing access control mechanisms to ensure that only authorized parties can access sensitive data stored on the blockchain.	Ensuring transparency and explainability of AI algorithms to build trust among users and stakeholders.	Designing incentive structures to encourage participation and collaboration in decentralized AI ecosystems.	Implementing privacy-preserving techniques in smart contracts to protect sensitive information.	Enhancing data privacy and security in the supply chain by encrypting data and limiting access to authorized parties.	Addressing privacy concerns related to financial transactions conducted using AI and blockchain technologies.
Inter-operability	Integrating blockchain and AI technologies with existing systems and standards to ensure interoperability and seamless data exchange.	Ensuring interoperability between different blockchain platforms and networks to facilitate data sharing and collaboration.	Ensuring interoperability between different AI models and systems to enable seamless integration and data exchange.	Developing standards and protocols for interoperability to enable communication between decentralized AI applications.	Ensuring that smart contracts can interact with external systems and data sources to execute complex business logic.	Integrating blockchain and AI technologies with existing supply chain systems and technologies to improve efficiency and transparency.	Ensuring interoperability between different financial systems and technologies to facilitate access for underserved populations.
Execution Efficiency	Optimizing blockchain consensus algorithms and data storage mechanisms to improve the speed and efficiency of transactions.	Implementing efficient data encryption and decryption processes to minimize the computational overhead of data security measures.	Developing AI models that are efficient and scalable, capable of processing large volumes of data in real-time.	Designing decentralized AI applications that can scale to accommodate a growing number of users and data sources.	Ensuring that smart contracts are executed efficiently and without delays to maintain trust and reliability.	Scaling AI and blockchain solutions to handle the complexity and volume of supply chain data requires robust infrastructure and protocol design.	Optimizing execution efficiency to ensure seamless and secure access to financial services for underserved populations.

Figure 2. The AI & Blockchain convergence matrix through Expectation-Confirmation Model (ECM) theory – Model developed by the authors as part of this research.

Working on these challenges will confirm an enhanced users' satisfaction and a continued use of technology on a large scale. The more these technologies will be used and the challenges addressed, the better the user experience will get.

Trust and Transparency

Technical Challenges: While blockchain provides a secure and transparent ledger, ensuring the accuracy and integrity of the data recorded on the blockchain can be challenging. AI algorithms may also introduce bias or errors, affecting the trustworthiness of the decisions made based on AI.

Data Privacy: The transparent nature of blockchain can raise privacy concerns, especially when it comes to personal or sensitive information. Balancing transparency with data privacy regulations and individual rights is crucial for maintaining trust.

Interoperability: Integrating AI and blockchain solutions with existing systems and ensuring they can communicate effectively can be complex. Interoperability issues can affect the reliability and transparency of the overall system.

Data Security

Encryption Challenges: While blockchain provides a secure way to store data, encrypting data effectively and managing encryption keys can be challenging. Any vulnerabilities in encryption could compromise the security of the data.

Data Integrity: Ensuring that the data stored on the blockchain is accurate and has not been tampered with is critical for data security. Implementing mechanisms to verify data integrity adds complexity to the system.

Access Control: Managing access to data stored on the blockchain and ensuring that only authorized parties can access sensitive information requires robust access control mechanisms.

Enhanced AI Models

Data Quality: The quality of the data used to train AI models is crucial for their effectiveness. Ensuring that the data is accurate, relevant, and unbiased requires careful data collection and preprocessing.

Algorithm Transparency: Understanding how AI algorithms make decisions is important for trust and transparency. Ensuring that AI models are explainable and can be interpreted by humans adds complexity to their development.

Model Robustness: AI models must be robust against adversarial attacks and other forms of manipulation. Ensuring that AI models are secure and reliable adds complexity to their design and implementation.

Decentralized AI Ecosystems

Governance: Establishing governance mechanisms for decentralized AI ecosystems, including decision-making processes and dispute resolution, can be complex. Ensuring that these mechanisms are transparent and fair is essential for maintaining trust.

Incentive Structures: Designing incentive structures to encourage participation and collaboration in decentralized ecosystems requires careful consideration. Balancing incentives with the overall goals of the ecosystem adds complexity to its design.

Scalability: Ensuring that decentralized AI ecosystems can scale to accommodate growth and demand requires robust infrastructure and protocol design. Scalability issues can affect the reliability and efficiency of the ecosystem.

Smart Contracts

Legal and Regulatory Compliance: Ensuring that smart contracts comply with relevant laws and regulations adds complexity to their development. Legal frameworks for smart contracts are still evolving and can vary between jurisdictions.

Code Security: Smart contracts are vulnerable to bugs and vulnerabilities in their code, which can be exploited by malicious actors. Ensuring the security and reliability of smart contracts requires thorough code auditing and testing.

Execution Efficiency: Ensuring that smart contracts are executed efficiently and in a timely manner requires optimizing their design and implementation. Scalability issues can affect the performance of smart contracts.

Supply Chain Optimization

Data Integration: Integrating AI and blockchain into supply chain processes requires integrating data from multiple sources. Ensuring that this data is accurate and reliable adds complexity to supply chain management.

Interoperability: Ensuring that AI and blockchain systems can communicate with existing supply chain systems and technologies requires standardization and interoperability efforts.

Scalability: Scaling AI and blockchain solutions to handle the complexity and volume of supply chain data requires robust infrastructure and protocol design.

Financial Inclusion

Accessibility: Ensuring that AI and blockchain-based financial services are accessible to underserved populations requires addressing issues such as internet connectivity and digital literacy.

Security: Ensuring the security and privacy of financial transactions conducted using AI and blockchain technologies is crucial for building trust among users.

Regulatory Compliance: Ensuring that AI and blockchain-based financial services comply with relevant laws and regulations adds complexity to their development and implementation.

Conclusion

The integration of blockchain and AI technologies presents significant opportunities for improving trust, security, and efficiency in various industrial applications. However, it also comes with complex challenges that require careful consideration and strategic planning to overcome. In conclusion, to successfully leverage the benefits of blockchain and AI integration, organizations must prioritize data integrity and security by implementing robust encryption and access control mechanisms (De Filippi et al., 2020), balance transparency with privacy considerations to comply with regulations and protect individual rights (Casino et al., 2019), focus on interoperability to ensure seamless integration with existing systems and standards, (Kshetri, 2018) enhance execution efficiency through optimization of blockchain consensus algorithms and AI model performance (Athey et al., 2018) emphasize governance and transparency in decentralized ecosystems to foster trust and collaboration, by addressing these challenges and considerations, organizations can unlock the full potential of blockchain and AI technologies to drive innovation and transformation in their industries.

For future studies, researchers could consider applying the ECM theory to understand how users' expectations of blockchain and AI technologies influence their acceptance and use. This could involve conducting surveys or interviews to gather data on users' initial expectations, their experiences with the technology, and their satisfaction levels.

By applying the ECM theory, researchers can identify factors that contribute to user acceptance and satisfaction, as well as potential barriers to adoption. This information can help developers and policymakers design more user-friendly and effective blockchain and AI systems, leading to increased adoption and successful implementation in various industries.

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Cultivating Real-Life Programming Skills Through Gaming (Game-Logic)

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Introduction

The importance of programming education in the modern educational landscape is crucial. Traditional learning environments, where students should sit and listen to the information provided by the teachers are unacceptable for them (Campbell, 2020). Students from various disciplines are taking programming classes, which have been shown to enhance learning and success levels and develop computational thinking skills (Rovshenov, A. & Sarsar, F, 2023), and in seeking more interesting, fun, motivating and engaging learning experiences (Anastasiadis, T., Lampropoulos, G., & Siakas, K., 2018). Scholarly publications suggest a variety of teaching methodologies that can significantly improve students' learning experiences.

With the rapid advancements in Information and Communication Technologies (ICT), educators face new demands that affect how programming should be taught in classrooms. As (Pedró, 2006) notes, today's students differ significantly from those for whom traditional educational systems were designed. Concurrently, there is a need

to bridge the gap between educational outcomes and employer needs (Voyager: direction for learning and careers community handbook set; book 4 Scarecrow education book, 2003). When teaching programming, it is crucial for students to grasp and apply abstract concepts to devise algorithms that address real-world problems. According to (Sobrel, 2020), students often have the perception that the focus is on learning the syntax of the programming language, leading them to focus on implementation activities rather than activities. (Anabela Gomes & Antonio Jose Mendes, 2007) identify multiple challenges in programming education, and I would like to combine them in two main categories: The teaching method, which often focuses on language syntax development rather than problem-solving, and the study method, where students struggle with algorithmic thinking and applying their developing problem-solving skills.

To address these challenges, educators must employ innovative teaching methods that maintain student enthusiasm and motivation, connecting programming tasks to tangible applications. This can be done using different strategies, however, I will be addressing two of them: Incorporating real-life examples in the classroom and Gamifications.

Incorporating Real-Life Examples in Programming Education

Real-life examples in programming education often involve problem-solving, which is a key skill in programming. For instance, explaining a loop through the analogy of repetitive daily routines can help students understand its purpose and functionality.

Studies have shown that incorporating real-life examples in programming education can significantly enhance students' understanding and problem-solving skills. For instance, a study published in *Education and Information Technologies* found that using visualization, interaction, and examples in the home language improves students' results (Prasad, A., Chaudhary, K. & Sharma, B., 3197–3223 (2022)). Another study in Educational Technology Research and Development explored an artificial intelligence learning platform in a visual programming environment, demonstrating the positive impact of real-world examples

on learning attitudes and performance (Chang, JH., Wang, CJ., Zhong, HX. et al, 2023).

By working through real-life examples, students can develop their logical thinking and problem-solving abilities, which enhances students' learning experience, creativity, and engagement, and provides a contextual understanding that makes abstract programming concepts more tangible. Students can begin to imagine how they can use code to solve problems or create something new, like a website or an application.

However, while using real-life examples in teaching programming has its benefits, it also presents several challenges. Real-life problems can be complex and intricate, making it difficult to simplify them into examples that beginners can understand. Finding examples that are relevant and interesting to all students can be challenging, given their diverse backgrounds and interests.

Additionally, developing and explaining real-life examples can be time-consuming. In a classroom setting with limited time, this might lead to less time for other important discussions. Some real-life examples might require resources (like specific software or hardware) that are not readily available in the classroom. There can also be a gap between theoretical concepts and their practical applications, and bridging this gap can be challenging for educators.

Despite these challenges, the benefits of using real-life examples in teaching programming often outweigh the difficulties. With careful planning and consideration, educators can overcome these obstacles and create a more engaging and effective learning environment.

Incorporating Game-Based Examples in Programming Education

Other studies suggest Implementation of a game-based learning approach (gamification) for creating engaging learning environments. While the approach of utilizing games for educational purposes holds considerable promise, it is important to recognize the complex and expensive nature of creating such games (Boyle et al, March 2016)

Crafting an educational game is a task that demands extensive planning and a diverse set of skills (Mahmood H. Hussein; et al, 2019). The used games must be developed to the right level of complexity that fits student's level of education to maintain learner interest without causing boredom or frustration (Liu, Z. Y., Shaikh, Z., & Gazizova, F., 2020). Game developers may struggle to incorporate educational objectives into their designs. At the same time, educators don't have the expertise (nor the time) required to develop games that effectively blend learning with fun (Meihua Qian & Karen R. Clark, 2016)

It is also essential to maintain a moderation between pedagogical and entertainment factors. games must be well designed and with the right level of complexity so the learners should not be bored or frustrated while playing (Zi-Yu Liu et al., 2020).

(Videnovik, M., Vold, T., Kiønig, L. et al., 2023) published a scoping literature review that provides insight into current trends and identifies research gaps and potential research topics concerning game-based learning in computer science education.

No matter what in-class strategies we use (flip class, peer programming…) we are still not being able to keep the students motivated enough to learn the concepts.

Incorporating Game-logic in Programming Education

Before writing the code for any program to solve a problem, the students must understand the problem, solve it by hand, and know how to draw a flowchart. Students often have the perception that the focus is on learning the syntax of the programming language, leading them to focus on implementation activities rather than activities such as planning, drawing, or testing (Sónia Rolland Sobra, 2020).

The Effectiveness of Using Games in Teaching Programming

Using games to teach programming concepts can be a highly effective strategy. Games are inherently engaging and fun, which can motivate students to learn and apply programming concepts. Games often have simple rules and objectives, making them easier to understand than complex real-life scenarios. Games provide immediate feedback on actions, helping students understand the consequences of their code.

Games often involve overcoming challenges or puzzles, which can encourage problem-solving skills - a key aspect of programming. Designing and coding games can stimulate students' creativity, as they can experiment with different ideas and solutions. Games provide a safe environment where students can make mistakes and learn from them without real-world repercussions.

In the context of game development, students often possess prior experience playing games, which grants them an intuitive understanding of game mechanics and logic. Their familiarity with game dynamics allows them to dissect complex problems into smaller, manageable components. Consequently, students can approach game development by breaking down the solution into logical segments, leveraging the programming language they are currently learning. This approach not only reinforces their programming skills but also encourages a systematic problem-solving mindset. By bridging the gap between gameplay experience and programming concepts, students can effectively create robust and engaging game solutions.

This paper serves as the first in a series dedicated to discovering the ideal game that can be used as a teaching tool for basic programming concepts. We delve into the representation of real-life concepts within games and explore how the same game can be adapted to different levels of learning.

Key Areas of Focus

1. **Basic Programming Concepts**: We will identify games that effectively illustrate fundamental programming concepts such as variables, control structures, data structures, syntax, and logic.

2. **Real-life Concept Representation**: We will analyze how games mirror real-life scenarios and principles, thereby making abstract programming concepts more tangible and relatable for learners.

3. **Game Adaptability**: We will investigate how a single game can be modified or scaled to cater to different learning stages, ensuring a progressive and level-appropriate learning experience.

Students find it hard to solve the problem by hand, so if we introduce them to problems they understand, love, and spend numerous times around the same problem while having fun. Code the problem solution using programming language and link the solution to a real-life problem.

Then we are saving the time needed to explain the problem, since most of them already understand the problem, and they are excited to know the coding behind it. In this paper, I am introducing what I am calling a "game-logic linked to real-life problem" in the classroom to teach programming concepts.

Game1

The Educational and Practical Applications of Mad Libs: A Research Perspective

Mad Libs, a popular word game that prompts players to fill in blanks with random words, has been found to have significant educational and practical applications beyond its primary function as a source of entertainment. Mad Libs can offer valuable lessons and insights applicable beyond playtime.

1. **Language Learning and Creativity**: Mad Libs can enhance language skills, vocabulary, and creativity. By selecting appropriate words to fit the context, players learn about parts of speech and sentence structure. In real-life scenarios, strong language skills are essential for effective communication, writing, and problem-solving.

2. **Algorithmic Thinking**: The process of creating a Mad Libs game involves designing an algorithm. This includes identifying placeholders, collecting input, and assembling the final story. Similarly, in programming, developers design algorithms to solve problems, such as sorting data, processing user input, or automating tasks.

3. **User Input Handling**: Mad Libs prompts users for specific types of words. This aspect of handling user input is crucial in programming applications. Real-

world software often requires user input validation, error handling, and data processing.

4. **Dynamic Content Generation**: Mad Libs dynamically generates unique stories based on user input. This concept aligns with dynamically generating content in web applications, reports, or personalized messages. For instance, e-commerce websites personalize product recommendations based on user preferences.

5. **Entertainment and Engagement**: Mad Libs entertain and engage players by turning a simple activity into an amusing experience. In real-life applications, user engagement is critical for websites, apps, and educational tools. Gamification elements, interactive interfaces, and storytelling enhance user experiences.

6. **Collaboration and Social Interaction**: Playing Mad Libs with friends or family involves collaboration, laughter, and shared creativity. In professional settings, collaboration is essential for teamwork, brainstorming, and problem-solving.

7. **Adaptability and Flexibility**: Mad Libs adapt to different themes, genres, and contexts. The same framework can generate countless variations. In programming, writing modular and flexible code allows applications to adapt to changing requirements.

Incorporating Multiple Programming Concepts into Mad Libs Game

Mad Libs game provide an excellent platform to incorporate various programming concepts. The game primarily relies on user input to fill in the blanks, utilizing the input() function to prompt users for different word types such as nouns, adjectives, and verbs. Variables are declared to store the user's input, and string manipulation techniques, such as concatenation, are used to construct the Mad Libs story by replacing placeholders in a predefined template with the user's input.

The structure of the game is based on templates containing blank spaces, which are replaced with the user's input to create a unique story each time. For more complex versions of the game, loops can be used to create multiple stories, and conditional statements can handle different scenarios based on specific user inputs.

Functions are also employed to organize the code, making it modular and easier to maintain. For instance, a function can take user input and return the completed Mad Libs story.

Beyond the basics, enhancements can be made to the game. A graphical user interface (GUI) can be created using Tkinter to make the game more user-friendly, and the pyttsx3 library can be used to convert the story to speech for added fun. Other enhancements include random story selection from a collection of templates and allowing users to select different themes for their Mad Libs.

It has been used in in "Augmenting Cross-Domain Document-Level Event Argument Data" (Joseph Gatto, Parker Seegmiller, Omar Sharif, Sarah M. Preum, 2024)

We can take the Mad Libs game to the next level by implementing some of the optional features we discussed above. Here are the steps you can follow:

1. Loops:

   ○ If you want to create multiple Mad Libs stories, consider using loops. You can use either a for loop or a while loop.

   ○ For example, you can prompt the user if they want to play again after completing one story. If they say yes, loop back to collect input for another story.

2. Conditional Statements:

   ○ Add conditional logic to handle different scenarios based on user input.

   ○ Example: If the user enters a specific word (e.g., "dragon") as a noun, you can adjust the story accordingly. Maybe switch to a fantasy theme or introduce magical elements.

3. Functions:

   ○ Organize your code by creating functions.

   ○ For instance, you can have a function that takes user input and returns the completed Mad Libs story.

   ○ This makes your code modular and easier to maintain.

4. Lists Usage:

   ○ Define lists for different parts of speech (nouns, verbs, adjectives, etc.).

   ○ Randomly select words from these lists to create more dynamic stories.

```python
import random
# Sample lists (you can expand these)
nouns = ["cat", "tree", "ship", "wizard"]
adjectives = ["sparkling", "mysterious", "gigantic", "playful"]

# Randomly select words
selected_noun = random.choice(nouns)
selected_adjective = random.choice(adjectives)
```

5. Simple Files:

   ○ Include these lists in separate files (e.g., CSV or text files).

   ○ Read the lists from files during runtime.

   ○ This approach allows you to easily update or expand your word options without modifying the code.

6. Incorporating the Natural Language Toolkit (NLTK) library can enhance your Mad Libs game by automatically identifying the part of speech (POS) of user-entered words.

   ○ Let's enhance the existing implementation with NLTK:

```python
import nltk
from nltk.corpus import wordnet

'''import ssl

try:
    _create_unverified_https_context =
```

```
ssl._create_unverified_context
except AttributeError:
    pass
else:
    ssl._create_default_https_context =
_create_unverified_https_context
nltk.data.path.append("/users/swzyhswryh/nltk_data")

nltk.download()

# Initialize NLTK (you'll need to download NLTK data if you
haven't already)
nltk.download("wordnet")'''

# Function to get the POS tag for a word
def get_pos(word):
    synsets = wordnet.synsets(word)
    if synsets:
        return synsets[0].pos()
    else:
        return None

def get_word_with_correct_pos(requested_pos):
    while True:
        if requested_pos == 'n':
            requestedPos = 'a noun'
        elif requested_pos == 'a':
            requestedPos = 'an adjective'
        user_input = input(f"Enter {requestedPos}: ")
        pos_tag = get_pos(user_input)
        if pos_tag and pos_tag.startswith(requested_pos):
            return user_input
        else:
            print(f"Error: '{user_input}' is not
{requestedPos}. Try again.")

def main():
    # Request user input for specific parts of speech
    noun1 = get_word_with_correct_pos("n")
    adjective2 = get_word_with_correct_pos("a")
    noun3 = get_word_with_correct_pos("n")

    # Construct the Story
    mad_libs_template = f"Once upon a time, there was a
{noun1} who loved {adjective2} {noun3}."
    print("\nYour Mad Libs story:")
    print(mad_libs_template)

if __name__ == "__main__":
    main()
```

7. Enhancements (Beyond Basics):

Once you've built the basic Mad Libs game, consider adding more features:

○ Graphical User Interface (GUI) (using Tkinter):

- Create a visually appealing interface where users can input words and see the completed story.

  ○ Text-to-Speech (using pyttsx3 or a similar library):

    - Convert the story to speech for added fun.

  ○ Random Story Selection:

    - Instead of a fixed template, randomly choose from a collection of templates.

    - Custom Themes: Allow users to select different themes (e.g., sci-fi, mystery, romance) for their Mad Libs.

Game 2

The Educational and Practical Applications of FizzBuzz: A Research Perspective

In the realm of computer science education, the FizzBuzz game serves as a noteworthy pedagogical tool. This simple programming task, often employed in coding interviews and introductory programming courses, provides an engaging platform for beginners to grasp fundamental concepts such as loops and conditionals. The game operates on a set of straightforward rules: a program is written to print numbers from 1 to 100, but with multiples of three replaced by "Fizz", multiples of five by "Buzz", and multiples of both three and five by "FizzBuzz". Despite its simplicity, FizzBuzz encourages students to think critically about the logic and structure of their code, and its connections to real-world programming skills make it a valuable exercise for both beginners and experienced developers fostering their problem-solving skills and computational thinking.

The Significance of FizzBuzz in Programming

FizzBuzz, serves as an effective interview screening device, assessing fundamental coding skills such as loops, conditionals, and basic arithmetic. The ability to solve

FizzBuzz efficiently mirrors the real-world software development requirement of translating problem requirements into code.

FizzBuzz also enhances problem-solving skills by encouraging logical thinking and the breakdown of problems into smaller, manageable steps. This approach is crucial in software development where complex tasks need to be simplified.

The game reinforces the understanding of essential programming constructs like loops and conditional statements, which are used daily in tasks ranging from data processing to user interface development. It introduces the use of the modulo operator for checking divisibility, a concept vital for tasks like scheduling and managing cyclic data.

FizzBuzz emphasizes the importance of code readability and maintainability. Writing clean, concise code for FizzBuzz demonstrates good coding practices, which are essential for maintaining, debugging, and collaborating on real-world projects.

The game necessitates the consideration of edge cases, promoting thorough testing to ensure software correctness. It also encourages clear communication and documentation, which are vital skills in collaborative development environments.

FizzBuzz fosters algorithmic thinking which is a critical skill for optimizing performance, solving complex problems, and designing efficient systems. It serves as a teaching and learning tool, introducing beginners to programming concepts. This aspect is similar to real-world projects where mentoring junior developers or explaining code to colleagues is often required.

Lastly, FizzBuzz can be approached creatively, leading to unique solutions. This aspect of the game enhances problem-solving and fosters innovation in software development, making FizzBuzz not just a game, but a significant tool in the programming world.

1. **Interview Screening Device**:

   o **Programming Interviews**: FizzBuzz is commonly used as an interview screening task for computer programmers. It assesses

fundamental coding skills, including loops, conditionals, and basic arithmetic.

- o **Real-Life Application**: Just as in interviews, real-world software development often involves solving straightforward problems efficiently. FizzBuzz reflects the ability to translate requirements into code.

2. **Problem-Solving Skills**:

- o **Programming Interviews**: FizzBuzz challenges candidates to think logically and break down a problem into smaller steps.

- o **Real-Life Application**: In software development, breaking down complex tasks into manageable components is crucial. FizzBuzz encourages this problem-solving mindset.

3. **Looping and Conditionals**:

- o **Programming Interviews**: FizzBuzz reinforces understanding of loops (e.g., for, while) and conditional statements (if, else).

- o **Real-Life Application**: Loops and conditionals are fundamental constructs used in everyday programming tasks, from data processing to user interfaces.

4. **Modulo Operator**:

- o **Programming Interviews**: FizzBuzz introduces the use of the modulo operator (%) to check divisibility.

- o **Real-Life Application**: Modulo operations are essential for tasks like scheduling, handling periodic events, and managing cyclic data.

5. **Code Readability and Maintainability**:

- o **Programming Interviews**: Writing clean, concise code for FizzBuzz demonstrates good coding practices.

o **Real-Life Application**: Well-organized, readable code is easier to maintain, debug, and collaborate on in real-world projects.

6. **Edge Cases and Testing**:

o **Programming Interviews**: Considering edge cases (e.g., multiples of 3 and 5) is essential for FizzBuzz.

o **Real-Life Application**: Robust software must handle various scenarios, including edge cases. Testing thoroughly ensures correctness.

7. **Communication and Documentation**:

o **Programming Interviews**: Explaining your FizzBuzz solution demonstrates communication skills.

o **Real-Life Application**: Clear documentation and communication are vital in collaborative development environments.

8. **Algorithmic Thinking**:

o **Programming Interviews**: FizzBuzz encourages candidates to think algorithmically.

o **Real-Life Application**: Algorithmic thinking is crucial for optimizing performance, solving complex problems, and designing efficient systems.

9. **Teaching and Learning Tool**:

o **Programming Interviews**: FizzBuzz teaches beginners programming concepts.

o **Real-Life Application**: Similar to teaching, real-world projects often involve mentoring junior developers or explaining code to colleagues.

10. **Fun and Creativity**:

o **Programming Interviews**: FizzBuzz can be approached creatively, leading to unique solutions.

o **Real-Life Application**: Creative thinking enhances problem-solving and innovation in software development.

Incorporating Multiple Programming Concepts into FizzBuzz Game

We can enhance the classic FizzBuzz game by incorporating various programming concepts.

1. Modular Design:

    ○ Break down the FizzBuzz logic into separate functions or methods. For example:

        • A function to check divisibility by 3.

        • A function to check divisibility by 5.

        • A function to handle the main FizzBuzz logic.

2. Object-Oriented Approach:

    ○ Create a FizzBuzzGame class with methods for printing Fizz, Buzz, and FizzBuzz.

    ○ Use encapsulation to store relevant data (e.g., range of numbers).

3. Error Handling:

    ○ Handle invalid input (e.g., negative numbers, non-integer values).

    ○ Raise custom exceptions for specific cases (e.g., "FizzBuzzError").

4. Localization and Internationalization:

    ○ Allow users to choose their preferred language for Fizz, Buzz, and FizzBuzz.

○ Implement language-specific rules (e.g., "Fizz" in French, "Bzzz" in German).

5. Concurrency and Parallelization:

○ Use multithreading or multiprocessing to compute FizzBuzz for multiple ranges simultaneously.

○ Optimize performance by parallelizing the computation.

6. Unit Testing:

○ Write test cases to verify correctness of FizzBuzz functions.

○ Test edge cases (e.g., large numbers, zero).

7. Functional Programming:

○ Implement FizzBuzz using functional constructs (e.g., map, filter, reduce).

○ Create a list of FizzBuzz results for a given range.

8. Memorization:

○ Cache FizzBuzz results for previously computed numbers to avoid redundant calculations.

○ Improve efficiency when querying the same range multiple times.

9. Generators:

○ Create a FizzBuzz generator that yields the next FizzBuzz value on demand.

○ Use lazy evaluation to avoid precomputing the entire sequence.

10. Visualization:

○ Display FizzBuzz results graphically (e.g., bar chart, pie chart).

○ Show the distribution of Fizz, Buzz, and FizzBuzz occurrences.

Some real-life problems that utilize the same programming concepts as the FizzBuzz game, such as conditional logic and iteration.

1. **Smart Home Automation**:

    o Smart home devices (such as thermostats, lights, and security cameras) rely on sensors and decision-making algorithms.

    o Conditional logic determines when to adjust room temperature, turn lights on/off, or trigger security alerts.

    o State machines manage device states (e.g., idle, active, standby).

2. **Traffic Light Control Systems**:

    o Traffic lights follow predefined rules based on sensor inputs (vehicle presence, pedestrian crossings).

    o Decision-making algorithms determine when to switch lights (green, yellow, red).

    o Edge cases (emergency vehicles, power outages) require adaptive behavior.

3. **Industrial Automation**:

    o Manufacturing robots (like robotic arms) follow specific paths to assemble products.

    o Sensors detect workpieces, obstacles, and safety conditions.

    o Feedback loops adjust robot movements for precision and efficiency.

4. **Medical Devices**:

    o Infusion pumps, heart rate monitors, and ventilators use sensors and state machines.

    o Safety checks (e.g., drug dosage limits) prevent errors.

    o Real-time decisions impact patient well-being.

5. **Financial Systems**:

    o   Trading algorithms execute buy/sell orders based on market conditions.

    o   Risk management systems use conditional rules to prevent losses.

    o   Event-driven programming responds to stock price changes.

6. **Game Development**:

    o   Video games employ decision trees, finite state machines, and event handlers.

    o   AI opponents follow strategies (e.g., pathfinding, combat behavior).

    o   Game engines manage game states (menus, gameplay, cutscenes).

7. **Autonomous Vehicles**:

    o   Self-driving cars use sensors (lidar, cameras) to perceive surroundings.

    o   Decision-making algorithms navigate roads, avoid collisions, and follow traffic rules.

    o   Edge cases (unpredictable pedestrians, adverse weather) require robust programming.

8. **Natural Language Processing (NLP)**:

    o   Chatbots, virtual assistants, and language translation tools rely on NLP principles.

    o   Conditional rules determine responses based on user input.

    o   State management handles conversational context.

The Intersection of FizzBuzz and Roomba Programming: A Comparative Analysis

Roomba, a popular autonomous vacuum cleaning robot, may seem unrelated at first glance to FizzBuzz game. However, a closer examination reveals intriguing parallels and contrasts between the two.

Despite their differences in purpose and complexity, both FizzBuzz and Roomba programming rely on conditional logic and iterative processes. This comparison serves as a reminder of the diverse applications of programming, from abstract challenges to practical, real-world solutions.

On the one hand, Roomba programming is a complex process that enables the robot to autonomously navigate and clean floors. This involves the use of various sensors to detect obstacles and drop-offs, path planning to create efficient cleaning paths, decision-making based on sensor data, state machines to transition between different states (e.g., cleaning, docking, idle), feedback loops to adjust behavior, and handling of edge cases.

Interestingly, both FizzBuzz and Roomba programming involve the use of conditional logic and iterative processes. In FizzBuzz, this is seen in the checking of divisibility, while in Roomba programming, sensors trigger actions based on environmental conditions. Furthermore, Roombas repeatedly navigate and clean areas, akin to the loop in FizzBuzz. The straightforward rules in FizzBuzz (divisibility by 3 and 5) also parallel Roomba's basic rules (avoid obstacles, recharge when low).

However, significant differences exist. FizzBuzz is primarily a test of coding skills, while Roomba programming serves a practical purpose - cleaning. Moreover, Roomba programming is more intricate due to real-world challenges such as obstacle avoidance and battery management. Lastly, while FizzBuzz is abstract, Roomba programming deals with physical environments.

Game3

Rock-Paper-Scissors (RPS): A Study in Strategy and Programming

The game of Rock-Paper-Scissors (RPS), often dismissed as a simple pastime, is a complex study in strategy and decision-making that offers valuable insights applicable to real-life situations and programming concepts.

1. **Decision-Making and Logic**:

    o   In RPS, players make choices based on rules (rock smashes scissors, paper covers rock, scissors cut paper). Similarly, programming involves decision-making using **conditional statements** (if-else, switch-case).

    o   Understanding how to structure logic and evaluate conditions is fundamental in both RPS and programming.

2. **User Input Handling**:

    o   RPS requires taking user input (rock, paper, or scissors). In programming, handling user input from forms, command-line arguments, or GUIs is crucial.

    o   Learning to validate and process user input is directly applicable to building interactive software.

3. **Randomization and Simulating Opponents**:

    o   In RPS, the computer randomly selects its move. This mirrors scenarios where programs generate random numbers or simulate opponents' behavior.

    o   Concepts like **random modules** in Python or **pseudo-random number generators** are essential for game development and simulations.

4. **State Machines and Finite Automata**:

   o RPS can be modeled as a **finite state machine** with three states (rock, paper, scissors) and transitions between them.

   o In programming, understanding state machines helps design systems with well-defined states and transitions (e.g., game states, UI navigation).

5. **AI and Decision Trees**:

   o Enhancing RPS with AI opponents involves creating decision trees. The AI predicts the player's next move based on patterns.

   o In real-life applications, decision trees are used for recommendation systems, fraud detection, and more.

6. **Code Organization and Functions**:

   o Well-structured RPS code uses functions for readability and maintainability.

   o Similarly, modularizing code into functions or classes is crucial in larger software projects.

7. **Error Handling and Robustness**:

   o RPS code should handle unexpected inputs (invalid choices, unexpected user behavior).

   o In programming, robust error handling ensures software resilience.

8. **Scalability and Performance**:

   o Imagine expanding RPS to include more options (e.g., Rock-Paper-Scissors-Lizard-Spock). Designing scalable solutions is akin to handling larger datasets or more complex systems.

9. **Testing and Debugging**:

   o Debugging RPS helps identify issues (e.g., infinite loops, incorrect outcomes).

   o Testing strategies (unit tests, integration tests) apply universally to ensure software correctness.

10. **Algorithmic Thinking**:

   o RPS strategies involve analyzing patterns and predicting opponents' moves.

   o Algorithmic thinking—breaking down problems, devising efficient solutions—is vital in programming.

Game 4

The **Wordle** game, which gained popularity after its launch by Josh Wardle in October 2021, offers valuable insights applicable to real-life programming concepts. Let's explore how:

1. **Building Command-Line Applications**:

   o **Wordle** is typically played in the terminal. Creating your own version of Wordle as a **command-line application** helps you understand input/output handling, user interaction, and game mechanics.

2. **User Input Validation**:

   o In Wordle, players guess words. Validating user input (ensuring it adheres to rules) is crucial. Similarly, in programming, input validation prevents unexpected behavior.

3. **Data Structures (Word Lists)**:

   o Wordle relies on a **word list** (a collection of valid words). Creating, managing, and searching through word lists are fundamental programming tasks.

o   You'll learn about **lists**, **sets**, or even more advanced data structures like **tries** for efficient word storage.

4. **Randomization and Pseudo-Randomness**:

o   Wordle selects a secret word randomly. Understanding **random number generation** is essential for games, simulations, and cryptography.

o   You'll encounter concepts like **seeded randomness** and **pseudo-random number generators**.

5. **Algorithmic Thinking (Feedback Mechanism)**:

o   Wordle provides feedback on guessed letters (correctly placed, misplaced, or wrong). Designing this feedback involves **algorithmic thinking**.

o   Similar thinking applies to algorithms for sorting, searching, and optimization.

6. **Text Formatting and User Interface**:

o   Using libraries like **Rich** (as in the Python Wordle clone tutorial), you'll enhance the game's appearance.

o   In real-life applications, creating an attractive user interface (UI) is crucial for user experience.

7. **Code Organization (Functions)**:

o   Wordle can be modularized into functions (e.g., checking word validity, providing feedback). Organizing code improves readability and maintainability.

o   In larger projects, well-structured functions are essential.

8. **Error Handling and Robustness**:

- o Wordle handles invalid guesses gracefully. Learning to handle exceptions, edge cases, and unexpected scenarios is vital.

- o Robust code ensures software reliability.

9. **Iterative Development**:

- o Wordle starts as a prototype and evolves into a polished game. This mirrors the iterative development process in software engineering.

- o You'll learn to incrementally improve your codebase.

10. **User Experience (UX)**:

- o Wordle's success lies in its engaging UX. Applying UX principles—simplicity, feedback, and responsiveness—translates to better software.

11.
```python
'''The code is short, but I included three methods to
select the computer word
I also showed how to use the dictionary and how to
translate a word. In this code I am translating to
Arabic.
'''
from nltk.corpus import words
uWord = input ("enter English word ")
allWords = words.words()
if uWord in allWords:
    print("this is an English")
else:
    print("this is NOT an English")
import random
#selecting the cWord Randomley from nltk words
cWord =random.choice(allWords)
print(cWord) #!=5
while len(cWord) !=5:
    cWord = random.choice(allWords)
print(cWord)

#Having fun with dictionary
from PyDictionary import PyDictionary
dic1 =PyDictionary("fun", "name")
dic =PyDictionary()
dic1.printMeanings()
print("***************")
if dic.meaning(uWord):
    print(uWord, "is in the dictionary")
    print(dic.meaning(uWord))
```

```python
    #You can also translate it :-)
    print(dic.translate(uWord, "ar"))
else:
    print(uWord, "is in not the dictionary")

#getting word list from file
fileR = open('wordleList.txt', 'r')
dataC= fileR.read()
words = dataC.split("\n")
print(words)
#end of file

#using my own list
words = ["clone", "marks", "floor"]
cWord = random.choice(words).lower()
flag = True
attempt = 1
print("The secret word is", cWord)
print("Add game rules, use functions, enter your word at
the prompt ->")

for i in range(6):
    print()

    uWord = input("->")
    #validating word length
    while len(uWord) != 5:
        print("enter a 5 letter word ")
        uWord = input("->")
    if uWord.lower() == cWord.lower():
        print("\033[2;32;48m", uWord)
        print("\033[0;30;48m,:-)")
        break
    else:
        for c in uWord:
            if c in cWord:
                if uWord.index(c)== cWord.index(c):
                    #if uWord[i]==cWord[i]:
                        print("\033[2;32;48m", c,
sep="", end="")

                else:
                        print ("\033[3;33;48m", c,
sep="", end="")

            else:
                print ("\033[0;30;48m", c, sep="",
end="")
    print("\033[0;30;48m")
```

ChatBot

Simple chatbots may seem basic, but they offer valuable insights into real-life programming concepts. Let's explore how:

1. **Building Command-Line Applications**:

    o Creating a simple chatbot involves handling user input and generating responses. This mirrors building **command-line applications** where input/output handling is crucial.

2. **User Input Validation**:

    o Chatbots validate user input (e.g., understanding commands, handling unexpected messages). In programming, input validation prevents errors and ensures robustness.

3. **Data Structures (Rule-Based Responses)**:

    o Simple chatbots often use **rule-based** responses. Understanding data structures (like dictionaries or lists) for mapping inputs to predefined outputs is essential.

4. **State Management**:

    o Chatbots maintain conversation state. Similarly, real-world applications (e.g., e-commerce carts, game progress) require effective state management.

5. **Error Handling and Resilience**:

    o Chatbots handle unexpected queries gracefully. Learning to handle exceptions and edge cases applies universally in programming.

6. **Text Processing and NLP**:

    o Even basic chatbots process text (splitting sentences, identifying keywords). This aligns with natural language processing (NLP) techniques used in more advanced systems.

7. **Modularity and Functions**:

    o Organizing chatbot code into functions improves readability and maintainability. In larger projects, modular design is crucial.

8. **Feedback Mechanisms**:

    o Chatbots provide responses based on user input. Similarly, feedback loops are essential for algorithms, simulations, and AI models.

9. **Scalability and Performance**:

    o Scaling chatbots (adding more responses, handling concurrent users) parallels scaling software systems.

10. **User Experience (UX)**:

    o Chatbot interactions impact UX. Designing intuitive prompts, clear responses, and error messages applies universally.

11.
```
def simple_chatbot(input_text):
    # Define rules and responses
    rules = {
        r'hello|hi|hey': 'Hello! How can I help you?',
        r'bye|goodbye': 'Goodbye! Have a great day!',
        r'how are you': 'I am a chatbot. I don\'t have
feelings, but thanks for asking!',
        r'your name|who are you': 'I am a simple
chatbot.',
        r'weather': 'I am sorry, I do not have
information about the weather.',
        r'what is up': 'The sky :-)',
        r'my name': 'Susan',
        r'isa': 'Andre'
        # You can add more rules and responses as needed
    }

    # Check input against rules and provide a response
    for pattern, response in rules.items():
        if re.search(pattern, input_text,
re.IGNORECASE):
            return response

    # Default response if no matching rule is found
    return 'I am sorry. I did not understand that.'
```

```
# Main loop for the chatbot
again = True
while again:        #True:
    user_input = input('You: ')
    if user_input.lower() == 'exit':
        print('Chatbot: Goodbye!')
        again =False          #break
    response = simple_chatbot(user_input)
    print('Chatbot:', response)
```

The previous games were introduced in an introductory programming class level CS1, and with every game, we simplified the code to the minimum to match the students' programming level. We also made sure to link it to real-life applications.

We surveyed the students about this approach, and we got the following feedback.
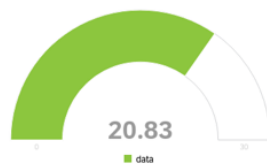
Figure 1. Age average
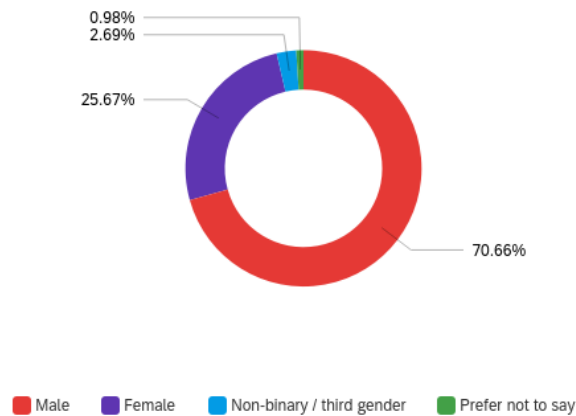
Figure 2. Gender
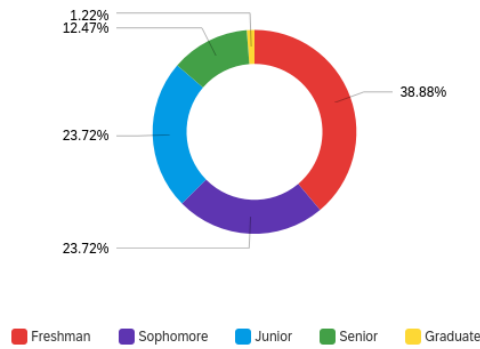
Figure 3. Academic Year

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Academic Year:	1.00	5.00	2.13	1.10	1.22	409

Gender	Choice Count	Choice Ratio
Male	287	70.66%
Female	103	25.67%
Non-Binary/Third Gender	11	2.69%
Prefer not to say	4	0.98%
Academic Year	Choice Count	Choice Ratio
Freshman	159	38.88
Sophomore	97	23.72
Junior	97	23.72
Senior	51	12.47
Graduate	5	1.22

Rate of confidence in programming:
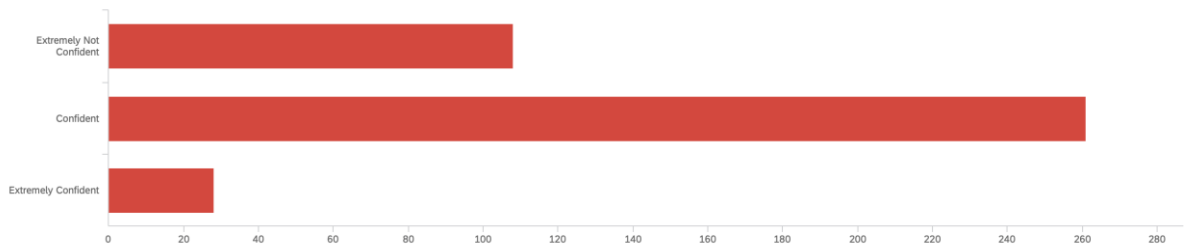
Figure 4. Programming Confidence level

Only those who answered yes to the previous question answered the next two questions.

Have your instructor(s) used game-logic to explain programming concepts?
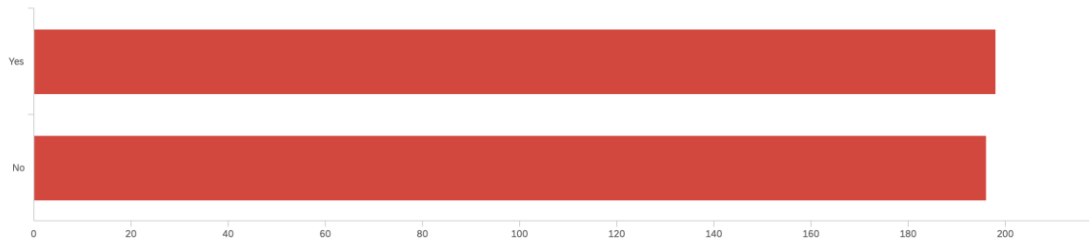
Figure 5. In-class game-logic usage.

How satisfied are you with using game-logic examples to learn programming concepts?
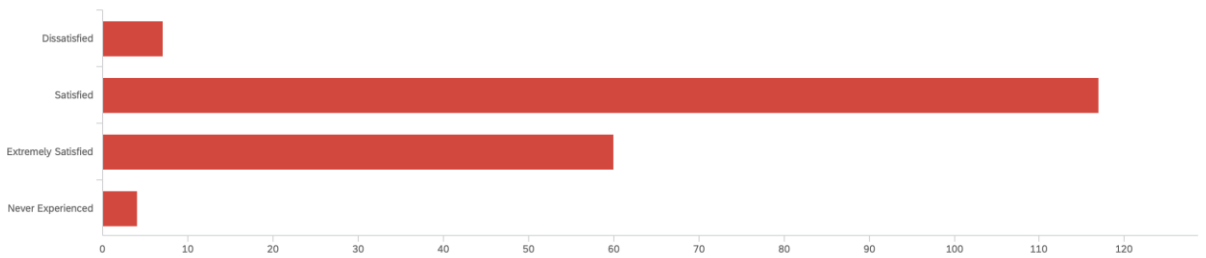
Figure 6. Game-logic satisfaction

How effective do you think using game-logic examples is in helping you understand programming concepts?
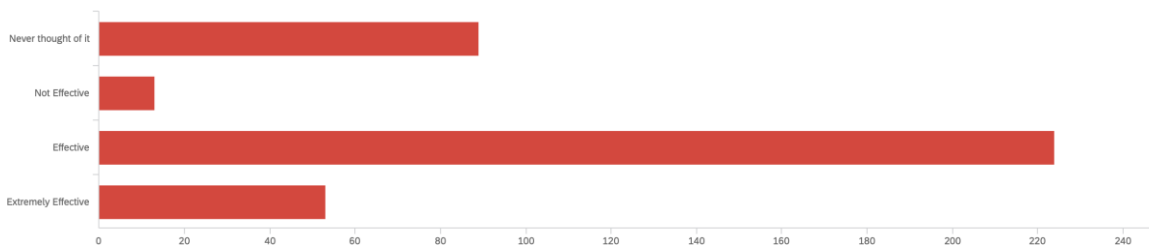
Figure 7. Effectiveness of game-logic
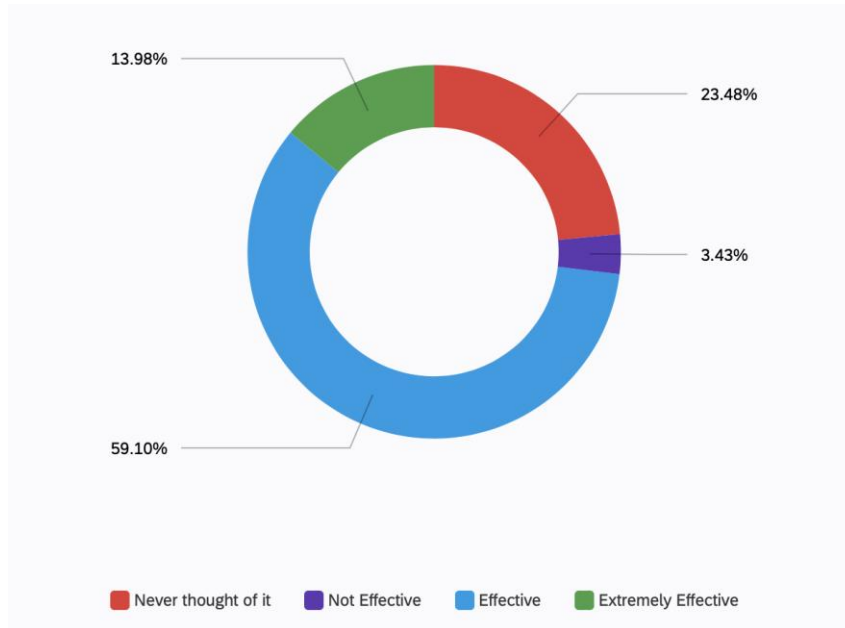
Figure 8- Another graph showing game-logic effectiveness

We asked the students if they have thought about the programming logic behind a game you are playing?
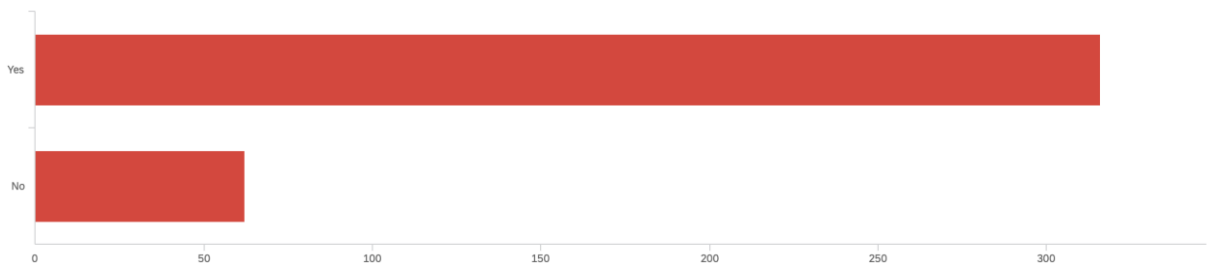
Figure 9. 83.60% of the participating students thought about programming logic behind a game playing

We asked them if they think learning how to program a game enhances their motivation to continue learning programming?
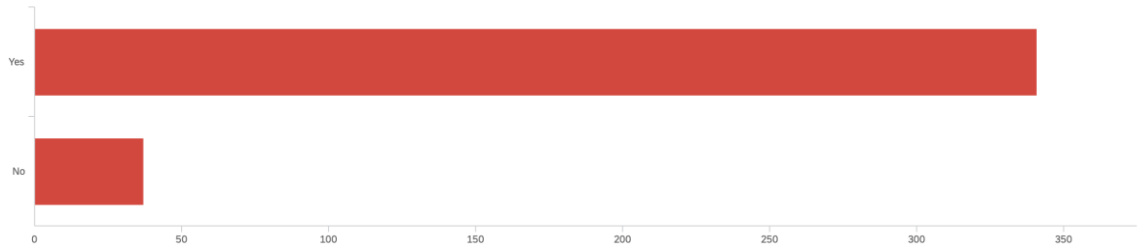
Figure 10. Learning how to program a game motivates students

It shows that 90% of the participants think that learning how to program a game enhances their motivation to continue to learn programming.
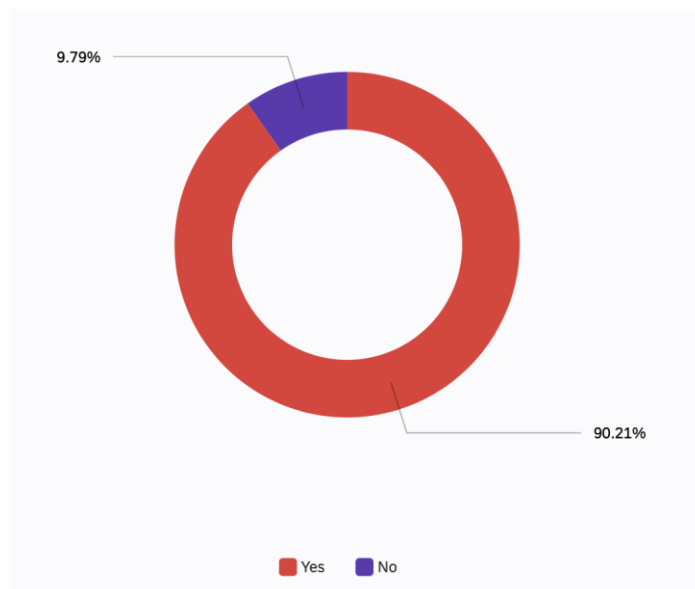
Figure 11. Pie chart showing motivation.

We asked if using game-logic examples used in class made learning programming more enjoyable?
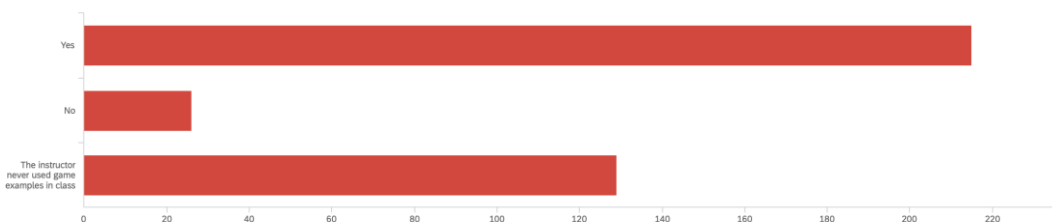
Figure 12. Game-logic examples made learning enjoyable
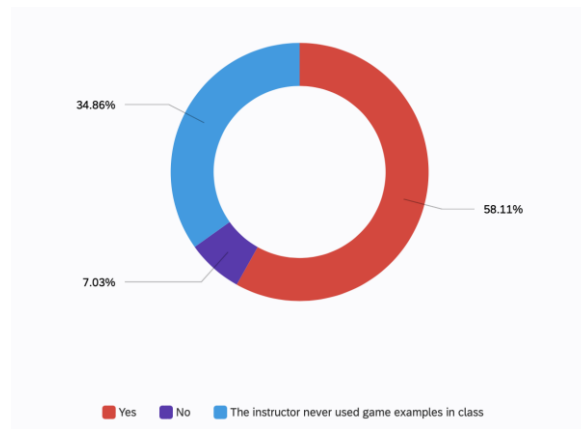
Figure 13. Pie chart representation for figure 13

We asked those whose instructor's used game-logic in class, if the instructor relates the logic behind game programming with real-life examples:
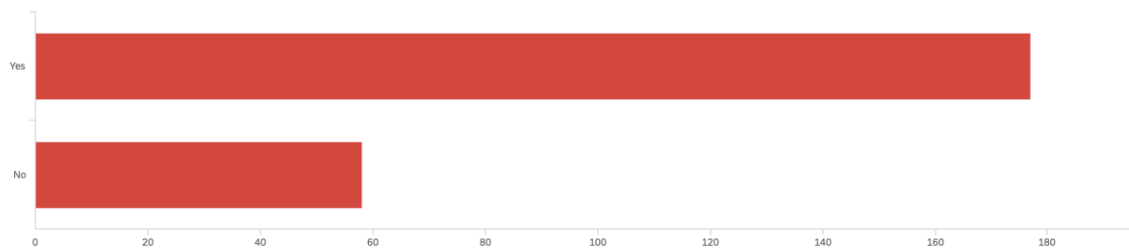
Figure 14. Game-logic & Real-life examples

We asked the students if they recommend using game-Logic to teach programming concepts to other students, and 93.97 said yes.
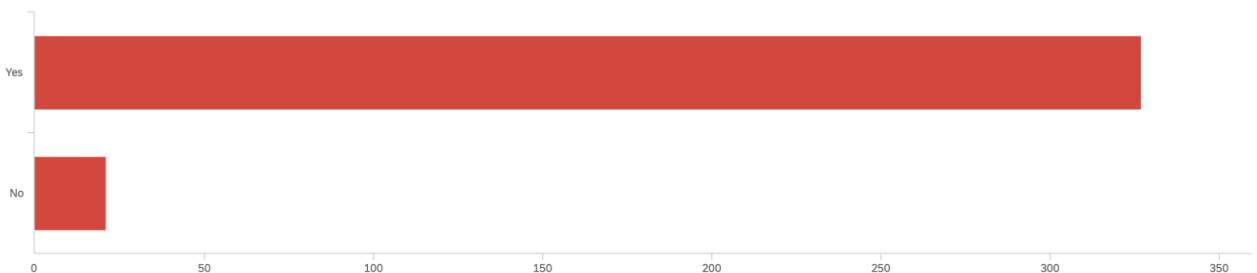
Figure 15. The answer to recommending the use of game-logic

The survey, inclusive of questions and responses, reflects the students' responses using diverse pedagogical approaches by multiple instructors within the university's CS1 course. My implementation of game logic over the past three semesters has yielded observable enhancements in student motivation, satisfaction, and class attendance. The research will be extended to evaluate the impact on student retention rates. Towards the end, I included the survey I used, and the default report.

To conclude, integrating game-logic into programming education significantly elevates the levels of student engagement, overall satisfaction, and the intrinsic motivation to delve deeper into the subject matter, thereby infusing a sense of enjoyment into the educational environment. This innovative approach has garnered increased interest among students from diverse academic disciplines, leading to a growing consideration for computer science as a minor specialization. It is anticipated that this trend will be reflected quantitatively in the form of reduced attrition rates and bolstered student retention—details of which will be presented subsequently. However, it is crucial to anchor this approach with solid real-life examples. Failing to do so may inadvertently convey the notion that programming is solely for the gaming industry, thereby overlooking the true essence of programming education: to foster critical thinking and problem-solving skills.

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University Education in Overzealous Promotion of Technology

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Introduction

A technology instruction expert advised his sons monthly: "Circumstances don't make or break you; they reveal you." Certainly, in this age of high pace technological advances, circumstances could reveal the character of students revealing themselves unprepared for the future workplace as soon as they graduate. This is reflected in difficulties in job matches in that when the students graduate, they cannot find the jobs that they have been taught to do, e.g. an overemphasis of technical skill in mathematical problem-solving exercises. Yet, throughout their education, they have been told that high-quality instructional materials involving the use of technology would provide them with the engaging learning opportunities beyond traditional barriers of place and time, all in the name of technology integration. This may leave many graduates disappointed and ultimately can lose trust in higher education. In a

2022 Students and Technology Report, EDUCAUSE, (Robert, J., 2022), a survey of 820 undergraduate students asking what the most important success of education is perceived by them, 30% (the highest percent), consider completing a degree to be the main objective, 15% consider securing a job. While 11% consider achieving personal growth to be important; and for those, learning the right technology certainly would be a good motivation, securing a high salary (10%) is clearly the ultimate highly valued goal.[1] A majority of students today care only earning a degree of recognition, not so much what they learn.

This paper argues that learning technology for the sake of technology cannot be the key to success. Educators need to go back to teaching students the basic skill of critical thinking (Ellis, 2002; Fahim and Masouleh, 2012; Werhun, 2024). Life is not about multiple choice and true/false questions. In this age of ever-changing technology, graduating students coming to the workplace will find their productivity depend not so much on the mastering of a particular technology, but largely may depend on good communication based on their ability of asking substantive questions and finding solutions for it. In a recent Vancouver Entrepreneur Forum discussion of AI ethics, an international head-hunter speaking at the forum described today's employers are looking for individuals who "can contribute to the organization", not just knowing how to follow instructions. The ability to engage in constructive dialogue with employers will be the type of job that would not easily be replaced by AI. To do so, it will be the responsibility of instructors to engage students in-and-off classroom to practice constructive dialogue. Learning from that perspective is not from top down, but what can be called collaborative learning, aiming students to take responsibility for their intellectual development, rather than learning a particular technology as the goal, as any technology will be likely be replaced by another technology due to the force of

Endnotes:

[1] https://library.educause.edu/resources/2022/10/2022-students-and-technology-report-rebalancing-the-student-experience

creative destruction (Schumpeter, 1942). It is entirely possible that a particular technology mastered by a student becomes obsolete even before a student graduates.

Collaborative Learning--an in-class attitude transferrable to workplace

Students addicted to instructions, whether by instructors or by technology, cannot adjust to a working environment doing things that requires hidden goals to be found. A student going through a training period of a brand-name company failed her 3-months probational period because she had always waited for instructions; and when instructions were given, she found them not being clear enough for her to follow. She lost out to the competition, even though she might have a bag of technology coming into the job. Indeed, it could be a sign of a general failure of education that GenZ are going now into a lazy girl syndrome.[2]

Collaborative learning has been studied in an earlier paper emphasizing the use of current-eventdriven videos to drive analytical discussions in classrooms (Lorne & Hlozkova, 2017). Independently, a large number of scholars have thoughts on practicing this methodology of teaching across various usages such as cognitive, social, psychology, instructional design, etc. (Hmelo-Silver, et.al., 2013; Rutherford, 2014). Theoretical support for this type of methodologies arguably existed since the Socratic age, but it is useful to bring it up for consideration because of the rapid obsolescence of knowledge and technology that we are experiencing now. The inspiration of the piece by one of the authors in this essay was written in the backdrop of the 2008 financial crisis. Conventional economics had failed to anticipate, and financial theories did not apply.[3] Unfortunately, a new framework has yet to be identified. This being a result of Schumpeter's creative destruction applied to the methodology in the field of economics. Some MBA programs today have deleted

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[2] https://www.forbes.com/sites/markcperna/2023/12/12/meet-the-latest-version-of-quiet-quitting-lazy-girl-jobs/?sh=3db116b6446e

[3] The most notable theory being Robert Lucas Jr., who won an Economic Nobel prize (1995) on his work on rational expectation.

economics entirely as a requirement. Yet, we cannot say that economic theory is totally non-applicable and not useful for today's economy, as it is the critical thinking skills that economics can most usefully contribute to the gaining of knowledge, at least for business acumen.

Clearly, the mission of today's education, irrespective of which program of study, is to inject an attitude of learning of a subject matter that would be transferable to the workplace (Swedberg, 2024), or for students who view learning as a simple pursuit and the understanding of the meaning of life. The presumption that whatever an instructor had learned in his/her training can be carbon-copied into today's classroom is not the right approach. Instructors can, through their respective academic disciplines, provide rich, balanced, and non-judgmental opportunities for students to develop their own values, beliefs, and opinions (Elias, 2017; Roche, 2009). Indeed, some would say that teaching is a moral enterprise, Palmer (1998). An in-class experiential relationship rests on a strong student-teacher relationship, even though not all students in the class may value those relationships. That relationship obviously relies a lot on trust.

Collaborative Learning is different from what is sometimes called a Learning-focused approach (O'Brien, et.al., 2008; Bart, 2017). For example, a Learning-focused approach prides itself as a "shared decision making" approach, putting students in a position the same as a teacher, or at least requiring the teacher to advise students on matters outside the teacher's expertise for the simple gesture of just being "nice". Likewise, there can be an overstressing of friendliness in that it is important to write a caring or welcoming outline as a tool to motivate, making the instructor warm, and approachable. (Richmond, 2016). This is not the collaborative learning approach that the authors in this essay would advocate. As a facilitator of collaborative learning, the instructor must have the critical thinking skill to discern whether a point raised in the discussion may be too tangential to be further elaborated, whether a point is out-of-context, whether elaboration is too lengthy and too repetitively. It hinges on the instructor's ability to intervene with conversations, with discretions at the right time.

Otherwise, a well-intention collaborative learning can evolve to become a drift-away conversation without proper focus.
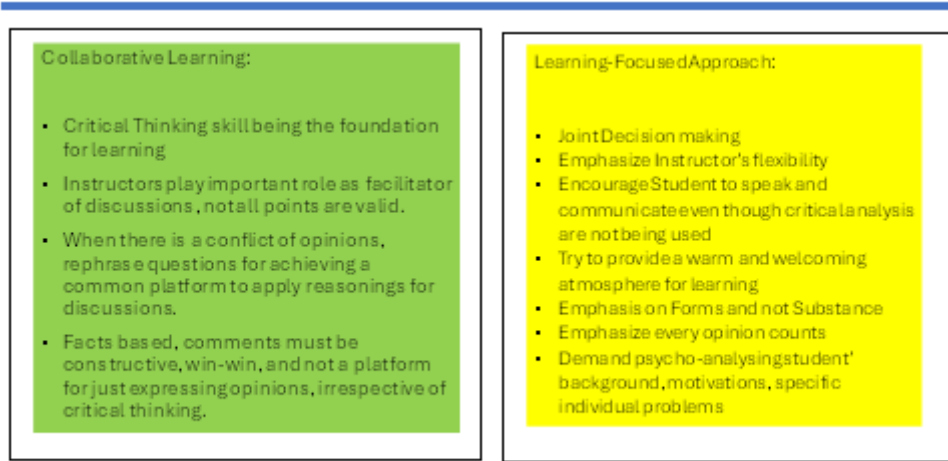
Figure 1. Difference between "Collaborative Learning" and "Learning-Focused Approach"

The collaborative learning approach this paper advocates is not in form and appearance, which the Learning-focused methodology stresses, but in terms of substance. The tool of a Learning-focused methodology builds on a syllabus. The presumption is that a good syllabus can set the tone for the course that will result in good learning. True collaborative learning needs to depend on results. Does the stock of knowledge increase as a result of collaborative learning. An objective measure of that could be research publications, opinion pieces arising from collaborative learning, or simply the ability to ask insightful and constructive questions. In institutions of high academic excellence, teacher/student creative works are common. A content-focused syllabus is the hallmark of academic excellence whereas a learning-focused syllabus encourages instructors to focus on classroom behaviors.[4] Regardless, the relevant

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[4] A Learning-focus approach, if stretched to the limit, holds an instructor entirely responsible for student learning the subject matter, irrespective of the student's motivation. An example would be when a student shows a lack of interest in the subject matter being taught, how a faculty is being advised to handle the situation. A Learning-focus approach would suggest having a private discussion with the student to identify his or her motivation to fix whatever misalignment of expectation. A content-focus approach would be to emphasize the features in the content of the class (perhaps in a different way) that can provide a more inclusive discussion for the whole class, as there are multi-angles to collaborative learning. Assessment of a classroom interaction based on an extreme Learning-focus approach can

question that needs to be addressed is how activities in the classrooms are transferable in the sense of an experiential learning to the modern workplace today.

Bringing critical thinking skills in the form of collaborative learning in the working place has been noted in various career advising platforms (Indeed, 2022; PMC, u.d.). Employers are looking for employees who can make a difference and not just to fill a lazy girl's job. (Mortensen and Edmundson, 2022). Creating meaning collaboration is recognized as an important workplace ethical standard (Harvard Human Resources, u.d.). Expert advises: "The first aspect employers notice is the way you communicate, your command over the language and how well you present yourself to them. Great communication gives the employer an insight into how confident and clear your vision towards your career and goals are." (Tambe, 2023). To be sure, students entering the workforce today must be somewhat technology savvy, but that's different from having an institution or a course structured around a particular technology. For example, Amazon in the city of Vancouver had planned on hiring 10,000 employees, but it does not mean the schools in Vancouver should be all teaching AWS as a course in their curriculum. Likewise, no higher learning institutions that the authors are aware of would adopt Microsoft's Co-Pilot as a theme for a course. Education in a crowded technology-driven economy usually lets a student choose the learning of a particular protocol. It is a student's own self-learning pursuit based on each person's individual interest and goal, and not necessarily rigidly defined in types and forms even though that might be what some teachers would like to adopt.

Collaborative learning can be conducted physically in classrooms or online. The determination and the gauging of the mix of on-and-off classroom activities is the instructor's choice, based perhaps on the background knowledge and motivation of students perceived by the instructor in a class. Except by regulations, most universities now conduct hybrid classes to allow instructors to experiment with the best mix of platforms. In this age where the workplace is increasingly digital, not only is this

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result in evaluating a class on the basis of students' body language, instructor's compromise of time for students in a class, and students use of cell phone during class, all superficial observations in forms, not in substance of the subject matter being taught in the classroom.

format provides flexibility, but it arguably is essential. In another paper, as a result of collaborative learning in a special topic course, one of the authors in this paper has pointed out that digital dialogues should be the focus for the 21st century economy (Lorne, et.al., 2024). The education business, like any business, has to think of ecosystem positioning in this complex technology evolving environment. A course is only a product in the whole education catalog of an education platform/institution, like a meal in a menu of a restaurant. The business, like any other business, will be subject to competition for designing its own ecosystem positioning.

For online or offline, constructive dialogues for collaborative learning are exceedingly important for higher learning institutions that emphasize academic excellence. To be sure, not all students' comments and contributions are valid. For example, social media where everyone has equal right to "contribute" has lots of noises. Educators most likely would need to have good critical thinking skills themselves first in order to facilitate collaborative sessions so that they can steer constructive dialogues to fulfill the objectives of a content-focus syllabus. There could be noises, disagreements, agree to disagree moments that if collaborative learning is not well-managed, and sometimes requiring a bit of forcefulness, it can be evolved into aimless discussions with frustrations, with each side accusing the other side of being "emotional", however unintended the true motivations might be. That would be the worst-case scenario of collaborative learning.

Collaborative Thinking Skill Under the Shadow of Technology Myths.

In this age of emerging technology and the AI we are about to face, educators in all higher learning institutions are asking the same question: How do we assist classroom teachings with the latest technology. Even though the question is of good intention, this can be a prone spot where the critical thinking skills that most faculty in higher learning institutions value may be compromised. At the outset, AI in principle can replace all teachings; and even if complete replacement will not happen, there will be a core of administrators looking for new opportunities to obtain new means to gain

power. Critical thinking skills will be under assault first in small instances but will likely grow if the force of technology becomes increasingly convenient for management to use as a whip.

Figure 2. An AI-Driven Baby Carriage suggesting the raising of a young mind can be totally managed by technologies. *Source: Photo by authors at InnovateWest show, April 16-17, 2024, Vancouver, Canada*

Some specific examples further illustrate how critical thinking skills can be disrupted by mesmerizing the glamor of technology.

a. *Losing common sense in believing technology guidelines gives the "best" answer to an exercise on social engineering, the method of phishing.*

In this age of high cybersecurity risk, it is normal to expect an ordinary person to be paranoid about things. Allegedly, someone famous was eating guacamole in a meal and commented that it was a bomb. Yet, critical thinking can lead us towards developing some type of self-guided defensive mechanism set for various risks.

Universities, however, do provide additional training for guidelines to follow based on "technologic" expertise. In the name of information security, such teaching lessons can be misleading and ambiguous, adding to fear rather than mitigating fear.
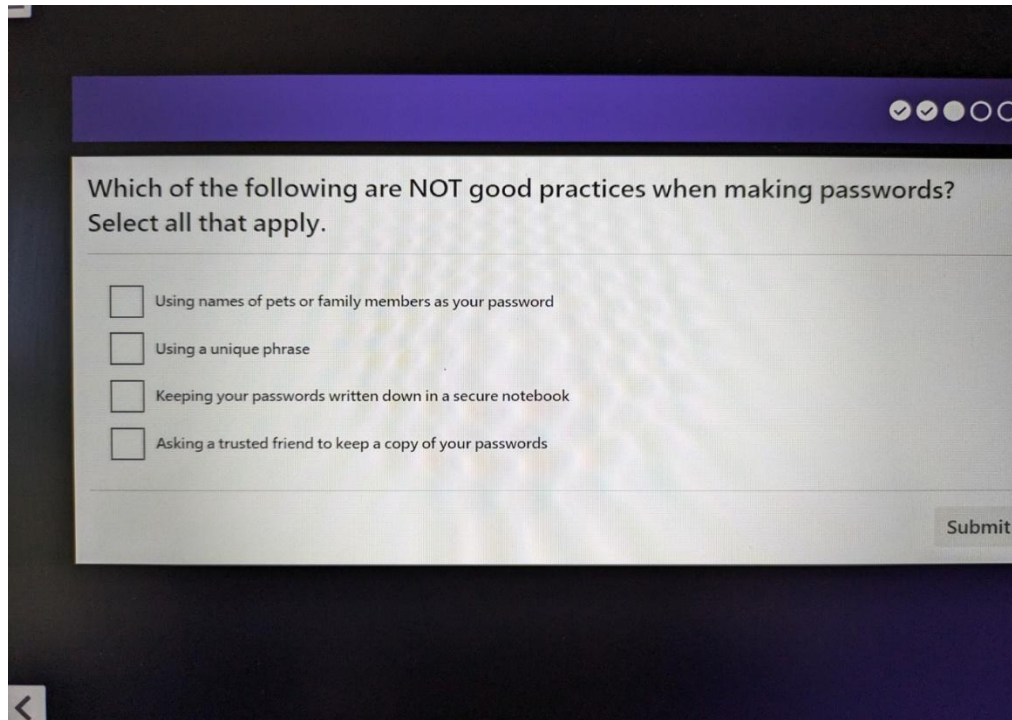
Figure 3. Multiple Choice of a Cyber security training tutorial.
Source: Know-Be-4 Training Tutorials, 2024

Above template is an example from a typical technology learning tutorial, teaching users on safe ways to manage emails. The correct answer to the question of managing passwords is rather surprising: All the options are NOT good practice except "using a unique phrase". In the first place, what kind of phrases will contain special characters, numerical, and at least one upper case? Moreover, how a technologist supremist can believe that all other circumstances specific to how an individual manages his/her life should be subservient to the unique phrase method? There may be all sorts of situations where individuals choose their method of handing privacy. Some individuals may have mental disability that rely on someone they trust to keep passwords for them. How could there be only ONE good way to manage passwords! Whoever was designing the question cannot be assumed to be using common sense and critical thinking in the

design of the question. The "right" answer humiliates the critical thinking of the respondent.

It is also interesting to note that universities have set up high security standards requiring okta verification to everything online, as if we have data as important to protect as financial institutions and alike. We note that paranoid is the result when nothing is absolute. The clip side of any security measure is cyberthreat, from outside and possibly inside of an organization. Our personal experience is that in spite of okta, fake email notification from administration is still appearing in our mailbox. Thus, there is no bullet-proof defense to cyberattacks simply because the resources spent (attackers and defenders) are relative. If one is disabled of the critical thinking skill to evaluate and discern specific circumstances, blindly following guidelines, it could be more dangerous than following guidelines.

b. *Worshipping technology can disrupt a class discussion that stresses critical thinking.*

As pointed out earlier, the overzealousness of technology may not be coming from the technology or the AI itself, but from the managing administrators supporting them. This could become burdensome for faculty seeking academic excellence and other means for creativity in classroom to accommodate, as the administrators could be aiming for "forms" and not "substance". For example, educators sometimes believe that good discussions can only be held on the platforms they create for discussions and will blame an instructor for not having sufficient discussions on the online discussion platform. The truth of the matter is, almost in every class, students "discuss and talk" on a platform outside what the institution provides, e.g. Whatsupp, Wechat, etc. As an example, when a "fake" news discussion was carried out in a classroom by one of the authors, administrator/evaluator pivoted on a topic of media forensic, simply because the administrator himself has certain preference on what should be discussed.

The dark cloud of the technology myths could be everywhere and not just in the classroom of higher learning institutions. For those who completely rely on technology or the disciples of technology, an untamed humanoid robot's interaction with a human

could illustrate that the interaction may not be as smooth as one would expect.[5] Human's critical thinking skills are way above the robots!

    c. *The development of a set of KPI is good in and of itself even if the KPI does not contain meaningful measures, all in the name of being more objective and scientific.*

Technologists pursue and pressure the creation of measurements. Yet, many quantitative assessments are either meaningless or easily evadible. For example, a scoring method to evaluate student learning based on the objectives of a course mentioned in the syllabus is absolutely meaningless if the instructor has to assign a number subjectively and arbitrarily to individual student in a course based on a set of subjectively defined goals; and somehow, someway, some "objective" criteria are being defined for the success of the whole course. The exercise could be, in one form or another, playing with numbers as self-assurance that somehow a subjective measure becomes an objective measure.

The belief that by creating KPI monitoring in classrooms that somehow the quality of teaching will be improved is a rather naïve way of managing higher learning education standards. Granted that performance requires monitoring, it is not necessarily true that the creation of KPI for the learning process in higher education means that a higher quality education will be provided.

Ed-Tech Survey

Technology upgrade is a necessary step-up for all organizations including education institutions. Most education institutions have an educational technology committee of some kind to oversee and plan the technology needed for the institution. This is a good thing, and arguably very much needed amidst the digital technology wave we are facing. For example, upgrading equipment, e.g. touchscreen displays, classroom furniture, managing institutional emails, effective ways to deliver online courses, stablishing internal protocols, etc., all are very important infrastructure/capital costs

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[5] See the Nvidia GTC event in March 2024: https://www.youtube.com/watch?v=51TYhPJ4zys

decisions that every education institution must make. The diligence of the administration is to be commended.

Yet, one has to also look at how faculty is viewing the assistance of technology, like the survey that is typically run for students for a class they have taken. Administrations like to criticize the low response rate for classroom evaluations, pushing faculties to repeatedly remind students to respond based on low response rate by students. They should subject themselves to the same methodology of self-evaluation. The institution in which the author(s) in this article works at conducted an Ed-Tech Survey in 2024. In spite of numerous institutional promotions of the Ed-Tech Survey, response to technology was less than overwhelming. The lack of good response could be that individual faculty already recognized what technologies would be best to conduct the class they feel are most suitable for the mission of their teaching. For example, if the class a faculty is teaching emphasizes collaborative learning in classroom, the need of technology is very little, because the exercises require oral skill in building constructive dialogues, which is the very needed skill that decision makings in the real-world require, not the type of skill that will be easily replaced by robots or AI.

Table 1. Response rate of an Ed-Tech survey

Source: Authors' email correspondence

New York	FT Faculty (from directory)	FT Faculty Submissions	FT Faculty Participation %
Architecture & Design	40	6	15.00%
Arts & Sciences	67	11	16.42%
Engineering & Computing Sciences	48	13	27.08%
Health Professions	37	17	45.95%
Management	27	3	11.11%
Osteopathic Medicine		1	
other		1	
TOTAL	**219**	**50**	**22.83%**

Vancouver	(from directory)	Submissions	Participation %

Full-Time Faculty	**21**	**4**	19.05%
Adjunct Faculty	**60**	**1**	1.67%
TOTAL	**81**	**5**	**6.17%**

The above table showed that among all the programs listed, the School of Management has the lowest response rate,11.11% on the main campus. The Vancouver campus full-time faculty response rate of 19.05% was not broken down into programs. In view of Vancouver's campus high emphasis on cybersecurity training, it is rather surprising that the response percentage is not higher than its equivalence of 27.08% for the main campus. In other words, the quest for technology and AI integration into classrooms could rely mostly on self-learning for the instructors and students in the classroom, depending on the subject matter to be taught.

Conclusion

We live in a world where circumstances are changing very rapidly. The powerful force of creative destruction cannot be expected to be unlikely, but likely, to "make or break" a person. The defense needed to deal with the situation is not being complacent in hoping what is to be "revealed" is always on the winning side of the creative destruction process. Learning a mixed bag of technology is not a good strategy to pursue because (1) competition is likely to result in many losing technologies, gaining expertise in one will be very risky, but diversifying by learning all will result in someone being "a Jack of no trade." (2) critical thinking skill is necessary for reading situations and circumstances even though the perception one has about what's coming may not be accurate; but the ability to strategize in reaction to changing circumstance is important, including the workplace requirements. (3) the blue-link economy (i.e. leads on the internet from a conventional search) is unlikely to be completely replaced by AI. What the 21st century employers really need should become the mission of university education, and not mislead students in believing a particular institution is the flagship of technology. The paper argues collaborative learning, teaching students to engage in constructive dialogues useful for the organization they serve could be a more fruitful path for the success of students and the mission of the educators.

There is no point in shaping our students to be a computer chip, not even a Blackwell chip. We live in a transformational environment. There is unlikely to be a one-size fits all teaching framework that can serve the multi-dimensional, multi-professionals based, and multi-disciplinary programs typical in a university. The overzealousness of a technological push can be manifested in many ways in higher education these days. Institutional support can be misfocused, particularly if the administrators are not trusting faculty and students in their own ways to pursuit a good mix of critical thinking skillset. University education can certainly be assisted by technology of the kind to provide enhancement of a particular critical thinking skill suitable for its respective professional needs. However, it is highly doubtful that a universal framework concerning technology adoption for learning in higher education exists. The push for changes in higher education based on technology needs to be critically examined.

With the world moving towards automation, with AI replacing human functionality including teaching, implying there will be a core of humans supporting its own destruction, this paper reviewed some alarming observations. There can be methods of increasing knowledge and methods of increasing students' employability in the workplace. These methods can only be evaluated by the experts in their own fields. While cross-disciplines opportunities certainly exist, and indeed, it is an opportunity that administration can assist; but most of these opportunities are based on human chemistry, starting at the level of faculty, via micro projects, and in the case of classroom situation, via collaborative learning. Administrators with preconceived teaching paradigms can hinder individual faculty development in achieving academic excellence.

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Prosocial Classroom Climate Through Awareness Integration Theory: A Culturally Relevant Educational Approach for Marginalized Students

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Introduction

The developmental period between 6 and 12, referred to as 'middle childhood,' universally marks a distinctive period between major developmental transition points. Many theories have established distinct features for middle childhood, such as Erik Erikson's psychosocial theoretical framework, which emphasizes the development of a sense of industry, and Harry Stack Sullivan's interpretation of the importance of interpersonal relationships during the same period. Freud believes this age group

experiences the latency stage, where a halt and retrogression in sexual development is replaced by the child's desire for social connection. Jean Piaget, a Swiss developmental theorist, states that the significant psychological accomplishments of middle childhood are in the realm of intellectual competence stemming from the child's need to develop a logical model of intellectual functioning in an engaging, integrating, interactive organism with its environment. The focal point of all the above developmental theories, and many more alike, is the significance of middle childhood's developmental needs to connect, engage, and mediate socially and intellectually (Collins, 1984; Rogoff et al., 1975).

Middle childhood is transformational as children emerge from early childhood and realize that many requirements and expectations are now being placed upon them. Entering elementary school brings more responsibility and accountability, from playfulness to serious endeavors, while physical growth prepares the child for socialization and looking for personal interactions and contacts. This growth changes progress toward maturity (Jafari et al., parenting book). Playing, doing homework, doing housework, gardening, and sports are essential for children in middle childhood. These activities provide the time and space for children to use their abundant energy and learn from their experiences; it is also a time for parents, teachers, and caregivers to share their ideas and values and let the children know they are cherished. Teachers, educators, and parents must recognize that children are at different levels of cognitive development. As children develop intellectually, they can suggest, discuss, and debate rationales, alternatives, consequences, and compromises. Parents should foster this type of explorative thinking.

Traditional curricular SEL has yet to show reasonable efficacy and steady successful results since teachers are vulnerable to experiencing compromised social-emotional competency (SEC). Current research suggests an inverse relationship between SEC and teacher burnout. Consequently, intervention efforts should be made to support teachers' SEC through stress reduction and mindfulness programs. A teacher who has developed SEC can be instrumental in students' SEL training—addressing the potential efficacy of intervention strategies to promote teacher social-emotional

competency and improve student learning outcomes (Jennings & Greenberg, 2009). It is time for the SES curriculum to be revamped and for a new generation of this essential educational program to be revitalized with consideration for addressing marginalized students for inclusivity, cultural competency, and teacher's effectual training.

Research Methodology

For this narrative review/opinion article, we searched PsychINFO, PubMed, Google Scholar, and Web of Science databases to identify relevant articles on topics such as "marginalization," "SEL," "prosocial," "cultural competency," and "emotional regulation." To eliminate duplicity and maintain uniformity in the definition of SES, academic achievement, and various contributory factors, the authors exercised extreme caution to prevent unintentional bias. The initial search for scientific peer review in relevancy to research produced 120 articles, which were screened again for inclusion and exclusion criteria. Among the 120 initial articles reviewed, the authors concluded the search by selecting 23 articles that met the criteria for this paper's research objectives.

Since this paper is NOT a systematic review, as a literature review methodology, the researchers used keywords such as SES and academic achievement in the title or abstract of any peer-reviewed study published by high-impact publications. The selected keywords were grouped into two main categories: 1) A group of keywords was set to identify articles whose goal of the study was to investigate the SEL programs, such as outcome, applicability, and cultural appropriateness. 2) The next category was groups of keywords used to describe or highlight the multifactorial and extraneous variables, such as the language and/or ethnicity role as obstacles in securing a successful SEL program. See Figure 1 below.

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| 1) 120 records found through preliminary database search for marginalization and SEL. | 2) First-line screening and elimination of irrelevant articles | 3) Keywords that highlighted the type of elements like multifactorial and extraneous variables such as culturally diverse SEL curriculum | 4) Out of 120 revviewed articles, 23 relevant articles ere selected articles contining marginalization, SEL, prosocial, emotional regulation. |

Figure 1. Research Studies Selection Criteria

Factors Contributing to Marginalization

Many factors may contribute to marginalization, for instance, poverty (UNICEF, 2014), socio-cultural practice, education, social status and power (Devkota, 2018), race, ethnicity or disability (Slee, 2013), gender or sexual orientation, linguistic, and cultural minorities (Khanal, 2017), religion (Smith & Barr, 2008) and personal circumstances such as being displaced, migrants or refugees (Shapira, 2011; UNCHR, 2018). Marginalization, in this sense, is a relational and intersectional phenomenon (Pihl et al., 2018) that is experienced and recognized at different levels in different contexts.

Children who live within a migrating family are particularly vulnerable to transitioning during middle childhood and prone to becoming marginalized as they arrive in a new country. Learning a new language, finding new friends and family connections, and maintaining academic performance can be particularly challenging for them. Transitioning to school, some migrant children might quickly adapt; however, many more might struggle with new and unfamiliar challenges, and others, particularly marginalized students, may need skill-building and strategies to optimize social-emotional learning and interpersonal and intrapersonal relationships.

Developing a culturally diverse and inclusive classroom environment is essential since an integrative learning atmosphere helps marginalized students feel accepted and included while cognitively and emotionally preparing for academic success (New Zealand Government Report (2022). Educational 'marginalization' is a complex issue characterized by biased, favored, or deliberate misdistribution of resources to educational tools, opportunities, accessibility, or opportunities aimed at particular groups such as SES, gender, geography, ethnicity, or individual characteristics or circumstances (Mission, 2013). According to Mowat (2015), this complexity is evident in the low participation of disadvantaged or excluded student communities in mainstream education.

Prosocial Behavior and Social-Emotional Learning

As defined by Eisenberg (1986), prosocial behavior is voluntary and intentional behavior intended to benefit another, including acts of kindness, helping, sharing, and comforting, as well as behaviors enacted for diverse reasons. The early signs of prosocial behavior, observed in toddlers as young as 12 to 24 months, are particularly intriguing. These young children often show a spontaneous spirit of attempting to help, give comfort, share, and cooperate with others (Brownell, 2013). Gonzalez-Mena explains that socially aware educators conduct classrooms in promoting a dynamic of reflecting on equilibrated power in relationships, discouraging competition as a motivator, encouraging appreciation, giving reasonable choices, and modeling and teaching a non-violence learning environment. Teachers are trained and well-versed in social-emotional learning models, such as behavior, explaining their actions, encouraging student peer cooperation and problem-solving, and avoiding punishments as a deterrent or behavioral compass that may lead to misbehavior.

The Mechanism of Social-Emotional Learning

The SEL developmental process starts at birth and continues throughout life (Weissberg et al., 2015); it helps the individual develop and foster the skills needed for healthy relationships. Self-awareness, self-regulation, social self-cognizance, relationship skills, and the ability to make complex decisions are essential components

of an effective SEL (Weissberg et al., 2015). Integrating social and emotional learning into teaching curriculum, instruction, and school climate leads to academic achievement, enhances well-being, positively impacts life outcomes, reduces teacher burnout, and promotes resilience (Durlak et al., 2011; Taylor et al., 2017).

Due to experiencing adversity, stress, and unfavorable treatment, individuals in a marginalized group may encounter higher mental health challenges. Teaching social-emotional learning (SEL) skills is instrumental in providing the necessary tools to navigate these challenges and improve their well-being. Social-emotional learning (SEL) provides the framework and strategies for promoting the development of self-regulation skills (Lereya et al., 2024). Teaching students to recognize and understand, learn regulation skills, manage behavior, and make responsible decisions. SEL helps individuals develop the self-regulation skills necessary for success in school and life.

Awareness Integration Theoretical Model for SEL

Awareness Integration Theory (AIT) is a theoretical framework designed as a comprehensive, multimodal psychological and educational approach to boost self-awareness, eradicate psychological and emotional obstacles, and promote a growth-oriented mindset. Individuals of any age can learn AIT's comprehensive tools and lead fulfilled and successful lives. As a holistic personal development approach, AIT integrates critical elements from established psychological and developmental theories and creates an accessible and applicable learning experience (Zeine, 2021).

The mechanism of AIT in teaching social-emotional learning (SES) is based on six easy-to-follow and practical phases customized to the learner's comprehension level. Its six phases help individuals cultivate self-awareness, emotional regulation, and professional growth, ultimately improving their job performance and overall satisfaction. Teachers can be trained on AIT through various modalities such as in-house customized training, online classes, in-house workshops, and/or by working on the "Foojan" app as an ongoing tool in various life areas. After the initial training, teachers can use "Mira"- an AI companion in the Foojan app for supplemental skill building (Zeine, foojan.com, 2024).

Teacher Training on Social-Emotional Competency Training

The review of existing literature on students' social-emotional competency highlighted that teachers' low levels of social-emotional competency and burnout factors, lack of curricular inclusivity, and considerations for marginalized students' needs are correlational to children's overall mental health well-being. Teachers' sensitivity and competency are significant in creating and incorporating a prosocial classroom environment. Sustainable social competency programs that can be adjusted to students' developmental or cultural needs. To incorporate these crucial elements in a prosocial classroom, genuine teacher-student interpersonal relationships are vital to academic outcomes (Jennings & Greenberg, 2009). As demonstrated, social-emotional competency learning is vital to marginalized students' overall developmental needs; the authors will briefly discuss the role of a teacher's cultural competency and prosocial awareness in the following passages as how AIT's social, emotional, and regulation strategies can be instrumental in facilitating teachers' SEL curricula.

- Teacher's awareness of their positive and negative perspectives, beliefs, thoughts, emotions, and behaviors and how their attitudes affect relationships with coworkers, supervisors, students, and parents, which they can replicate and train students through interaction, direct and indirect teaching, and modeling. Teachers can also replicate this process in any interactions with their students. This phase will result in students gaining insight into automatically identifying areas for growth, improving their decision-making, and communicating more effectively within the school environment. (Zeine, 2016).

- Trained teachers in observing and assessing their assumptions about others and how these beliefs influence their behavior. Recognizing and verifying these assumptions fosters healthier relationships and personal growth. A teacher's belief and modeling of this behavior can facilitate AIT's social-emotional competent teaching in the classroom environment, which is a pro-emotional regulation learning atmosphere (Zeine, 2016).

- Teachers who have learned to practice self-emotional regulation can recognize emotions like anger, shame, or hopelessness. They also examine how they treat themselves, noting whether they approach themselves with kindness and compassion or with self-criticism and punitive behaviors. This demonstration in the classroom can act as an exemplary role model for students learning SEL in a conducive classroom environment (Zeine, 2016).

- Socially competent teachers integrate their empowered and vulnerable selves to inspire students to access their full range of strengths. This empowerment enables students to approach situations with confidence and a sense of personal power.

- AIT SEL-trained teachers will learn culturally competent moral understanding and strategies suitable to apply in diverse classrooms. Teachers use these strategies to guide students in setting values and goals for academic achievement, handling homework, and managing relations with peers, siblings, and parents.

- An academic curriculum that values the impact of SEL as much as other curricular vigor will establish a periodic assessment mechanism for feedback, ensuring steady progress toward achieving goals among colleagues and students (Zeine, 2016).

Teachers can be trained on AIT through online classes, in-house workshops, and/or working on "the Foojan" app through various life areas as an ongoing tool. After the initial training, teachers can use "Mira"- an AI companion in the Foojan app for supplemental skill building (Zeine, foojan.com, 2024).

Teaching AIT SEL Curriculum by a Social-Emotional Competent Teacher

The authors propose an SEL curriculum customized by AIT principals to create a prosocial classroom environment for marginalized students. The curriculum starts at the beginning of the year with a pretest assessment specific to identifying the marginalized student's area of social competency needs. After completing the AIT SEL curriculum, a posttest will help educators fine-tune gap areas and reevaluate areas for adjustment. The duration and specifics of each AIT SEL program will be developed

based on the age and needs of the classroom within the demographic in which it operates. The following passages will give a closer look into the proposed classroom prosocial environment conducive to AIT SEL student training.

Phase 1- Relatedness to The World (Mastering Self-Awareness and Mindfulness)

 The first phase entails teaching students how to access their self-awareness channel using mindfulness techniques. Through this phase, students are guided to examine their positive and negative perspectives, beliefs, thoughts, emotions, and behaviors. Teachers can use this process to explore their own. This process helps the learner identify biases, dualities, and patterns by incorporating these lessons into their curriculum or replicating them in student interactions. As a result, the student will learn how to recognize and regulate their decision-making, communication style, and behavior in the classroom (Zeine, 2016).

Phase 2 - Projection Disguised as Reality (Recognizing Assumption)

During this phase, students learn to reflect on their assumptions about others and how they can influence their behavior, leading to defensive thoughts and behavior and understanding how one's assumption can lead to misunderstandings and harmful conclusions. Upon completing this phase, students learn to recognize unconscious assumptions and one-sided judgments about teachers. Phase I is a culturally sensitive process, and its success depends on the teacher's cultural competency and elements of inclusivity to put the learner at ease with foundational beliefs. Encouraging students to reflect on their assumptions about others and how these beliefs influence their behavior is of utmost importance for the integrity of this phase. Students can learn this phase by direct teacher teaching or in the frame of the SEL curriculum (Zeine, 2016).

Phase 3 – Identity (Examining Positive and Negative Self-Beliefs)

Individuals identify and alter unproductive cognitive and behavioral patterns related to their self-perception. Students will learn to differentiate between their positive self-beliefs, which act as strengths, and negative self-beliefs, which hinder their personal growth and interpersonal development. Through this phase, they will learn to reflect on their emotions toward themselves—whether feelings of pride, joy, empathy, or

negative emotions like anger, shame, or hopelessness. In this phase, children learn a deeper level of empathy and observe how they treat themselves, noting whether they approach themselves with kindness and compassion or with self-criticism and punitive behaviors (Zeine, 2016).

Phase 4 – Linking/Connecting/Integrating to the Origination of Schemes (Emotional Regulation)

Children learn how to process and regulate their emotions by recognizing, understanding, and accepting emotions while using strategies to manage them in a healthy, adaptive way. This process includes identifying the emotion, where it is felt in the body, and the belief that triggers it, and finally, linking the emotion to the original life event that caused the emotional trigger. An essential step in this phase is to learn how past experiences shape their responses to tasks and interactions and provide valuable insights for growth. Naming their emotion and locating their physiological signs in their body while releasing them enables students to master social interaction and interpersonal skills. Teachers trained in AIT-specific social-emotional learning can model this phase while using peer groups to practice the reciprocal interaction of emotional regulation (Zeine, 2016).

Phase 5 – Future to the Present Integration Process (Deliberate Selection of Belief Systems)

By this phase, students have learned to practice self-awareness, recognize assumptions, examine self-beliefs, and regulate emotions. Now, they are ready to focus on mastery of the deliberate selection of values, beliefs, emotions, and behaviors contributing to positive outcomes. During this phase, individuals set clear and attainable goals for both personal and professional growth. By consciously making these changes, individuals align their actions with their professional goals and core values, fostering growth and success. Teachers support students in setting values and goals for academic achievement, handling homework, and relations with peers, siblings, and parents (Zeine, 2016).

Phase 6 - Sustainability of the Present to the Future (Self-Assessment and Feedback Loop)

In this phase, students learn the importance of establishing a social-emotional loop and feedback mechanism to ensure steady growth of learned skills and proving regressive behavior. They also learn to be mindful of the built-in structure for checks and balances to ensure steady progress toward achieving their goals among colleagues and students (Zeine, 2016).
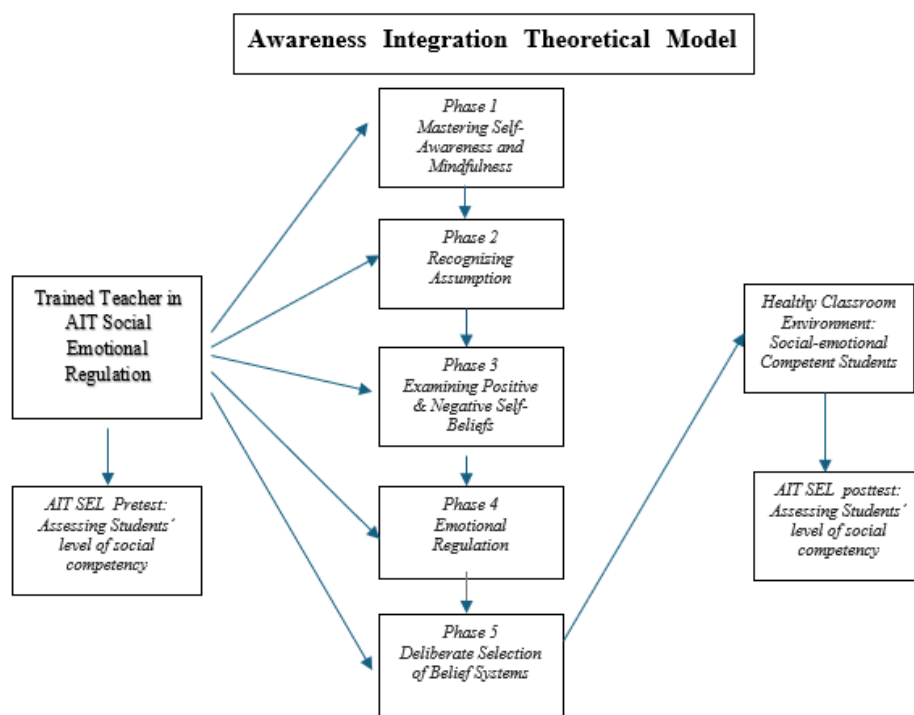
Figure 2. The proposed AIT SEL curriculum process

Gaps in the Literature

A transformative and inclusive SEL framework emphasizes the importance of culturally adaptive SEL opportunities for underrepresented students to support those children's social-emotional and academic skills (Jagers et al., 2019). Williams and Jagers (2020) pointed out that learning culturally relevant topics has become prominent in school education in explaining appropriate child developmental support. Recent transformative SEL research advocates for a balanced cultural education as a

critical strategy to address the emotional well-being and learning growth of underrepresented students, including those from minoritized cultural or ethnic groups (Jagers et al., 2019; Rivas-Drake et al., 2020). The urgency and significance of providing culturally adaptive SEL opportunities for underrepresented students cannot be overstated. Learning environments for effective SEL where underrepresented students can feel safe and inclusive relate to a classroom climate where peers and teachers can respect differences and encourage plentiful positive interactions (Jennings & Greenberg, 2009).

The literature review for this paper revealed several discrepancies in the current student's social-emotional learning. Furthermore, the high rate of failed attempts at incorporating SEL into school curriculum showed correlations to teachers' low levels of social-emotional competency and burnout factors, lack of curricular inclusivity, and considerations for marginalized students. Most literature on the SEL curriculum focused on 'gender' as the primary factor in marginalization; however, a more meaningful analysis of other contributory factors, such as language, culture, ethnicity, demographics, and socioeconomic status, is needed. Our review of global literature indicates that a combination of many factors causes marginalization and that a comprehensive approach is needed to address its pervasive and entrenched nature in most under-resourced contexts. Importantly, further research is needed on the SEL curriculum that focuses on the specific needs of marginalized and underprivileged students, presenting a significant opportunity for future research and development in this field.

Culturally Relevant Educational Approach for Marginalized Students

AIT offers a unique, culturally designed student-centered model linked to emotional, cognitive, and behavioral outcomes assessed through an interventional emotional regulation learning with pre-test and post-test built-in to evaluate program efficacy. A student-centered model focuses on students' needs and strengths, linking emotional, cognitive, and behavioral outcomes. AIT supports this model by providing tools for

personalized learning and self-improvement. Since the AIT model directly works with the student's grass root belief system, it has a built cultural competency to protect the integrity of the participants' symbolic inheritance as the purpose of its culturally appropriate emotional regulation skill building is to support the student's foundational beliefs not to change or modify them.

Conclusion

The Awareness Integration Theory provides a robust framework for creating a prosocial classroom climate, especially for marginalized students. AIT is a high-efficacy model that incorporates a culturally relevant educational approach, focuses on student-centered outcomes, and offers interventional emotional regulation learning with built-in assessments. Its adaptability to cultural factors ensures that it can meet students' diverse needs, making it a valuable tool for educators aiming to foster inclusive and effective learning environments.

For marginalized students, a culturally relevant educational approach is critical to their engagement and success. The Awareness Integration Theory (AIT) offers a comprehensive framework that can be adapted to meet these needs. This article explores how AIT can create a student-centered model linked to emotional, cognitive, and behavioral outcomes, incorporating interventional emotional regulation learning with built-in assessments. AIT's adaptability to cultural factors and its high efficacy in addressing the shortcomings of traditional Social Emotional Learning (SEL) models make it a powerful tool in educational settings.

After reviewing the literature, the consensus is that traditional SES curricula need more cultural inclusivity and trainer diversity competency. The authors propose a prosocial classroom model highlighting the importance of teachers' social and emotional competence (SEC) and well-being in developing and maintaining supportive teacher-student relationships, effective classroom management, and successful social and emotional learning program implementation.

For marginalized students, a culturally relevant educational approach is critical to their engagement and success. The Awareness Integration Theory (AIT) offers a

comprehensive framework that can be adapted to meet these needs. This article explores how AIT, with its adaptability to cultural factors and its high efficacy in addressing the shortcomings of traditional Social Emotional Learning (SEL) models, can create a student-centered model linked to emotional, cognitive, and behavioral outcomes, incorporating interventional emotional regulation learning with built-in assessments. The potential of AIT to revolutionize educational settings is a cause for optimism among educators and policymakers. This model proposes that these factors contribute to creating a classroom climate more conducive to learning and promoting positive student developmental outcomes.

Creating a prosocial classroom climate where students can process and regulate emotions fosters an inclusive and effective learning environment. For marginalized students, a culturally relevant educational approach is critical to their engagement and success. The Awareness Integration Theory (AIT) offers a comprehensive framework that can be adapted to meet these needs. This article explores how AIT, with its adaptability to cultural factors and its high efficacy in addressing the shortcomings of traditional Social Emotional Learning (SEL) models, can create a student-centered model linked to emotional, cognitive, and behavioral outcomes, incorporating interventional emotional regulation learning with built-in assessments. The potential of AIT to revolutionize educational settings is a cause for optimism among educators and policymakers.

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The Evolution of Inclusive Education in Cambodia (1953–2024): A Literature Review

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Introduction

Cambodia has faced the repercussions of civil war and a genocidal regime, resulting in numerous adverse effects, particularly a notable increase in the population of individuals with disabilities. Some Cambodians with disabilities have been directly affected by remnants of the civil war, such as mines and unexploded ordnances.

Additionally, disabilities stem from various causes such as traffic accidents, workplace incidents, prenatal and postnatal issues, aging, and other factors. Children with disabilities are considered to be among society's most vulnerable members (Abosi and Koay, 2008). Approximately 10% of Cambodian children are disabled, with speech-to-cognition impairments being the most visible (Dorlack, 2022). However, the education available in Cambodia today is far from universal (Abosi and Koay, 2008). In accordance with (Shaeffer and Perapate, 2022), 17,300 Cambodian students with disabilities received basic education during the 2019-2022 school year. Despite substantial achievements in the creation of inclusive schools, strategic objectives, and regulations, problems continue to be essential to the expansion and growth of disabled diversity (Grimes et al.). This chapter, based on secondary sources, provides a brief overview of inclusive education for children with disabilities in Cambodia, as well as a brief definition of inclusive education and, more specifically, inclusive education for children with disabilities. It then goes into detail about the progress made by the Cambodian government and partner organizations. Before concluding, the chapter suggests future steps to improve the equality and quality of inclusive education for Cambodian children with disabilities.

What is inclusive education?

In addition to all, it is essential to comprehend what inclusive education entails. These statements, often expressed in common phrases like "All means all" or "No child left behind," indicate that every learner matters equally. Inclusive education is the belief that schools should serve as a platform for all children or pupils, regardless of learning differences (Elliott and Thurlow, 2005). In other words, it should be a system that is effective, efficient, and successful in response to the diversity of students in its locality (Leg, 2022; Mpofu, 2022; Chumo, 2020). Unfortunately, according to UNESCO (2022), learners all over the world are being denied access to high-quality education because of factors such as gender, gender orientation, ethnic or social origin, language, religion, nationality, economic status, or abilities.

Education that is inclusive for kids with impairments

In general, inclusive education for children with disabilities is viewed as a method of meeting their needs within general educational settings (Abosi and Koay, 2008). In other words, inclusive education includes everyone without discrimination based on disability (Nind, 2014). People with disabilities, according to the United Nations Convention on the Rights of Persons with Disabilities, are those who have long-term physical, mental, intellectual, or sensory impairments (Rasmussen and Lewis, 2007). When combined with other societal barriers, such impairments can impede equal participation with others (Latchem and Latchem, 2018).

Actually, if a school is primarily designed for children with disabilities, it is considered segregation.' Similarly, putting children in a special or separated unit is referred to as segregation. On the other hand, 'integration' occurs when both children with and without disabilities are included in mainstream settings but lack appropriate support and accommodations (Thomazet, 2009).

Methods

This paper is a comprehensive review of the development of inclusive education and the effects of inclusive education policy on Cambodia's development prospects over six phases of political change. It also discusses the success and failure of each regime's adaptation of inclusive education as a policy for national development. The researchers briefly reviewed and organized the contents of scholarly articles related to the previously mentioned concepts. The majority of the documents were discovered in the form of journals written by well-known authors who made significant contributions to Cambodia's inclusive educational research.

Data from scholarly sources, such as journal articles, were analysed using content analysis. The two analytical methods used in content analysis are conceptual analysis and relational analysis. However, in this study, the researchers used relational analysis to examine texts from various scholarly sources. Researchers can use relational analysis to investigate in-depth relationships between concepts or units identified

through the examination of semantic or meaningful relationships between those concepts or units.

Result

Under the Sangkum Reastr Niyum (1953 – 1970)

Constitution, Policies, Regulations, and Law Related Inclusion Education

At the Geneva Conference on November 9, 1953, Cambodia achieved peaceful independence from France. Prince Sihanouk dedicated efforts to advance educational initiatives across all levels, aiming to elevate the nation into a modern, industrially developed, and technologically advanced state within the region. Following this, the king established two highly effective political entities: the People's Socialist Community (Sangkum Reastr Niyum-SRN) and the Socialist Youth Movement of the Khmer Kingdom (SYKK) (Rany et al., 2012).

During the Sangkum Reastr Niyum period (1953–1970) in Cambodia, a dedication to inclusive education permeated constitutional provisions, policies, regulations, and laws. Prince Norodom Sihanouk, the leader of this era, endeavored to establish a holistic educational framework that championed accessibility and fairness throughout the nation. The Cambodian constitution under the Sangkum Reastr Niyum accentuated the paramount importance of education as a fundamental right for every citizen. Constitutional provisions underscored the government's commitment to nurturing an inclusive educational system tailored to the diverse needs of the populace. This constitutional framework laid the foundation for subsequent policies geared towards ensuring equal educational opportunities (Keo, 2019).

Under Prince Sihanouk's leadership, specific policies and regulations were implemented to propel inclusive education forward. These measures addressed multiple facets, encompassing basic education access, the quality of educational facilities, and the infusion of diverse perspectives into the curriculum. The government actively dismantled barriers to education, striving to guarantee quality schooling for students from all backgrounds. Legislation enacted during the Sangkum Reastr Niyum

period mirrored the government's dedication to inclusive education. Laws were crafted to secure equal educational opportunities for individuals, regardless of socio-economic factors or geographic location. The legal framework also tackled issues like compulsory education, teacher qualifications, and the establishment of educational institutions (Keo, 2019).

The country experienced a significant increase in the number of primary and secondary schools, as well as the establishment of numerous new universities nationwide (Chendler, 2008). Notably, seven higher education institutions were founded between 1953 and 1959, including the National Institute for Law, Politics, and Economics (1953), the Royal Medical School (1953), the Royal School for Public Administration (1956), the National Institute of Pedagogy (1958), the Faculty of Letters and Humanity Studies (1959), the Faculty of Science and Technology (1959), and the National School of Commerce (1959) (Chhum, 1973). Additionally, nine esteemed universities were established in provincial and municipal areas. The Buddhist University, inaugurated in 1954, marked the regime's first university, offering studies in religion and Khmer language. The Royal Khmer University followed suit in 1960, and by 1965, six more universities were established, including the Royal Technical University (RTC), the Royal University of Fine Arts (RUFA), the Royal University of Kompong Cham (RUKC), the Royal University of Takeo-Kampot (RUTK), the Royal University of Agricultural Science (RUAS), and the People's University (PU). Finally, the Royal University of Battambang (RUBB) opened its doors in 1967.

Achievements and issues related to Inclusive Education

Under Prince Norodom Sihanouk's leadership, endeavours were undertaken to widen educational access, particularly in rural regions, with the government aiming to diminish the educational divide between urban and rural communities. Policies were implemented to enforce compulsory education, ensuring that children had the chance to enrol in schools, a move intended to elevate literacy rates and lay the groundwork for advanced educational opportunities. The government also allocated resources to establish tertiary education institutions, responding to the escalating demand for higher

education, thereby contributing to the cultivation of a skilled workforce and the formation of a more educated society.

Inclusive education efforts during this period may not have adequately addressed the needs of students with disabilities or special educational requirements. The primary emphasis was on broad access, with limited attention given to tailored support for diverse learning needs. In summary, while the Sangkum Reastr Niyum era in Cambodia achieved notable progress in inclusive education, persistent challenges included disparities between urban and rural areas, socio-economic obstacles, concerns about educational quality, political control, and insufficient focus on special educational needs. The accomplishments and issues from this period significantly influenced Cambodia's educational landscape, laying the groundwork for subsequent reforms in these following years.

Under the Khmer Republic (1970 – 1975)

Constitution, Policies, Regulations, Law related Inclusion Education

The deterioration of education in Cambodia began with the establishment of the Khmer Republic (KR) after General Lon Nol's 1970 coup against King Sihanouk, supported by the United States to counter communism (Chandler, 1983). Concurrently, Cambodia became embroiled in the Vietnam War, leading to extensive bombings by U.S. B-52 aircraft targeting Communist North Vietnam forces and their supply lines within Cambodia. This conflict resulted in significant casualties, with over 700,000 Cambodians killed and approximately two million displaced farmers seeking refuge in Phnom Penh and other urban centres (Curtis, 1993).

Amidst these challenges, the KR government, preoccupied with war and military expenditure, neglected the education sector. Funding for education was drastically reduced, leading to school closures and prompting some students and teachers to join the Democratic Kampuchea (DK) revolution (Dy, 2004). In summary, the intersection of political upheaval, external conflicts, and resource allocation prioritized military endeavors over education, contributing to a decline in Cambodia's educational landscape (Chandler, 1983; Curtis, 1993; Dy, 2004).

The expansion of education in Cambodia faced significant challenges due to the allocation of the national budget towards war and defense efforts, resulting in the destruction of numerous educational infrastructures (Burgler, 1990; Fergusson & Masson, 1997). Despite UNESCO's acknowledgment of Lon Nol's government's intent to advance the education sector, financial resources were predominantly directed to wartime activities rather than educational development.

Fergusson and Masson (1997) highlighted the devastating impact of U.S. bombardments on educational institutions, citing the destruction of universities such as the University of Takeo-Kompot and the University of Kompong Cham in May 1970. Chandler (1983) further emphasized the extensive bombing campaigns by the U.S. in rural Cambodia, aiming to delay a Communist victory until congressional restrictions halted further bombings in 1973. Consequently, educational infrastructure, teacher training, and curriculum development were severely hindered during this period (Burgler, 1990; Fergusson & Masson, 1997; Chandler, 1983).

Achievements and issues related to Inclusive Education

During the Khmer Rouge (KR) regime, Cambodia's education system experienced significant instability attributed to political turmoil, civil conflict involving students and teachers, and the ramifications of the Vietnam War, particularly affecting rural areas. The conflict led to a sharp increase in dropouts, with many students and educators either opposing the KR government or joining the revolution. Consequently, school closures were widespread, resulting in a drastic decline in enrollment rates throughout the KR's five-year tenure until the Democratic Kampuchea (DK) assumed power in 1975. The regime did not introduce any new educational strategies or policies to foster the expansion of the education sector during this period. As a result, progress in inclusive education under the Khmer Republic was limited, characterized by a moderate expansion of educational opportunities and a heightened emphasis on technical and vocational education. Nevertheless, these endeavors faced substantial hindrances due to prevailing challenges such as conflict, disruptions, and political instability. These pervasive issues dominated the era, creating a foundation for the subsequent difficulties encountered by the education system in Cambodia.

Under the Democratic Cambodia (1975 – 1979)

Constitution, Policies, Regulations, Law related Inclusion Education

From 1975 to 1979, Cambodia experienced a devastating revolution under the Democratic Kampuchea (DK) regime led by Pol Pot, resulting in the loss of millions of lives. The Khmer Republic, previously led by Lon Nol, was overthrown in April 1975. This period, often termed "Year Zero," aimed to rebuild Cambodia through an emphasis on education. However, the DK regime targeted intellectuals, educators, students, and other perceived enemies, resulting in mass killings, starvation, and forced labour. Scholars such as Ayres (2000) and Chandler (1983) highlight the DK regime's catastrophic impact on Cambodia's educational infrastructure, with approximately 90% of schools destroyed. Libraries and laboratories were abolished, and educational institutions were repurposed for other uses, exemplified by the transformation of the Toul Sleng Prison from a high school. The regime's policies led to a significant loss among educators and students. Clayton (1998) reported that 75% of teachers, 96% of tertiary students, and 67% of elementary and secondary students perished. Moreover, Whitaker (1973) noted a drastic decline in the number of teachers, with only 5,000 remaining out of over 20,000 before the DK regime. Among intellectuals at the University of Phnom Penh, only 87 out of 1,000 survived. The DK regime indoctrinated Cambodian youths with revolutionary ideologies, viewing them as instruments to transform Cambodia into a socialist country. However, scholars such as Burgler (1990) and Chandler (1983) underscore the profound implications of this indoctrination, leading to the exploitation and manipulation of young individuals for the regime's objectives. In summary, the DK regime's radical policies resulted in widespread devastation, particularly targeting Cambodia's educated population, disrupting the education system, and leaving enduring scars on the nation's history.

Achievements and issues related to Inclusive Education

During the Democratic Kampuchea (DK) regime, education in Cambodia underwent significant changes and was primarily geared towards indoctrination rather than traditional learning (Burgler, 1990; Vickery, 1984; Clayton, 1998). Schools were

established for children up to ten years old, offering limited hours of instruction focused on basic subjects like reading, writing, arithmetic, and revolutionary songs and dances. Instruction was conducted in Khmer, prohibiting foreign languages. Teachers were selected based on trust by the Angkar organization and typically came from peasant backgrounds with minimal education or teaching experience (Burgler, 1990; Whitaker, 1973). The DK regime aimed to instil revolutionary values in the youth, emphasizing ideological indoctrination over academic development (Whitaker, 1973). Furthermore, Vickery (1984) and Vireak &Bunrosy (2024) highlighted additional educational initiatives focused on technical training. The Institute for Science Training and Information offered specialized courses for selected youths, primarily from peasant families, aiming to produce technicians and scientists rapidly. Some of these individuals were sent abroad for further training, reflecting the regime's ambitions to expedite national development. Furthermore, political education was integral, targeting DK squads and members with daily sessions on agricultural production, infrastructure projects, and revolutionary policies (Vickery, 1984). Music and songs served as essential tools for disseminating the regime's ideology and maintaining control over the population. In summary, education under the DK regime was profoundly influenced by ideological objectives, emphasizing revolutionary values, and control over the population.

Under the People's Republic of Cambodia and State of Cambodia (1979 – 1991)

Constitution, Policies, Regulations, Law related Inclusion Education

In the era spanning the People's Republic of Kampuchea (PRK) and the subsequent State of Cambodia (1979–1991), various constitutional, policy, regulatory, and legal changes significantly influenced inclusive education in Cambodia. This period emerged after the collapse of Democratic Kampuchea and was characterized by extensive initiatives to reconstruct the nation's educational system. Noteworthy elements concerning inclusive education during this timeframe include the adoption of the 1981 constitution of the People's Republic of Kampuchea, which, along with subsequent legal frameworks, formed the basis for governing the country.

The period also witnessed a focus on vocational and technical education, aligning educational priorities with the country's developmental goals. Training programs were developed to equip individuals with practical skills, contributing to economic growth. The government recognized and endeavored to tackle disparities in educational access, potentially formulating policies to bridge gaps between urban and rural areas and address socioeconomic imbalances affecting educational opportunities. Seeking international support and collaboration, the PRK and the State of Cambodia engaged in partnerships with international organizations, and donor assistance played a pivotal role in shaping inclusive education policies.

Achievements and issues related to Inclusive Education

Substantial endeavors were undertaken to rebuild the education system, which had suffered extensive damage during the Khmer Rouge regime. These efforts encompassed the restoration of schools, the training of educators, and the rehabilitation of educational infrastructure. Initiatives were launched to widen the reach of basic education, specifically focusing on augmenting enrollment rates and ensuring broader accessibility, particularly in rural areas. The implementation of teacher training programs was geared towards augmenting the skills and capabilities of educators, resulting in an overall enhancement of educational quality and better-equipped teachers capable of addressing diverse learning needs.

In short, accomplishments during the People's Republic of Cambodia and State of Cambodia era include significant strides in educational reconstruction, the extension of basic education access, and a focus on vocational training. However, enduring challenges, including resource limitations, post-conflict trauma, rapid recovery pressures, socioeconomic disparities, and international controversies, impacted the effectiveness of inclusive education initiatives.

Under the UNTACT and the coalition Government (1991 – 1993)

Constitution, Policies, Regulations, Law related Inclusion Education

Education was deemed as the most important sector to restore after the 1991 Paris Peace Accords at the United Nations (UN). Therefore, the modern education system was initiated under the support of the United States, UN agencies, and other countries. The international development aids started to flow into Cambodia about 500 million dollars or more since the early 1990s. The newly elected government adopted education as the priority goal for the national development by emphasizing on human resource development as the key to poverty alleviation and socio-economic development. According to the Constitution adopted on September 21st, 1993, the right to quality of education was guaranteed as stated in the Article 65, and Cambodian government was rigorously committed to providing compulsory education for nine years for free of charge by 2015 (Sovachana, 1991). After the national election sponsored by the UN in 1993, Cambodia experienced significant stable political and educational development.

The Policy of Education for Children with Disabilities, drafted in 2008 (Smith et al., 2010), comprehensively covers all children with Disabilities and is meant to ensure that they enjoy their right to education similar to other children without such disabilities. This policy supports the Policy for Child-Friendly Schools. The MoEYS is giving full support in implementing this policy to meet the goals of the Education Strategic Plan as well as the National Plan for Education for All.

 Achievements and issues related to Inclusive Education

Between 1991 and 1993, Cambodia was undergoing significant political and social changes, particularly after the signing of the Paris Peace Accords in 1991, (Curtis, G. 1993). That aimed to restore peace and rebuild the nation after years of conflict and the devastating Khmer Rouge regime. However, the term "UNTACT" is not directly associated with Cambodia's historical or educational context during this period. Regarding inclusive education in Cambodia during the early 1990s, the focus was

primarily on rebuilding the education system, which had been severely disrupted by years of conflict.

Achievements

Rehabilitation and Reconstruction: After years of conflict, efforts were initiated to rehabilitate and reconstruct the education system in Cambodia. Schools were rebuilt, and efforts were made to restore educational infrastructure to facilitate access for all students (UNESCO, 1993).

Policy Development: The establishment of a coalition government and international support paved the way for policy development in education. Although inclusive education might not have been fully realized during this period, initial steps were taken to address the educational needs of marginalized groups (UNICEF, 1993).

International Assistance: Cambodia received significant international assistance to rebuild its education sector. Organizations like UNESCO and UNICEF played crucial roles in supporting educational reforms and initiatives aimed at promoting inclusivity and accessibility in education (UNESCO, 2003).

Issues

Resource Constraints: There were severe financial, human, and material resource constraints facing Cambodia. These restrictions made it difficult to implement comprehensive inclusive education programs and provide effective support to marginalized communities (Sharma & Mahapatra, 2007).

Teacher Training: There was a significant shortage of trained teachers and educational professionals equipped with the necessary skills and expertise to implement inclusive education practices effectively (UNESCO, 1993).

Accessibility Barriers: Rural and marginalized communities encountered various barriers to accessing quality education, including inadequate infrastructure, transportation challenges, and socio-economic constraints (UNICEF, 1993).

***Societal Attitudes and Stigma*:** Deep-rooted societal attitudes and stigma towards individuals with disabilities or special needs remained pervasive, posing challenges in fostering inclusivity within schools and communities (Human Rights Watch, 2021).

Under the Royal Government of Cambodia (1993 – the present)

Government policies/regulations/Laws

The Royal Government of Cambodia, under the Rectangular Strategy, Phase III, prioritizes the implementation of the national policy on disability through the Disability Action Council (DAC). This involves strengthening the enforcement of the Law on the Protection and Promotion of the Rights of Persons with Disabilities and aligning the rights and welfare of disabled individuals with the United Nations Convention on the Rights of Persons with Disabilities.

The National Disability Strategic Plan (2014-2018) outlines 10 strategic objectives, focusing on reducing poverty among persons with disabilities. It aims to ensure equal access to quality health services, physical and mental rehabilitation, and justice intervention services. The plan also emphasizes active participation, access to information, gender equality, empowerment for women and children with disabilities, and international cooperation.

The Ministry of Education, Youth and Sport implemented an Education Policy for Children with Disabilities (2008-2018) to provide equal opportunities for all, resulting in 54,838 children and youths with disabilities (22,621 female) being enrolled in schools during the 2017-2018 school year.

Cambodia's Constitutional Law (Article 74) mandates state assistance to disabled persons and families of combatants who sacrificed their lives. Article 38 of the Education Law encourages special education for disabled persons and exceptional learners. The Law on the Protection and Promotion of the Rights of Persons with Disabilities (Articles 27-32) advocates for the rights of learners with disabilities to access education.

Educational Strategic Plan, (1993-2024)

1993

In 1993, Cambodia was recovering from the Khmer Rouge regime and grappling with challenges in rebuilding its educational system, especially in providing inclusive education for children with disabilities. The hurdles included limited infrastructure and resources, barriers to access for children with disabilities, stigma and discrimination, slow progress despite international assistance, and the development of policies and legislation for inclusive education. Despite ongoing efforts to reform the education system and promote inclusivity, progress was sluggish, and substantial barriers persisted. International assistance and community-based initiatives played vital roles in supporting endeavours to enhance educational access for children with disabilities in Cambodia (Zucker, 2013).

2001-2005

The Cambodia Education Strategic Plan (ESP) 2001-2005 was a critical framework developed to guide Cambodia's education sector during that period (Tan, 2007). The plan aimed to address the challenges faced by the country's education system and lay down strategies for improving access, quality, relevance, and equity in education.

Universal Primary Education: One of the primary objectives was to ensure that all children, especially those from marginalized and vulnerable groups, have access to primary education. Efforts were made to increase enrolment rates and reduce dropout rates at the primary level.

Quality of Education: The plan emphasized enhancing the quality of education by improving teacher training programs, curriculum development, and educational infrastructure. There was a focus on providing teachers with the necessary resources and training to deliver quality education.

Relevance and Equity: To ensure that education is relevant to the needs of the country and its people, efforts were made to align the curriculum with national development

priorities. Special attention was given to promoting gender equity and ensuring that girls have equal access to education.

Technical and Vocational Education and Training (TVET): Recognizing the importance of TVET in meeting the demands of the labor market, the plan emphasized strengthening technical and vocational training programs. This included improving the quality of TVET institutions, curriculum development, and collaboration with the private sector.

Infrastructure Development: Infrastructure development, including the construction and renovation of schools, was a crucial component of the plan. Efforts were made to improve school facilities, classrooms, libraries, and laboratories to create a conducive learning environment.

Partnerships and Collaboration: The plan recognized the importance of partnerships and collaboration among various stakeholders, including government agencies, development partners, civil society organizations, and the private sector. Collaborative efforts were essential to mobilize resources, share expertise, and implement effective education reforms.

Monitoring and Evaluation: To ensure the successful implementation of the strategic plan, a robust monitoring and evaluation mechanism was established. Regular assessments and reviews were conducted to track progress, identify challenges, and make necessary adjustments to the strategies and interventions.

Overall, the Cambodia Education Strategic Plan 2001-2005 aimed to transform the education sector by addressing key challenges and laying down a comprehensive framework for improving access, quality, relevance, and equity in education. While the specific details and outcomes may vary, the overarching goal was to create a more inclusive, responsive, and effective education system to support Cambodia's socio-economic development aspirations.

2006-2010

The Education Strategic Plan 2006 – 2010, Tan (2007) identifies education policy and strategic priority of the education for following five-year period. The MoEYS has been prioritizing the provision of equity in schooling access and quality in basic education, which is Goal and Strategy of National Plan of Education for all, during this period. This plan, being implemented in partnership with private stakeholders, NGOs, and the community of parents, has also highlighted:

- Expansion of Early Childhood Education

- Expansion of Non Formal Education and Professional Training for Youth

- Increasing opportunities in Secondary Education Access and Higher Education Access

- Ensuring the encouragement of capacity-building for educators

- Enforcing Education Law, good management, and accountability.

2009-2013

The Education Strategic Plan (ESP) 2009-2013 in Cambodia underwent a comprehensive review to align with the "Rectangular Strategy Phase 2" and the "National Strategic Development Plan Update 2009-2013." This review marked a crucial commitment by the Ministry of Education, Youth, and Sport to ongoing reforms within the broader government initiatives.

Over the five-year implementation of the ESP, the Ministry and its partners achieved significant progress in enhancing equitable access to education, improving educational quality and efficiency, and better managing the education sector. The plan prioritized establishing connections between education policies, strategies, development programs, and effective planning and budgeting

With a focus on achieving the National Education For All (EFA) Plan by 2015, the ESP emphasized equitable access to high-quality education, especially in basic education. It also emphasized expanding early childhood education, non-formal education, technical and vocational training, and opportunities for secondary and post-secondary education. Collaboration among the Royal Government, development partners, private sector, NGOs, communities, and parents was emphasized for successful implementation.

The development of the ESP involved clear mechanisms, studies, consultations, and broad participation from relevant stakeholders, including the Education Sector Working Group (ESWG). The Ministry expressed optimism that the ESP would serve as a roadmap for the effective implementation of accelerated education sector reforms for the benefit of all Cambodians.

2011-2015

The Cambodia Education Strategic Plan (ESP) 2011-2015, Onn & Hyojin (2019) continued the efforts of the previous strategic plans to further improve the education sector in Cambodia. This plan built upon the achievements and lessons learned from previous initiatives and aimed to address the evolving challenges and priorities of the education system during that period.

- *Quality Education*: The plan emphasized enhancing the quality of education at all levels, from primary to tertiary education. Efforts were made to improve teacher training, curriculum development, and learning outcomes. The focus was on ensuring that students acquire relevant knowledge, skills, and competencies to meet the demands of the 21st-century world.

- *Access and Equity*: The plan aimed to improve access to education, especially for marginalized and vulnerable groups, including girls, children from rural areas, and children with disabilities. Efforts were made to increase enrollment rates, reduce dropout rates, and ensure that all children have equal opportunities to access quality education.

- *Technical and Vocational Education and Training (TVET)*: Recognizing the importance of TVET in addressing the skills gap and promoting economic growth, the plan emphasized strengthening TVET programs. Efforts were made to improve the quality of TVET institutions, enhance curriculum relevance, and strengthen partnerships with the private sector.

- *Infrastructure Development*: Infrastructure development remained a critical component of the plan. Efforts were made to improve and expand educational facilities, including the construction and renovation of schools, classrooms, libraries, and laboratories. The aim was to create a conducive learning environment for students and teachers.

- *Teacher Development*: Recognizing the crucial role of teachers in the education system, the plan focused on improving teacher recruitment, training, professional development, and retention. Efforts were made to enhance teacher competencies, motivation, and working conditions to ensure quality education delivery.

- *ICT in Education*: The plan emphasized integrating Information and Communication Technology (ICT) in education to enhance teaching and learning processes, improve access to educational resources, and prepare students for the digital age. Efforts were made to expand ICT infrastructure in schools, train teachers in ICT skills, and develop digital learning resources.

- *Partnerships and Collaboration*: The plan recognized the importance of partnerships and collaboration among various stakeholders, including government agencies, development partners, civil society organizations, and the private sector. Collaborative efforts were essential to mobilize resources, share expertise, and implement effective education reforms.

- *Monitoring and Evaluation*: A robust monitoring and evaluation mechanism were established to track progress, assess the impact of interventions, identify challenges, and make necessary adjustments to the strategies and programs.

Regular assessments, reviews, and evaluations were conducted to ensure the effective implementation of the strategic plan.

Overall, the Cambodia Education Strategic Plan 2011-2015 aimed to build upon the achievements of previous initiatives and address the emerging challenges and priorities of the education sector. By focusing on quality education, access and equity, TVET, infrastructure development, teacher development, ICT integration, and partnerships, the plan aimed to create a more inclusive, responsive, and effective education system to support Cambodia's socio-economic development aspiration.

2014-2018

The Strategic framework of ESP focuses on continuing, extending and sustaining the improvements already made in access and equity, building a relevant and quality learning experience for children and youth delivered professionally, transparently and accountably. In order to achieve these policy objectives, programs will work with the following principles (Heng, M. 2022):

- Connect with the National Program for Sub-National Democratic Development (NPSNDD) and contribute to process of installing unified and sub-national administrations (SNA) under the guidance of the National Committee for Democratic Development (NCDD).

- Prepare mechanism of internal and external institutional operational arrangements and clear vertical and horizontal management, information, and operational functioning reflecting the sub sector approach and the objectives of the Ministry's policy on the decentralization and de-concentration reform.

- Actively respond to the framework for result based planning, budgeting, monitoring and evaluation

- Based on rights and equity

- Provide a holistic quality accountability framework that will include student learning assessment (and connect with regional and international

assessments), curriculum and learning materials, teaching knowledge and skills, facilities, and management, service standards

- Improve financial sustainability built on needs based projections

- Mobilize the involvement of all stakeholders and development partners Top of FormwjaknaaTop of Form

2019-2023

The Education Strategic Plan for 2019-2023 outlines a comprehensive roadmap to enhance the quality, accessibility, and inclusivity of education. This strategic plan aims to address current challenges, leverage opportunities, and achieve sustainable development in the education sector (Em et al., 2022; Keo et al,. 2024).

Vision, Mission, and Values

Vision: To create a future-ready education system that fosters innovation, equity, and lifelong learning opportunities for all.

Mission: To provide a high-quality, inclusive, and equitable education that empowers individuals, strengthens communities, and drives national progress.

Values: The strategic plan is guided by principles of excellence, equity, collaboration, innovation, and accountability.

Strategic Goals

*Curriculum Innovation***:** Emphasize curriculum reform to promote 21st-century skills, interdisciplinary learning, and holistic development.

*Teacher and Leadership Development***:** Enhance teacher quality, professional development, and leadership capacity to meet evolving educational needs.

*Infrastructure and Learning Environment***:** Modernize educational facilities, improve accessibility, safety, and create conducive learning environments.

Technology-Enhanced Learning: Integrate technology in education to enhance digital literacy, connectivity, and interactive learning experiences.

Equity, Access, and Inclusion: Implement targeted strategies to reduce disparities, promote inclusivity, and ensure equitable access to quality education for all learners.

Implementation Framework

Phased Approach: The plan adopts a phased implementation strategy with specific milestones, timelines, and performance indicators.

Resource Allocation: Detailed budgeting, funding mechanisms, and resource mobilization strategies are outlined to support plan implementation.

Monitoring and Evaluation: Robust monitoring, evaluation, and feedback mechanisms are established to track progress, measure impact, and facilitate continuous improvement.

Collaboration and Partnerships

The strategic plan emphasizes collaboration with government agencies, NGOs, private sector, academia, and community stakeholders. Strategic partnerships will be forged to leverage expertise, resources, and innovative solutions to achieve shared goals.

Risk Management

The plan identifies potential risks, challenges, and barriers to implementation. Risk mitigation strategies, contingency plans, and adaptive management approaches are developed to address uncertainties and ensure plan resilience.

The Education Strategic Plan 2019-2023 serves as a guiding framework to transform and elevate the education system. By focusing on curriculum innovation, teacher development, infrastructure enhancement, technology integration, and equity promotion, the plan aims to create a future-ready education ecosystem that equips learners with the knowledge, skills, and competencies to thrive in a rapidly changing world.

National and International Collaborations with NGOs and Civil Societies

Several non-governmental organizations (NGOs), including Rabbit School, Save the Children, and Aide-et-Action, are actively engaged in promoting inclusive education in Cambodia. The Rabbit School Organization is working in collaboration with the government to develop the National Manual on Teaching Children with Intellectual Disabilities, Learning Disabilities, and Autism Spectrum Disorder, with leadership from the Ministry of Education, Youth and Sport (MoEYS) and international non-profit organizations like Save the Children.

Aide-et-Action's Schooling for Deaf and Blind Children focuses on integrating children with disabilities into general classrooms. The organization provides teachers with the necessary knowledge and skills to teach children with disabilities, supplies required materials, and assists parents in enrolling their children in school. In Steung Sen and Kampong Svay districts of Kampong Thom province, the USAID-funded Children Reading-Cambodia project ensures educational opportunities and access for children with hearing problems, treating them similarly to children without disabilities. The project includes sign language and teaching methodology training for volunteer teachers and deaf volunteers, along with the use of learning and teaching materials.

Catholic Relief Services is another organization contributing to inclusive education in Cambodia. They have implemented inclusive education activities for young children and provided digital recording materials to the Department of Special Education. Collaborating with other ministries, the organization has promoted and launched inclusive educational games for preschool children on the MoEYS website.

Issues Related the inclusive Education in Cambodia

In Cambodia, various barriers, including poverty, disabilities, language differences, and prejudice, impede certain students from accessing education. Despite the government's efforts to promote inclusive education, significant challenges persist, such as limited resources, insufficient teacher education on inclusive methodologies, and societal beliefs that perpetuate discrimination. Research by Vong and Penh in 2019 identified challenges faced by children with disabilities, including inadequate

infrastructure, financial constraints, lack of specialized teacher preparation, and negative perceptions about disabilities. A 2018 report by the Cambodian Disabled People's Organization (CDPO) revealed instances of exclusion, discrimination, and harassment against these children in regular schools.

The government has taken steps to improve educational access for marginalized communities, including students with disabilities, by establishing support centers and allocating resources for inclusive education programs. Save the Children highlighted successful instances of inclusive education in Cambodia, particularly their initiative integrating children with disabilities into regular school settings. To amplify these achievements, enhanced collaboration among stakeholders, including the government, civil society, and international organizations, is imperative to exchange best practices and expand proven models. The Cambodian government's proactive measures, such as the Education Strategic Plan 2019-2023, aim to augment educational opportunities for marginalized sectors, specifically addressing the needs of children with disabilities, according to UNESCO in 2020.

Discussion

To successfully execute the Educational Strategy Plan for inclusion education in Cambodia, it's crucial to intensify resource constraints, teacher training, accessibility barriers, societal attitudes and stigma, and policy development. The constraints of this research encompass its narrow geographical focus within Cambodia and its reliance on qualitative methodologies, potentially constraining the broader applicability of the results. Subsequent studies should broaden their scope to investigate challenges and prospects for inclusive education across various regions of Cambodia. Additionally, assessing the efficacy of distinct interventions and approaches aimed at advancing inclusive education remains imperative.

This research indicates that while Cambodia faces notable obstacles in advancing inclusive education, there exist viable avenues for advancement. By tackling these challenges head-on and leveraging successful initiatives, Cambodia has the potential

to cultivate a more inclusive and fair educational landscape, thereby positively affecting the lives of numerous children within the nation.

Conclusion

This paper aims to explore the historical evolution of inclusive education in Cambodia across six different regimes, spanning from the era of Prince Norodom Sihanouk to the recent leadership of Mr. Hun Manet as the new prime minister. Additionally, a comprehensive literature review is provided, delving into the Cambodian Constitution, Policies, Regulations, and Laws pertaining to Inclusive Education. The review also encompasses an examination of the achievements and challenges associated with inclusive education in Cambodia. In summary, the discussion highlights five critical issues: Resource Constraints, Teacher Training, Accessibility Barriers, Societal Attitudes and Stigma, and Policy Development. These present-day challenges within inclusive education need urgent attention and resolution by the government and stakeholders. The aim is to effectively enhance the education system and integrate inclusive practices across all educational institutions. This aligns with the Cambodian Education Strategic Plan and the Government Policy on equal and equitable education for all citizens, emphasizing the need for inclusivity in learning opportunities for individuals with disabilities.

Recommendations

To improve the equality and quality of inclusive education for children with disabilities in Cambodia, collaboration among various stakeholders, including the government, partnering organizations, and individuals, is crucial. A shared goal is necessary to ensure that Cambodian children with disabilities can fully exercise their rights and become productive citizens. The Ministry of Education, Youth and Sport (MoEYS) highlights the importance of collective efforts. The document provides several suggestions for stakeholders to consider in pursuit of these objectives.

- **Cambodian Government**: For children with disabilities to receive an inclusive education, the Cambodian government plays a critical role. To

overcome the obstacles, these students facing inclusive education must be given top priority as a critical developmental objective. This entails providing enough funding at the subnational level for initiatives that cater to their particular needs, like materials and infrastructure that is accessible to people with disabilities. Enforcing strict laws requiring special considerations during building construction—especially in schools—is essential to removing obstacles to students attending classes regularly, especially those with mobility issues. It's crucial to look into programs aimed at enhancing mobility in places with weak infrastructure.

- **Partnering Organization:** Issues have been successfully addressed by partnering organizations, but government cooperation is essential to achieving a shared objective. Transparent sharing of action plans is crucial to prevent duplication. When mandates expire, independent operation frequently results in ambiguous transitions that cause regression from advancement to stagnation. This pattern of unsustainable development highlights the necessity of government cooperation. Partnering organizations should also support secondary and higher education in addition to primary education. The Sustainable Development Goals' aim of promoting lifelong learning for all is undermined when these later stages are disregarded.

- **Individual:** People's understanding of human rights and the current injustices experienced by those with disabilities is crucial to improving inclusive education for kids with disabilities. It is imperative that all people view disabled children as fellow human beings. The antiquated belief that a person's disability results from their past life's Karma must be given up and recognized as a mistake. Sadly, a lot of Cambodians still hold onto this misconception, which makes them think that children with disabilities are helpless, weak, and pitiful. Addressing discrimination is still a particularly difficult problem. Children with disabilities might not have the bravery to navigate the world and stand up for their rights until society accepts them as equal members.

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Awareness Integration Theory: An Evidence-Based and Transformative Educational Model for Middle Childhood Self-Regulatory Skill

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Introduction

Research findings indicate that a prosocial classroom emphasizes the importance of social and emotional competency (SEC) and overall well-being in building and maintaining supportive teacher-student relationships, effective classroom management, and successful social and emotional learning program implementation (Skinner et al., 2009). SEC involves specific emotional regulation skills that contribute to a classroom environment conducive to learning and positive student developmental outcomes. Additionally, current research suggests a link between SEC and teacher burnout and explores intervention efforts to support teachers' SEC through stress reduction, mindfulness programs, professional development, and peer support. The article also proposes a research agenda to assess the effectiveness of these intervention

strategies in promoting emotional regulation competency and improving student learning outcomes (Jennings & Greenberg, 2009).

A crucial aspect of emotional regulation is social and emotional learning (SEL), a developmental process that begins at birth and continues throughout life (Weissberg et al., 2015). SEL assists individuals in developing the skills necessary for healthy relationships, encompassing self-awareness, self-regulation, social and emotional competency, interpersonal skills, and problem-solving in a balanced state of mind (Weissberg et al., 2015). However, not all students enter the academic arena equipped with social-emotional awareness and self-regulatory skills. Research supports that integrating social and emotional learning into curriculum, instruction, and school climate can enhance academic achievement, well-being, and life outcomes and reduce teacher burnout. SEL is a powerful tool for prevention and resilience (Durlak et al., 2011; Taylor et al., 2017).

The strategic model's high efficacy is crucial to increasing the sustainability of such a prosocial classroom, as it advocates teacher-student interpersonal relationships vital to academic outcomes (Jennings & Greenberg, 2009). Research on the AIT model's efficacy for applying social-emotional learning, emotional regulation, and competency has been consistently positive. AIT's strategic model for emotional regulation provides the framework and foundations for developing self-regulation skills and social-emotional competency.

Awareness Integration Theory Strategies for Self-Regulation Skills

Awareness Integration Theory (AIT) is a comprehensive, multi-modality psychological and educational approach designed to enhance self-awareness, resolve psychological barriers, and cultivate a positive, growth-oriented mindset. Teachers equip students with the tools and skills to lead effective, productive, and successful lives. AIT integrates critical elements from established psychological and developmental theories to foster holistic personal development. (Zeine, 2021).

Research has shown that Awareness Integration Theory (AIT) is effective in reducing symptoms of depression, anxiety, and PTSD while also improving self-esteem, self-

efficacy, and overall well-being. The Personal Growth Institute conducted a study on AIT-based face-to-face therapy and found a 76% reduction in depression and a 60% reduction in anxiety. Additionally, self-esteem increased by 43% and self-efficacy by 20% (Zeine, 2016). Another study on separated or divorced individuals participating in a six-hour AIT workshop showed a 27.5% improvement in depressive symptoms, a 37% decrease in anxiety, a 15% boost in self-esteem, and a 13% increase in self-efficacy (Zeine et al., 2017). Telehealth has also proven to be an effective medium for AIT, with studies reporting a 50% reduction in anxiety and a 60% increase in self-esteem (Madani, 2022). In one telehealth case study, depression decreased by 66%, anxiety by 75%, and PTSD symptoms by 66% (Zarbaksh, 2023).

A study on the American college student population using the Awareness Integration Theory in a hybrid modality at the California State University Long Beach showed an overall 68% decrease in depression and a 21.72% decrease in anxiety (Zeine et al., 2017). Due to this revelation, the "Foojan" app was developed as a cutting-edge telehealth platform that utilizes the principles of Awareness Integration Theory (AIT) to provide personalized, affordable, and accessible mental health support globally. The app offers a holistic approach by integrating various psychological and emotional regulation interventions to drive transformative change. Data from the "Foojan" app from 280 users from 2/2023 to 7/2024 has shown that users have an average of 65% improvement in various areas of life, including career, intimate relations, relation with family members, self, and finances (Zeine, foojan.com, 2024).

For children, AIT facilitates the development of an emerging understanding of how their perceptions of the world influence their decision-making and self-identity. The theory supports children in gaining deeper insights into their interactions with others and their behavioral patterns. AIT cultivates essential qualities such as respect, acceptance, responsibility, and accountability, which are critical for building self-esteem, self-confidence, and self-efficacy (Jafari et al., 2022). Children select their friends at this stage, typically of the same gender. Often, these friendships can be characterized by hostility or rejection, with statements like "You are not my friend!" or "I do not like you!" being typical. They engage in competitive games and exhibit

various behaviors when interacting with adults, such as being demanding, sociable, hesitant, helpful, or charming. Conflicts, arguments, and occasional aggression may arise with peers, siblings, and adults, especially parents. Social pressures from parents, peers, and teachers can trigger intense emotional reactions, including tantrums, jealousy, dependency, or aggression (Jafari et al, 2022).

During this time, children begin to grasp the essential social "dos and don'ts" needed for functioning in society, often displaying extreme behaviors as they learn. They typically lack group loyalty and are easily excited. Social situations can be challenging for them, and they tend to be highly eager to participate, often insisting on being first in everything. Children in this group may also exhibit bossy or argumentative behavior, tease or bully others, or even frighten and hit their peers or siblings. When things are unexpected, they may react by threatening to leave, quarreling, name-calling, or fighting (Jafari et al., 2022). Children are guided to recognize the connection between their behaviors and cognitive/emotional experiences. After a child demonstrates a specific behavior, teachers help them reflect on the emotions they are feeling, the thoughts they are having, and how these internal processes shape their actions. Teachers may take every opportunity to educate children about the impact of their behaviors on themselves and those around them lovingly and compassionately (Jafari et al., 2022).

Common emotional traits at this age include dissatisfaction, frequent complaints, blaming others, sulking, and mood swings. Typical fears emerge, such as fear of death or injury, failure, ridicule, and imaginary threats like those associated with darkness, thunder, and lightning. Nervous habits may also appear, such as nail-biting, stuttering, tugging at ears or clothing, shifting from side to side, nervous tics, or facial distortions. Children in this age group are easily embarrassed, especially when they fail to meet expectations or perform poorly on tasks like homework. Bullying has become a prevalent issue in both schools and society. Children may be targeted due to factors such as their religion, ethnicity, disability, sexual orientation, or simply because they are different. While some may view bullying as a regular part of childhood, the emotional impact on those affected can be profound and damaging. AIT encourages

and rewards children for demonstrating compassion, empathy, and understanding toward others. They are taught to care for all living things, be aware of their emotional needs, and act appropriately to pursue their desires. In applying the AIT model, teachers deliberately engage students in collaborative work, actively involving them in daily activities. Children develop valuable life skills by working alongside their teachers and peers, including responsibility, teamwork, and a sense of belonging to their community (Jafari et al., 2022).

Teachers promote independent exploration and discovery, encouraging students to develop problem-solving skills by considering situations from multiple perspectives. This approach helps children understand how solutions or actions can be reached by examining a problem through different lenses, fostering a well-rounded and critical-thinking approach to challenges.

The Awareness Integration Theory Nine Foundational Principles

The AIT model is based on nine comprehensive principles that create a foundation for its structure, mechanism, applicability, and execution. These principles explain and support why the design of AIT as a theoretical learning model is practical, universal, versatile, and applicable to any area of human development and self-improvement, resulting in learning life skills and empowering proficiencies. Here is the narrative of the nine principles:

1. The observer's reality is subjective, shaped by their beliefs, emotions, and behaviors.

2. Human beings have the potential to acquire skills needed for a functional and successful life.

3. These skills are developed through physical and psychological growth and parental and environmental mirroring.

4. Perception of information and experiences enables the assignment of meaning, allowing the development of a personal identity through categorization and generalization.

5. Experiences, including trauma, are stored cognitively, emotionally, and somatically. Traumatic experiences become compartmentalized and await reintegration for healing.

6. Healing and reintegrating these unintegrated belief-emotion-body states result in a neutral or positive attitude.

7. Completing this process allows for the conscious creation of intentional choices regarding values, thoughts, feelings, actions, and outcomes.

8. Skills can be learned and sustained in neutral environments, guiding intentional results.

9. A clear and conscious vision, goal setting, effective planning, and actionable steps increase the likelihood of achieving desired outcomes (Zeine, 2016).

This model aims to promote self-awareness, integrate various aspects of the self, and create a clear vision for the future. It encourages setting solid goals and action plans, is supported by external feedback loops, and ensures a sustainable and fulfilling life.

Efficacy of AIT in Social-Emotional Learning (SEL) and Emotional Regulation

AIT emphasizes self-awareness by helping teachers and students recognize their cognitive, emotional, and behavioral patterns. This deepened understanding is a critical component of SEL, enabling individuals to manage emotions effectively and make responsible decisions. Through the phases of AIT, participants explore how experiences and core beliefs shape their feelings and interactions, fostering emotional regulation and competency. AIT encourages individuals to reframe negative thoughts and beliefs that contribute to emotional dysregulation. By addressing these thought patterns, AIT promotes healthier emotional responses, essential for developing emotional regulation skills. As individuals learn to connect thoughts, emotions, and behaviors, they gain the tools to manage stress and emotional triggers, aligning with SEL frameworks focused on emotional management (Zeine, 2016).

AIT fosters the development of social awareness, another core pillar of SEL, by helping individuals understand how their internal projections and assumptions affect interpersonal relationships. As participants become aware of their impact on others and learn to empathize, they enhance their social skills, improving relationships and reducing conflict in personal and school settings. AIT provides structured phases that target the root causes of emotional difficulties, promoting competency in managing emotions and improving social interactions. This competency is consistently reinforced through personalized interventions, helping individuals develop lifelong emotional skills, thereby enhancing the efficacy of SEL initiatives (Jafari et al., 2022).

AIT Techniques for Elementary School Teachers to Promote Social-Emotional Learning (SEL)

Middle childhood is critical for developing emotional regulation, social skills, and personal responsibility, and AIT offers a structured and practical approach to fostering these skills. Below are the keyways AIT supports SEL for teachers in this context.

Enhancing Teacher Self-Awareness and Emotional Regulation

AIT emphasizes self-awareness and emotional regulation, helping teachers manage their emotional responses in the classroom. By reflecting on their cognitive and emotional patterns, teachers can avoid burnout and remain calm and composed, even in challenging situations. Teachers who have mastered emotional regulation through AIT can be powerful role models for students. By demonstrating how to handle stress, frustration, and interpersonal conflicts healthily, they teach students by example how to manage their own emotions.

Supporting Teachers in Facilitating SEL Skills in Students

Belonging and feeling safe to express thoughts and feelings are crucial to students; overall, learning and teachers play a vital role in creating such an atmosphere. Learning environments for effective SEL where students can feel safe and inclusive relate to a classroom climate where peers and teachers can respect differences and encourage plentiful positive interactions (Jennings & Greenberg, 2009). AIT equips teachers to

recognize students' emotional and cognitive patterns, especially in distress or conflict. This insight allows teachers to intervene early and guide students in developing better emotional regulation strategies. Teachers can tailor SEL lessons through AIT to meet their students' emotional and cognitive needs. For instance, they can provide personalized support to students struggling with anxiety or self-esteem issues, helping them build emotional skills at their own pace.

Encouraging Healthy Teacher-Student Relationships

Social and emotional learning (SEL) starts at birth and, as a developmentally important process, continues throughout life (Weissberg et al., 2015), resulting in skills needed for recognizing, developing, and fostering development and fostering the skills needed for healthy relationships. AIT fosters empathy in teachers, allowing them to understand better and respond to their students' emotional needs. This can strengthen teacher-student relationships, creating a supportive environment that encourages emotional growth. AIT also provides teachers with tools to guide students through conflicts by addressing the root causes of emotional reactions and teaching healthy communication and problem-solving skills. Understanding the fundamentals of emotional reactions and regulations helps teachers promote a classroom culture of respect, understanding, and emotional regulation.

Developing Social Awareness and Interpersonal Skills in Students

Self-awareness, self-regulation, social self-cognizance, relationship skills, and the ability to make complex decisions are essential components of an effective SEL (Weissberg et al., 2015). AIT helps teachers guide students in developing social awareness by encouraging them to reflect on how their actions affect others. This is critical in elementary school ages 7 to 12, where peer relationships become increasingly important. Students learn to recognize their impact on others and develop empathy, a key component of SEL. AIT teachers can effectively teach emotional regulation strategies, helping students identify their emotions and develop coping mechanisms for stress, anger, or anxiety. This helps students manage their emotions in social interactions and fosters a more positive classroom environment.

Promoting Long-Term Emotional and Academic Success

A 'transformative SEL framework emphasizes the importance of culturally adaptive SEL opportunities for underrepresented students to support those children's social-emotional and academic skills (Jagers et al., 2019). Research shows that students with strong SEL skills perform better academically. Teachers use AIT to build students' emotional intelligence to help them become more focused, resilient, and engaged in learning. AIT equips students with emotional regulation and social skills that extend beyond the classroom. These skills are essential for personal well-being, relationships, and future success, making SEL a critical investment in their development.

Awareness Integration Theory Intervention Training for Teachers

Teachers' social and emotional competence and well-being in developing and maintaining supportive teacher-student relationships, effective classroom management, and successful social and emotional learning program implementation (Jennings & Greenberg, 2009). AIT allows teachers and school staff to focus on specific areas of their lives, such as careers, finances, and relationships with superiors, colleagues, students, spouses, or family members. AIT provides a structured approach to personal development and psychological well-being, which is particularly useful in workplace settings. Its six phases help individuals cultivate self-awareness, emotional regulation, and professional growth, ultimately improving their job performance and overall satisfaction.

Phase 1 - Focuses on cultivating self-awareness and mindfulness. Teachers examine their positive and negative perspectives, beliefs, thoughts, emotions, and behaviors and how their attitudes affect relationships with coworkers, supervisors, students, and parents. This process allows them to recognize biases, dualities, and patterns. Teachers can also replicate this process in any interactions with their students. By gaining insight into automatic reactions and habitual behaviors, individuals can identify areas for growth, improve their decision-making, and communicate more effectively within the school environment (Zeine, 2016).

Phase 2 - Teachers are encouraged to reflect on their assumptions about others and how these beliefs influence their behavior. Individuals can reduce defensiveness and improve interactions by recognizing that they may be reacting based on unverified assumptions, such as believing a boss, other teachers, students, or their parents dislike them. Assumptions often lead to guarded and reactive behavior, limiting open communication and self-expression. Many individuals define themselves based on how they believe others perceive them, which can prevent them from valuing their authentic selves and reaching their full potential in leadership or other capacities. Recognizing and verifying these assumptions fosters healthier relationships and personal growth (Zeine, 2016).

Phase 3 - Individuals identify and alter unproductive cognitive and behavioral patterns related to their self-perception. They distinguish between positive beliefs, which act as strengths, and negative beliefs, which can impede personal and professional growth. Through this process, individuals reflect on their emotions toward themselves—whether feelings of pride, joy, or empathy or negative emotions like anger, shame, or hopelessness. They also examine how they treat themselves, noting whether they approach themselves with kindness and compassion or with self-criticism and punitive behaviors (Zeine, 2016).

Phase 4 - Highlights the significance of emotional processing and regulation. Emotional regulation involves recognizing, understanding, and accepting emotions while using strategies to manage them in a healthy, adaptive way. This process includes identifying the emotion, where it is felt in the body, and the belief that triggers it. By linking the emotion to the original life event that caused the emotional trigger, individuals can integrate their vulnerable and resilient selves, fostering empowerment. By learning to process emotions constructively, individuals can maintain a positive outlook, handle setbacks more effectively, and contribute to healthier relationships. Understanding how past experiences, whether personal or professional, shape their responses to tasks and interactions provides valuable insights for growth. For students, learning to name their emotion, locate it in their body, and release the feeling while being conscious of the origination of the trigger will facilitate integration. In this

phase, individuals can confront the root causes of emotional dysregulation and connect with the negative core and generalized beliefs formed about themselves and the world. They also refocus on the strengths they demonstrated, such as resilience, power, and patience, during challenging times. By integrating their empowered and vulnerable selves, individuals gain access to their full range of strengths, enabling them to approach situations with confidence and empowerment. This process involves identifying a limiting core belief, previously explored in Phase Three that holds the individual back. It bridges back to the event where the belief originated, focusing on the resilience displayed at that time. By integrating this inner strength into their present self, they release stored emotions and expand the narrow perspective of their younger self into a broader, more empowered understanding of the present (Zeine, 2016).

Phase 5 - Emphasizes the deliberate selection of values, beliefs, emotions, and behaviors contributing to positive outcomes. During this phase, individuals set clear and attainable goals for both personal and professional growth. By consciously making these changes, individuals align their actions with their professional goals and core values, fostering growth and success. Teachers support students in setting values and goals for academic achievement, handling homework, and relations with peers, siblings, and parents (Zeine, 2016).

Phase 6 - Establish feedback mechanisms to ensure steady progress toward achieving their goals among colleagues and students (Zeine, 2016).

Teachers can be trained on AIT through online classes, in-house workshops, and/or by working on the "Foojan" app as an ongoing tool in various life areas. After the initial training, teachers can use "Mira"- an AI companion in the Foojan app for supplemental skill building (Zeine, foojan.com, 2024).

Incorporating Awareness Integration Theory (AIT) in The Classroom

Teachers can effectively implement AIT in the classroom for students aged 7-10 by incorporating its principles into daily activities and fostering an environment that

promotes self-awareness, emotional regulation, and positive social interactions. Here are practical strategies for teachers:

Cultivating Self-Awareness

- o **Daily Check-ins**: Start the day with a "feelings check-in," where students use an emotional chart or a simple emoji system to identify their emotions, locate where they feel them in their bodies, and share them with the class in small settings or a dyad with another student in large classes

- o **Self-Reflection Journals**: Encourage students to keep a daily or weekly reflection journal where they write or draw about their thoughts, feelings, and behaviors. This will help them connect their attitude with their actions and the impact that their actions have on their lives and those around them.

- o **Personalized Statements**: Have students create positive self-affirmation cards or posters using values, beliefs, feelings, and actions they are committed to, such as "I am kind" and "I am responsible," to build self-awareness and a positive self-image.

Building Emotional Regulation Skills

- o **Emotion Identification**: Introduce a "feelings vocabulary" and use visual aids (like an emotion wheel) to help students name and recognize their emotions.

- o **Identify the Source:** Teach students to identify the thought process or the belief that produced and sourced the feeling.

- o **Pay Attention to Intention**: Teach the students to define their intention and what they want. Support students in finding the appropriate actions to achieve their goals.

- o **Mindfulness and Breathing Exercises**: Incorporate short mindfulness activities like deep breathing, stretching, or guided meditations into the day

to help students calm themselves when they feel overwhelmed or have to accept what is instead of what they want.

o **Personalized Safe Corners**: Create a designated " Safe Space" in the classroom where students can go when they feel upset. Equip it with sensory tools, books, or emotion cards to help them regulate their emotions before rejoining class activities.

Fostering Positive Relationships and Social Skills

o **Collaborative Learning Activities**: Use group projects or peer-learning activities to encourage teamwork, empathy, and respect for one another. Assign reflection time for the students to focus on their thoughts, feelings, behaviors, and impact on their peers. This allows students to practice sharing, cooperating, and solving problems together.

o **Role-Playing and Social Stories**: Use role-playing activities to simulate real-life situations where students practice handling conflicts, sharing, and understanding others' perspectives.

o **Conflict Resolution Skills**: Teach basic conflict resolution steps. Students to stop and reflect on their thoughts, feelings, desires, and goals. Practice listening, understanding, and empathizing with their peers. Communicate and negotiate the desired outcome.

Developing a Growth Mindset

o **Mistakes as Learning Opportunities**: Reinforce the idea that making mistakes is part of learning. When a student makes an error, use it as a teaching moment to explore what they learned and how they can improve, promoting a growth mindset.

o **Goal Setting**: Help students set small, achievable goals related to their academic or personal development. Evaluate why they did not achieve the goal and recommit to the same or a new goal.

o **Acknowledging Effort**: Teachers role-model for students to acknowledge their own and their peers' achievements, efforts, and progress. This encourages resilience and perseverance.

Encouraging Reflection on Behavior and Emotions

o **Behavior-Emotion- thought Connection**: After incidents such as conflicts or emotional outbursts, guide students in reflecting on what they were feeling, what thoughts led to the behavior, and what they could do differently next time.

o **Circle Time Discussions**: Regular class meetings where students can discuss their experiences, challenges, and feelings in a supportive group setting. This is encouraged by drawing or painting about their feelings and sharing them with their peers.

Promoting Compassion and Empathy

o **Kindness Challenges**: Create classroom challenges where students perform acts of kindness toward peers, teachers, or even family members. Recognize and celebrate these acts to foster a caring community. Acknowledge the impact of the acts of kindness toward others and self.

o **Empathy Building Activities**: Use books, videos, or stories about different cultures, abilities, or experiences to spark discussions about understanding and respecting others' feelings and perspectives.

Creating a Supportive Classroom Environment

o **Safe Space for Sharing**: Ensure students feel safe expressing their thoughts and emotions without fear of judgment. Promote an open-door policy for students to share their concerns or feelings, as the teacher offers the AIT structure for awareness and resolution.

o **Visual Reminders**: Display posters or charts around the classroom that reinforce emotional regulation strategies, positive affirmations, and

conflict resolution steps. This will make AIT principles visible and accessible.

- o **Positive Behavior Reinforcement**: Reinforce positive behavior and emotional regulation through praise, rewards, or privileges when students demonstrate self-awareness, empathy, or emotional control.

Engaging Parents and Guardians

- o **Parent-Teacher Communication**: Share the principles of AIT with parents so they can reinforce these concepts at home. This can be done through the "Foojan" App, meetings, and workshops.

- o **Home Reflection Activities**: Assign simple reflection activities or conversations that children can have with their parents. This will help bridge the AIT practices between home and school environments.

By incorporating these AIT principles into the classroom for children aged 7-10, teachers can foster an emotionally intelligent and socially aware learning environment, helping students develop the skills necessary for emotional regulation, empathy, and positive self-awareness.
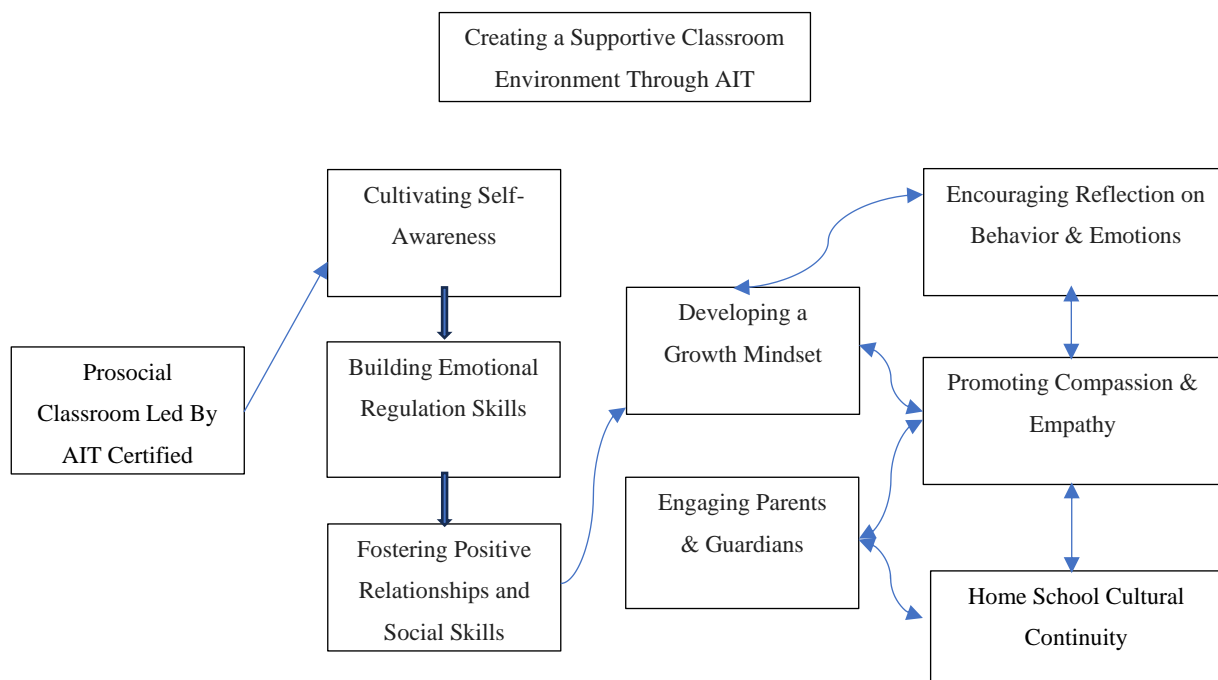
Conclusion

An emotionally regulation-based classroom climate is one in which students feel safe expressing emotions, processing and verbalizing the experience, and effectively resolving the emotional challenge while reaching optimum equilibration. This environment promotes positive social interactions and reduces instances of bullying and discrimination. The key components to creating a prosocially structured learning environment are self-awareness, emotional regulation, and interpersonal skills, which enhance students' ability to communicate, collaborate, and resolve conflicts constructively. An educational design that fosters Social Emotional Learning (SEL) can significantly impact the student's positive developmental growth and shape the academic success of school-age children. Research findings show that students who adeptly manage their emotions and thoughts are more successful in retaining information, learning, and adjusting to school life. Educators, counselors, administrators, and policymakers must consider SEL to ensure students' academic and future success. Implementing AIT in the classroom can help educators foster such an atmosphere by encouraging students to develop self-awareness, emotional regulation, and interpersonal skills.

School-age children must learn, develop, foster, and practice emotional and social regulation, resulting in holistic growth, healthy development, academic success, and life-long well-being. Awareness Integration Theory offers a practical framework for promoting social-emotional learning among elementary school students 7 to 12 years of age by enhancing teacher emotional regulation and self-awareness; AIT helps educators model and teach essential SEL skills, fostering a supportive classroom environment where students can thrive emotionally and academically. The research-backed outcomes of AIT, including improvements in emotional regulation and interpersonal skills, make it a valuable tool in the modern classroom, equipping teachers and students with the skills they need for long-term success.

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Section 4

Ethics and Theoretical Debates in Education

Chapters

Unfairness by the FAIR Principles Promoters: A Case Study on the Absence of Accountability for Integrity in Research Publishing

Carl Taswell

The Divergence between Theory-Practice

Sihem Djidjik, Marcyann Mukami Muragu

Unfairness by the FAIR Principles Promoters: A Case Study on the Absence of Accountability for Integrity in Research Publishing

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Introduction

Plagiarism remains prevalent in research publishing. This misconduct has been discussed in a variety of publication formats from brief commentaries to systematic literature reviews for which respective examples include C. Taswell (2010c) and Foltýnek et al. (2020). Plagiarism becomes even more harmful when published as its falsely claimed opposite of publishing with *fairness*. Stated formally, an inherent logical contradiction exists when a data scientist, information scientist, computational linguist, or research investigator who professes to study language, information and data with ethics and integrity, then also chooses to condone idea plagiarism. Indeed, it is an oxymoronic self- contradiction for any research scholar who promotes the use of data sharing, data linking, data management, the semantic web and knowledge engineering with vocabularies, thesauri, ontologies, concept similarity rules, ontology mappings, logical reasoning inferences, and related tools, who then also ignores,

disregards, and/or condones idea plagiarism. Those who wish to encourage *fair* sharing of data and information and join us in ethical research with integrity (Athreya, Craig, et al., 2023) must also refrain from idea plagiarism in both its benign forms citation amnesia or cryptomnesia, and its malign forms including idea-laundering plagiarism (Dutta, Uhegbu, et al., 2020; S. K. Taswell, Triggle, et al., 2020). The data sciences, knowledge engineering, and semantic web communities cannot be taken seriously by honorable scientists who respect truth and logic if such a basic self-contradiction is promoted and propagated by idea-laundering plagiarists within these scientific communities who claim to be sharing data, information, and knowledge *fairly* but who do not practice what they preach.

This historical review analyzes the primary idea-laundering plagiarism by Wilkinson *et al.* authors in their papers published in Nature Scientific Data (Wilkinson, Dumontier, et al., 2016; Wilkinson, Sansone, et al., 2018), and the secondary propagating plagiarism by Musen (2020), Mons et al. (2020), Jacobsen et al. (2020), and other authors in their papers published in Data Intelligence of the original papers and USPTO patents previously published by Carl Taswell (C. Taswell, 2007; 2008; 2010b; 2010a; 2014). The plagiarizing authors include Michel Dumontier of Maastricht University, Barend Mons of Leiden University and Mark Wilkinson of Polytechnic University of Madrid who bear the greatest responsibility for the plagiarism published in Nature Scientific Data (Wilkinson, Dumontier, et al., 2016; Wilkinson, Sansone, et al., 2018) as explained herein. Therefore, this review also contains an analysis of the academic integrity violations by Michel Dumontier, Barend Mons and Mark Wilkinson according to the criteria specified in Annex 1 of the "Maastricht University Regulations on Academic Integrity" (Maastricht University, 2020).

Definitions of Plagiarism

Definitions of plagiarism can be found in numerous dictionaries and other sources. According to the Wikipedia article on plagiarism (Wikipedia, 2019a), "Plagiarism is the 'wrongful appropriation' and 'stealing and publication' of another author's

'language, thoughts, ideas, or expressions' and the representation of them as one's own original work." The Office of Research Integrity at the US Department of Health & Human Services provides a similar definition (US HHS Office of Research Integrity, 2019) and cites the quote attributed to the American Association of University Professors from 1989: "Taking over the ideas, methods, or written words of another, without acknowledgment and with the intention that they be taken as the work of the deceiver."

Most reputable journals published by professional organizations comply with the COPE principles (Committee on Publication Ethics, 2019) and the principles of many institutions of higher learning, education, research and scholarly publishing: *to anchor scholarly education, research and publishing in ethics that prohibits plagiarism including the plagiarism of ideas*. In particular, IEEE publishes the *Publication Services and Products Board Operations Manual* (IEEE, 2019) which devotes Section 8.2.4 to allegations of misconduct and Section 8.2.4.D to guidelines for adjudicating different levels of plagiarism. In an article published by IEEE, authors Dutta, Uhegbu, et al. (2020) named and defined another level of plagiarism, a form of idea plagiarism called *idea-laundering plagiarism*. In a subsequent reportpublished by ASIS&T, authors S. K. Taswell, Triggle, et al. (2020) further clarified the criteria for evaluating both idea-laundering plagiarism by authors and idea-bleaching censorship by editors.

With reference to these ethical publishing standards and published definitions of plagiarism, this review analyzes (a) the primary idea-laundering plagiarism found in the papers by Wilkinson, Dumontier, et al. (2016); Wilkinson, Sansone, et al. (2018) with their first paper submitted in 2015 to Nature Scientific Data then published in 2016, and (b) the secondary propagating plagiarism by Musen, Mons *et al.*, Jacobsen *et al.*, and other authors in their papers published 2020 in Data Intelligence (Musen, 2020; Mons et al., 2020; Jacobsen et al., 2020), in comparison with (c) the previously published papers and patents by Carl Taswell (C. Taswell, 2007; 2008; 2010b; 2010a; 2014) with his first report submitted in 2006 to IEEE Transactions on Information Technology in Biomedicine then published online in 2007. This case of plagiarism by Wilkinson *et al.*, Musen, Mons *et al.*, and other plagiarists and promoters of the

collection of conceptual ideas previously published in the papers and patents by Taswell is discussed in this historical review and analysis within a sociocultural context which clarifies a code of conduct and practice *differentiating unintentional omission of citation from intentional exclusion of citation* of the previously published work.

Unintentional Omission of Citation

Scholars who wish to remain good citizens of their research communities with respect for citing the published work of their colleagues should adhere to the metaphorical principle expressed in the famous phrase *standing on the shoulders of giants* (Wikipedia, 2019b) with "creative authenticity and fair citation" (S. K. Taswell, Triggle, et al., 2020). Good scholars who respect ethics and integrity not only refrain from plagiarism but also offer apologies for any unintentional omissions of citations when brought to their attention and then correct those omissions in the historical record of the published literature.

When teaching students in the educational research programs of the BHA Virtual Institute, C. Taswell has frequently described several examples of this respectful scholarly practice with the use of two different incidents separated by 40 years and dissimilar research communities. In 1979 long before the modern era of the internet and electronic computerized search on the web, C. Taswell, MacDonald, and Cerottini (1979) published a paper in the field of cellular immunology for cancer research that unintentionally omitted the citation of an unknown colleague's paper. In response to a letter received via physical mail, Taswell *et al.* replied with both a written response apologizing to the colleague and a written Letter to the Editor of the journal where the paper had been published correcting the omission of citation. Forty years later in 2019, a colleague planned to present a conference paper intended to be a systematic survey in the field of brain imaging for dementia research that unintentionally omitted citation of a paper by Taswell *et al.* (C. Taswell, Donohue, et al., 2018). When Taswell alerted the colleague about the omission, an apology was immediately offered, and correction was made in time for proper citation of the Taswell *et al.* paper in the colleague's

presentation of the systematic survey of the relevant literature at the research conference.

As another example not involving C. Taswell's experience, but rather in this case involving IEEE engineering publications, consider the apology and correction offered by Salagean (2010). These examples of correcting omissions of citations in the different research fields of cellular immunology, brain imaging, and information theory raise the following questions: Do different scientific communities maintain different sociocultural standards of adherence to the metaphorical principle of *standing on the shoulders of giants*? If good citation practices are maintained in various other scientific communities, then why not also in the communities of information and data scientists, knowledge engineers, and semantic web researchers who claim to devote themselves and their research field to linking and citing things fairly?

Intentional Exclusion of Citation

In a post-truth era in which ethics, integrity, and truth have been abandoned not only in politics but also apparently in some fields of science, a new form of plagiarism has arisen. Regrettably, too many research scholars and published papers have been victimized by this *post-truth plagiarism of ideas* perpetrated by plagiarizing authors without integrity and respect for publishing ethics. This pattern of plagiarism can be described with the following summary of their sequential tactics:

1. Intentional exclusion of citation with collective refusal by a selective group of insiders, who are known as a 'publishing clique', 'elaborate fiefdom', or 'citation cartel', to cite a publication authored by an outsider who is not considered a member of the insider group. This refusal-to-cite territoriality by citation cartels that knowingly exclude non-members has also been described in other contexts and situations. Plagiarism of the outsider's publicly available and accessible research by the citation cartel insiders.

2. Feigned ignorance of the published research plagiarized by the citation cartel with their false claim of independent development of the plagiarized material

and/or their false claim that the material was common knowledge in the public domain without any necessity to cite the original references and sources.

3. A more complete formal definition for this *idea-laundering plagiarism* has been published by Dutta, Uhegbu, et al. (2020) at the IEEE 2020 ICSC (see also quote below) with further exposition of the criteria necessary to evaluate idea-laundering plagiarism clarified and published by S. K. Taswell, Triggle, et al. (2020) at the ASIS&T 2020 Annual Meeting.

DREAM Principles and FAIR Metrics

In 2006, Carl Taswell wrote the original manuscript for the PORTAL-DOORS Project (PDP) with a comprehensive collection of design principles. In 2007, this article was published online at IEEE Transactions on Information Technology in Biomedicine (C. Taswell, 2007; 2008). Since 2007, numerous reports, conference papers, and journal articles as well as two USPTO patents related to PDP have all been publicly, continuously, and freely available at www.PORTALDOORS.org. Neither the original nor any of the subsequent papers about PDP have been cited by Musen, by Dumontier and the Wilkinson *et al.* authors, or by Barend Mons and the Mons *et al.* and Jacobsen *et al.* authors, or by any of Musen, Dumontier, Mons, or Wilkinson in their continuing promotion and propagation of the Wilkinson *et al.* plagiarism published in Nature Scientific Data (Wilkinson, Dumontier, et al., 2016; Wilkinson, Sansone, et al., 2018).

Quoting an important sentence about the plagiarism by Wilkinson, Dumontier, et al. (2016); Wilkinson, Sansone, et al. (2018) published in the paper by Craig, Ambati, Dutta, Kowshik, et al. (2019) presented June 28 at IEEE ECAI 2019 Conference in Pitesti, Romania:

"As a result of this item-by-item comparison and analysis, we cannot find any novel idea or concept in [1], [34] that can be described as fundamentally new and/or different from the content, principles, analysis and discussion in [2], [3], [10], [23], [24]."

Quoting another excerpt from Craig *et al.* (2019) in which the PDP and NPDS principles were renamed the DREAM principles:

"In order to address these problems in the literature, we are renaming the NPDS principles previously published in [2], [10], [23], [24] as the DREAM principles with the acronym DREAM for Discoverable Data with Reproducible Results for Equivalent Entities with Accessible Attributes and Manageable Metadata as the comprehensively summarizing phrase to describe collectively all of the PDP and NPDS principles of Taswell [2], [10], [23], [24] that have been unfairly renamed the FAIR principles by Wilkinson et al. [1], [34]."

The omission by Wilkinson *et al.* of any principle relating to *equivalent entities* in their FAIR principles (Wilkinson, Dumontier, et al., 2016; Wilkinson, Sansone, et al., 2018) enabled them, perhaps in their own minds incorrectly and wrongly, to rationalize the plagiarism of Taswell's PDP and NPDS principles (C. Taswell, 2007; 2008; 2010b; 2010a; 2014). If Wilkinson *et al.* (2016, 2018) had attempted to innovate in an intellectually meaningful and substantive manner, then they could have proposed or otherwise supported some version of an *equivalent entities* principle. But if they had done so, and actually themselves proposed their own versions of the *equivalent entities* principle, and adhered to it with honor and integrity, then presumably they would not or could not have been able to plagiarize Taswell's papers and patents with such blithe indifference and willful disregard for scholarly research publishing ethics, not to mention their disregard for intellectual property laws, and legal due-diligence requirements at for-profit publishing corporations. If Wilkinson *et al.* (2016, 2018), including those authors representing for-profit publishing corporations, had made a reasonable effort to perform their due diligence and to search and cite the literature properly as required by basic standards of quality research scholarship, then they could have and should have *fairly* cited the published work of Carl Taswell (2007; 2008; 2010b; 2010a; 2014).

Quoting another excerpt from Craig, Ambati, Dutta, Kowshik, et al. (2019) about the importance of *fair* citation:

"As noted in a letter to IEEE Computer Magazine in 2010 by Taswell, 'any discussion of provenance and reproducibility for computational science and engineering that does not also address citation and attribution leads to a contradiction in terms. It is not possible to maintain standards for scholarly peer-reviewed reproducible science without proper citation and attribution' [38]. This principle remains paramount when the professed goal has been 'to improve the infrastructure supporting the reuse of scholarly data' as claimed by Wilkinson et al. [1], [34], but apparently not practiced by them with respect to citing fairly other authors such as Taswell [2], [23]."

Quoting a final excerpt from Craig *et al.* (2019) about the misuse by Wilkinson *et al.* of the acronym 'FAIR' and the word 'fair':

"In order to address this problem in the literature with the misuse of the phrases 'FAIR principles' and 'FAIR metrics' by the Wilkinson et al. [1], [34] authors, we have proposed and published an alternative interpretation of the acronym 'FAIR' with our FAIR family of truly quantitative numerical metrics for maintaining fair standards in scholarly research and publishing [35], [36]. We defined and continue to use 'FAIR' as an acronym for the Fair Acknowledgment of Information Records and Fair Attribution to Indexed Reports [35], [36]."

Further quoting an important paragraph from a paper by Dutta, Kowshik, et al. (2019) presented and published at the IEEE eScience 2019 Conference in San Diego, California:

"Taswell [2] published the PDP principles almost a decade before Wilkinson et al. [7] paraphrased them as the FAIR principles. Key authors of [7] were aware of and knew about [2]. At least six of the fifty-three authors of [7] attended a scientific conference [10] in 2009 where direct face-to-face discussion occurred with conversations between the paraphrasing authors of [7] and the paraphrased author of [2]. Considering the sequence of events with these face-to-face conversations about PDP documented by the W3C 2009 F2F meeting attendance [10] and PDP presentation slides [11], and then the subsequent failure by Wilkinson et al.[7] to cite

Taswell [2], we emphasize that science will be neither reproducible nor fair without recognition, acknowledgment, attribution and citation of equivalent entities regardless of whether those equivalent entities are considered to be scientific hypotheses, scientific experiments, scientific data, scientific results or published articles in the scientific literature."

Finally, quoting from a paper by Dutta, Uhegbu, et al. (2020) presented and published at IEEE ICSC 2020 Conference in San Diego, California:

"The IEEE Publication Services and Products Board Operations Manual defines five levels of plagiarism... We describe here another kind of plagiarism called idea laundering, analogous to the concept and practice of money laundering, in which ideas are plagiarized and then the plagiarism is hidden in plain sight. To clarify this analogy, first define money laundering as the act of passing money that was illegitimately obtained through another illegitimate process with the intent of making it appear legitimate, ie, making dirty money look clean. Then define idea laundering as the act of passing ideas that were illegitimately obtained through another illegitimate process with the intent of making it appear legitimate, ie, making dirty ideas look clean."

Authors who publish research work, especially work financially supported by public funding at education and research institutions, including authors such as Musen, Wilkinson *et al.*, Mons *et al.*, and Jacobsen *et al.*, should adhere to the COPE principles (Committee on Publication Ethics, 2019) and the principles of many institutions of higher learning, education, research and scholarly publishing as noted above and repeated again here: *to anchor scholarly education, research and publishing in ethics that prohibits plagiarism including plagiarism of ideas*. Nature Research publishes its correction and retraction policy (Nature Research, 2020a) concerning both the presence of plagiarism and fabrication (2020c) and absence of discussion of published work (2020b), the latter defined by Nature Research with the following quote:

"When discussing the published work of others, authors must properly describe the contribution of the earlier work. Both intellectual contributions and technical developments must be acknowledged as such and appropriately cited.".

Therefore, the analysis presented in this case study identifies and names the following persons:

1. Mark Musen of Stanford University as author, co-author, editor, and leader of the citation cartel (Musen, 2020) most responsible for aiding, abetting, and promoting in numerous journals and journal papers both the idea- laundering plagiarism by authors of the Wilkinson *et al.* FAIR principles (Wilkinson, Dumontier, et al., 2016; Wilkinson, Sansone, et al., 2018) and the associated idea-bleaching censorship by editors who have excluded any citation and discussion of the previously published Taswell PDP and NPDS principles (C. Taswell, 2007; 2008; 2010b; 2010a; 2014);

2. Michel Dumontier of Maastricht University as the single individual co-author most responsible for the idea- laundering plagiarism by Wilkinson, Dumontier, et al. (2016); Wilkinson, Sansone, et al. (2018);

3. Barend Mons of Leiden University as the corresponding co-author most responsible for the idea-laundering plagiarism by Wilkinson, Dumontier, et al. (2016); Wilkinson, Sansone, et al. (2018) and the propagating plagiarism by Mons et al. (2020) and by Jacobsen et al. (2020);

4. Mark Wilkinson of Polytechnic University of Madrid as the first co-author most responsible for the idea-laundering plagiarism by Wilkinson, Dumontier, et al. (2016); Wilkinson, Sansone, et al. (2018).

Plagiarism by Wilkinson et al

In a detailed item-by-item conceptual idea comparison analysis by Craig, Ambati, Dutta, Kowshik, et al. (2019) of the *plagiarism of ideas* by Wilkinson, Dumontier, et al. (2016); Wilkinson, Sansone, et al. (2018), the authors Craig *et al.* referred to the research misconduct of plagiarism by the authors Wilkinson *et al.* euphemistically as *paraphrasing without citing*. However, the misconduct of Wilkinson *et al.* does constitute *plagiarism of ideas*, more specifically called *idea-laundering plagiarism*

(Dutta, Uhegbu, et al., 2020; S. K. Taswell, Triggle, et al., 2020), for the reasons that have been explained and the questions that have been posed in reports published in past years including: Craig, Ambati, Dutta, Kowshik, et al. (2019); Craig, Ambati, Dutta, Mehrotra, et al. (2019); Dutta, Kowshik, et al. (2019); Dutta, Uhegbu, et al. (2020); Athreya, Taswell, et al. (2020); Choksi et al. (2020); S. K. Taswell, Triggle, et al. (2020); S. K. Taswell, Athreya, et al. (2021). In the following analysis, the papers by Wilkinson, Dumontier, et al. (2016); Wilkinson, Sansone, et al. (2018) are considered the *plagiarizing articles* with primary idea-laundering plagiarism, the papers by Mons et al. (2020) and Jacobsen et al. (2020) are considered the *plagiarizing articles* with secondary propagating plagiarism, and all of the Wilkinson *et al.*, Mons *et al.*, and Jacobsen *et al.* authors are considered the *plagiarizing authors*; whereas the previously published papers and patents by Carl Taswell (C. Taswell, 2007; 2008; 2010b; 2010a; 2014) are considered the *plagiarized articles* and Taswell is considered the *plagiarized author*. This section entitled "Plagiarism by Wilkinson et al" summarizes some of the most relevant arguments and concerning evidence for demonstrating their *idea-laundering plagiarism* in the following itemized analysis:

1. Authors Wilkinson, Dumontier, et al. (2016), which include Mark Wilkinson as first author, Michel Dumontier as second author and Barend Mons as corresponding author, in their 2016 Nature Scientific Data article plagiarized the previously published work of Taswell as demonstrated by the carefully detailed analysis with itemized listings in Tables III to VI of Craig, Ambati, Dutta, Kowshik, et al. (2019) published in the Proceedings of the IEEE ECAI 2019 Conference.

2. Analysis of the plagiarism by Wilkinson, Dumontier, et al. (2016) of the previously published work of Taswell has been reconfirmed with quantitative FAIR metrics which evaluated the fairness with which a document cites prior literature. These FAIR metrics for the Wilkinson *et al.* (2016) plagiarism have been presented at and published in the proceedings of the IEEE 2023 eScience Conference and the IEEE 2023 Guardians Conference (Craig, Athreya, & Taswell, 2023a; 2023b).

3. Authors Wilkinson, Sansone, et al. (2018), which include Mark Wilkinson as first author and both Mark Wilkinson and Michel Dumontier as corresponding authors, in their 2018 Nature Scientific Data article repeated and promoted the plagiarism of the same material that they plagiarized previously in the original Wilkinson *et al.* 2016 paper, by again failing and refusing to cite the previously published work of Taswell.

4. Authors Mons et al. (2020), which include Barend Mons as first author and corresponding author, and authors Jacobsen et al. (2020), which include Michel Dumontier as ninth author and Barend Mons as corresponding author, in their 2020 Data Intelligence papers again repeated, promoted and propagated the plagiarism of the same material that they previously plagiarized in the original Wilkinson *et al.* 2016 paper, by once again failing and refusing to cite the previously published work of Taswell.

5. Because Mark Wilkinson is a first author and/or a corresponding author on one or more of the plagiarizing papers (Wilkinson, Dumontier, et al., 2016; Wilkinson, Sansone, et al., 2018), then review of his plagiarism and his failure to respect the COPE publishing ethics should be admissible and required by a committee convened by an agency mandated to enforce research integrity with a policy that requires such integrity does apply to first authors and/or corresponding authors.

6. Because Michel Dumontier is a corresponding author on one of the plagiarizing papers (Wilkinson *et al.* 2018) then review of his plagiarism and his failure to respect the COPE publishing ethics should be admissible and required by a committee convened by an agency mandated to enforce research integrity with a policy that requires such integrity does apply to corresponding authors.

7. Because Barend Mons is a first author and/or a corresponding author on one or more of the plagiarizing papers (Wilkinson, Dumontier, et al., 2016; Mons et al., 2020; Jacobsen et al., 2020), then review of his plagiarism and his failure to respect the COPE publishing ethics should be admissible and required by a

committee convened by an agency mandated to enforce research integrity with a policy that requires such integrity does apply to first authors and/or corresponding authors.

8. Authors Wilkinson *et al.*, Mons *et al.*, and Jacobsen *et al.* have continued their *refusal to cite* the published work of Taswell even when brought to their attention.

9. Authors Wilkinson *et al.*, Mons *et al.*, and Jacobsen *et al.* have continued their *refusal to correct the omission of citation* even when brought to their attention.

10. Authors Wilkinson *et al.*, Mons *et al.*, and Jacobsen *et al.* have continued their false claims in which they wrongfully declare 'independent development' of their work and deny prior knowledge and awareness of the previously published articles and patents of Taswell — even though documented evidence exists with proof of attendance at the W3C 2009 F2F meeting at MIT in Cambridge MA (World Wide Web Consortium, 2009) with an attendance record for 6 of the 53 authors of the initial plagiarizing paper by Wilkinson, Dumontier, et al. (2016).

11. The authors, editors, publishers, and promoters of the published FAIR principles as plagiarized by Wilkinson *et al.*, Mons *et al.*, and by Jacobsen *et al.* could have and should have corrected their omission of citation, and thus cited and discussed the original papers and patents of Taswell at the journal Nature Scientific Data with a correction, addendum, Letter to the Editor, or Expression of Concern even if for some misleading reason the publisher proffered a pretextual argument against issuing an actual Notice of Retraction for plagiarism by authors and failure with refusal by editors and publishers to disclose the editors' conflicts of interest. Though repeatedly brought to their attention, all authors, editors, publishers, and promoters involved have continued to ignore, disregard, and/or refuse to correct their omissions of citation. If they had agreed to correct their omissions of citation, then perhaps the matter could have been possibly considered a relatively benign form of idea plagiarism such as citation amnesia or cryptomnesia. Because the plagiarizing

authors, editors, publishers, and promoters have *'doubled down'* with their refusal to cite and discuss the papers and patents published by Taswell and their persistent lies falsely claiming independent development, their plagiarism should be considered the malign form of idea plagiarism called *idea-laundering plagiarism* (Dutta, Uhegbu, et al., 2020).

12. Among the 6 authors of the 54 authors of the Wilkinson *et al.* papers (Wilkinson, Dumontier, et al., 2016; Wilkinson, Sansone, et al., 2018) who attended in 2009 the W3C F2F Meeting (World Wide Web Consortium, 2009), Carl Taswell spoke with at least 4 of them during conversations after the formal presentation of his papers at the meeting. These 4 authors included Michel Dumontier, Maryann Martone, Carol Goble and Timothy Clark. These individuals who participated in the plagiarism of Taswell's work cannot feign ignorance claiming that they were not aware of his published papers and patents. The publicly available document for the 2009 W3C F2F. Meeting provides *written evidence* of their attendance and presence at his featured lunch-time presentation at that W3C HCLS F2F Meeting in person at the MIT Campus in Cambridge Massachusetts.

13. Among these 4 authors (Dumontier, Martone, Goble, and Clark), because of the lengthy conversation that Taswell had with Dumontier at the HCLS F2F Meeting dinner on 30 April 2009, and especially because of the manner in which Dumontier stated that he did not believe in searching and citing the published literature and has since promoted himself as "the founder of the FAIR principles", Michel Dumontier should be considered the single individual author most responsible for the plagiarism by the Wilkinson *et al.* (2016, 2018) authors.

14. How is it possible that not a single one of the other 47 of the 53 authors of the initial Wilkinson *et al.* (2016) paper conducted and completed a proper literature search and discussed relevant prior publications as required by the Nature Publishing requirements and the COPE publishing ethics? How is it possible that not a single one of the other representatives of the for-profit

corporations who signed that paper with their names as authors failed to conduct and complete their *legal due diligence* properly and correctly? How is it possible that all 53 of the authors of Wilkinson *et al.* (2016) failed to find, cite and discuss any of the Taswell papers and patents from any of the online searchable databases or the easily accessible online PORTAL-DOORS Project web site?

15. Was it mere coincidence that Dumontier as self-proclaimed "founder of the FAIR principles" chose the acronym FAIR? Or did he choose that acronym as a name purposefully crafted in a deceptive and misleading manner to suggest to readers of the FAIR principles paper (Wilkinson, Dumontier, et al., 2016) that his goal was to be fair in citing other authors' work? While hiding his own plagiarism not only in the sheer number of the 53 co-authors, but also in proclaiming himself to be fair when in fact he was not being fair to the original author Taswell of the previously published collection of PDP principles? The original collection of PDP principles (C. Taswell, 2007; 2008; 2010b; 2010a; 2014), first published online in 2007, have since been renamed in 2019 as the DREAM and PDP-DREAM principles (Craig, Ambati, Dutta, Kowshik, et al., 2019; Dutta, Uhegbu, et al., 2020).

16. If the authors of the so-called 'FAIR principles' wish to be considered fair with fairness as publishing research scholars, then they should eliminate the irony and hypocrisy of calling their plagiarized principles 'FAIR' by correcting their intentional exclusion of the citation of Taswell's papers and patents and by stopping their persistent lies in which they feign ignorance of Taswell's work on the PORTAL-DOORS Project.

17. Summary of plagiarism analysis: Documented evidence (World Wide Web Consortium, 2009) for prior awareness of Taswell's IEEE TITB paper on the PORTAL-DOORS Principles (C. Taswell, 2007) exists for at least 6 of the 53 authors of Wilkinson, Dumontier, et al. (2016). Documented analysis for a complete item-by-item match of intellectual concepts and ideas between all of the Wilkinson et al. 2016 FAIR principles with a subset of the Taswell 2007

PORTAL-DOORS Principles has been published by Craig, Ambati, Dutta, Kowshik, et al. (2019). Therefore, research scholars who adhere to the Nature Publishing requirements and the COPE publishing ethics should consider the writing of Wilkinson, Dumontier, et al. (2016); Wilkinson, Sansone, et al. (2018) published by Nature Scientific Data, and that of Mons et al. (2020) and of Jacobsen et al. (2020) published by Data Intelligence, not just paraphrasing of ideas without citing Taswell, but actual plagiarizing of ideas from Taswell, and thus nothing other than plagiarism according to any of the definitions of plagiarism (Wikipedia, 2019a; US HHS Office of Research Integrity, 2019; Nature Research, 2020c; 2020b; S. K. Taswell, Triggle, et al., 2020).

Further discussion of the PDP-DREAM Principles and the PDP-FAIR Metrics as the original unplagiarized alternatives by Taswell et al. to the plagiarizing FAIR principles by Wilkinson et al., as well as general discussion of research misconduct including idea-laundering plagiarism and idea-bleaching censorship, related to this case of plagiarism can be found in a series of published papers (Craig, Ambati, Dutta, Kowshik, et al., 2019; Craig, Ambati, Dutta, Mehrotra, et al., 2019; Dutta, Kowshik, et al., 2019; Dutta, Uhegbu, et al., 2020; Athreya, Taswell, et al., 2020; Choksi et al., 2020; S. K. Taswell, Triggle, et al., 2020; S. K. Taswell, Athreya, et al., 2021; Craig, Lee, et al., 2022; C. Taswell, 2022; Craig, Athreya, & Taswell, 2023a; 2023b).

Questions for Agency Committees

Questions for organizations and/or agencies that convene committees mandated to review and issue their own reports on the primary and secondary plagiarism documented in this case study:

1. Assume that the idea-laundering plagiarism by Wilkinson *et al.* is not at the level of 100 percent. Then what percent credit should they be given for their sole novel contribution represented by their use of what some have called the *'clever acronym'* FAIR? Should they be given 5, 10 or 25 percent credit reducing their level of idea plagiarism to only 75 percent? What minimum percentage of idea plagiarism is necessary for the agency committee to take

action against the plagiarists? Is more than 50 percent plagiarism enough? And what if it is only 25 percent plagiarism? Why would that amount of idea plagiarism not be enough when there is explicit evidence and proof of direct communication between the plagiarizing authors and the plagiarized author who was victimized by their theft of concepts, ideas, and an entire published collection of principles?

2. Assume that corresponding authors are not responsible for the plagiarism. Then which authors should be responsible for the plagiarism? Should it be first authors who are responsible? Or should it be those authors who plagiarized Taswell after speaking and interacting with him in person with face-to-face conversations? And what about secondary propagating plagiarists, recruited by the primary idea-laundering plagiarists, who then repeat, promote, and propagate the plagiarism of the primary plagiarists? Should these secondary plagiarists also be held accountable?

3. Assume that secondary plagiarists will not be held accountable for repeating and propagating the plagiarism of the primary plagiarists. Assume that journal editors and publishers remain *extremely slow* responding to requests to publish corrections and retractions. Then will the university academic and research integrity offices take the necessary steps to require the plagiarists on their faculty to request the retractions themselves? Will the agency committees require these plagiarists to submit their own letters to the journal editors and publishers requesting retractions?

Violations of Academic Integrity

Analysis of the *violations of academic integrity* as specified in Annex 1 to the "Maastricht University Regulations on Academic Integrity" (Maastricht University, 2020) for the plagiarists should be based on this main quote from the annex:

"The universities categorically reject, actively resist, and will punish with the means available to them the following conduct. Violations of academic integrity are understood to include:"

and more explicitly, these relevant numbered quotes from the Maastricht University Regulations annex:

Violation 3 "Plagiarism of all or part of other people's publications and results. Science works only with the honest acknowledgment of the intellectual ownership of each person's contribution to knowledge. This applies to the entire range from student projects and papers to academic publications and dissertations. This is not confined to the literal appropriation but also includes the paraphrasing, omission of notes or citations, the unacknowledged use of data, drawings, or tables prepared by others. While copyright offers victims the opportunity for redress through the courts, a plagiarist can be prosecuted for plagiarism even if there is (no longer) any direct victim."

Violation 4 "Intentionally ignoring and failure to acknowledge contributions by other authors is a form of misconduct related to committing plagiarism. Willful and flagrant violations which cannot be resolved within the academic community demand the independent judgment of the Committee for Academic Integrity."

Violation 5 "Wrongly presenting oneself as an author. A researcher may only be listed as a publication's author when he has made a demonstrable contribution to it in the form of ideas and expertise incorporated in it, research performed, or theorizing. A researcher who attaches his name to a publication will ascertain the accuracy and integrity of its contents as best as possible."

Violation 7 "Culpable carelessness in carrying out the research. It can be labelled as misconduct only when the researcher goes further than error and sloppiness and does not modify his procedure after serious and well- founded criticism. A Committee for Academic Integrity can investigate whether this is the case."

Violation 8 "Permitting and concealing the misconduct of colleagues. A researcher or director has a duty of due care with respect to the science as a whole and particularly

to the researchers in his immediate circle. It must be acknowledged that hierarchical relationships in science, such as between supervisor and doctoral candidate, do not always make it easy to lodge a complaint against colleagues."

Given these quoted explanations describing violations of academic integrity from the Maastricht University Regulations, this report and the published paper by Craig, Ambati, Dutta, Kowshik, et al. (2019) have presented extensive evidence and detailed explanations demonstrating that Michel Dumontier, Barend Mons and Mark Wilkinson have violated the academic integrity criteria numbered 3, 4, 5, 7, and 8.

Note also that the Maastricht University Regulations on Academic Integrity as published do not use the phrases *corresponding author* or *first author*. These regulations do not require that an accused violator must be identified as either a *corresponding author* or a *first author*. Nor do the regulations explicitly exempt, excuse or exonerate other kinds of authors or co-authors as innocent or excluded from investigation. In fact, the language used by the Maastricht University Regulations includes the words "everyone", "author", "a publication's author", and a "researcher". Therefore, according to the published Maastricht University Regulations, Michel Dumontier is not exempt nor innocent by default (regardless of his authorship status as a corresponding author, first author, or any other position or descriptive label of authorship), and he should not be excluded from investigation for violations of integrity according to the Preamble which declares that

"Everyone involved in academic teaching and research at Maastricht University shares in the responsibility for maintaining academic integrity. Everyone is expected to adhere to the general principles of professional academic practice at all times."

Retraction of Plagiarizing Papers

Therefore, this matter concerning the plagiarism by Michel Dumontier, Barend Mons and Mark Wilkinson of the USPTO patents, scholarly research papers, and publicly available website content published by Taswell, should be investigated by the research ethics and academic integrity committees at Maastricht University, Leiden University and Polytechnic University of Madrid, and at any other organizations and agencies

mandated to investigate this research misconduct with the violations of academic integrity and research integrity documented in this historical review and analysis. The papers written by Wilkinson *et al.* published by Nature Scientific Data and those by Mons *et al.* and Jacobsen *et al.* published by Data Intelligence on the FAIR principles should be retracted for their plagiarism and grave lapses of scholarship and ethics in research publishing. Maastricht University, Leiden University and Polytechnic University of Madrid should require Michel Dumontier, Barend Mons and Mark Wilkinson to adhere to the COPE principles, to conduct and complete proper literature searches, to cite and discuss relevant work that has been published previously, to refrain from plagiarizing other authors who have established historical priority on published work, and to stop unfairly promoting the FAIR principles that they plagiarized and stole from the PORTAL-DOORS Project and the papers and patents published by Carl Taswell.

Furthermore, Maastricht University, Leiden University and Polytechnic University of Madrid should require Michel Dumontier, Barend Mons and Mark Wilkinson to write their own letters to the respective journal editors and publishers requesting that the Wilkinson *et al.* papers and the Mons *et al.* and Jacobsen *et al.* papers be retracted for their plagiarism and grave lapses of scholarship and ethics in research publishing. Maastricht University, Leiden University and Polytechnic University of Madrid should also require Michel Dumontier, Barend Mons and Mark Wilkinson to send copies of those retraction letters, and proof of receipt by the journal editors for those retraction letters, to the original author victimized by their plagiarism, ie, the author Carl Taswell. *If the plagiarists Dumontier, Mons and Wilkinson refuse to be held accountable or otherwise fail to write these retraction letters to the journal editors, then the corresponding organization or agency committee should write the retraction letters on their behalf.* These statements of culpability assigning responsibility and accountability to Dumontier, Mons and Wilkinson for the idea-laundering plagiarism committed by all 53 authors of Wilkinson, Dumontier, et al. (2016) as documented here in this report, and as supported by additional analysis published elsewhere (Craig, Ambati, Dutta, Kowshik, et al., 2019; Craig, Ambati, Dutta, Mehrotra, et al., 2019;

Dutta, Kowshik, et al., 2019; Dutta, Uhegbu, et al., 2020), *do not absolve the other 50 of the 53 plagiarizing authors from their duty to search and cite the literature appropriately and to correct omissions of citations in the historical record of the published literature when brought to their attention.*

Willful Disregard, Inaction, or DARVO

Has enforcement of rules against research misconduct been abandoned in the current era of information wars? To date, none of the research integrity offices associated with this case of plagiarism have addressed the matter. Instead, all of them so far have demonstrated willful disregard, willful inaction, or a practice known by the acronym DARVO with its characteristic pattern of behavior (Freyd, 1997; Harsey & Freyd, 2020):

"DARVO stands for 'Deny, Attack, and Reverse Victim and Offender'. The perpetrator or offender may Deny the behavior, Attack the individual doing the confronting, and Reverse the roles of Victim and Offender such that the perpetrator assumes the victim role and turns the true victim – or the whistle blower – into an alleged offender."

The use of DARVO typically occurs in the context of a *kangaroo court investigation* and represents the most harmful of the non-responses to complaints about plagiarism and other misconduct, which can be summarized with the following descriptively named categories:

1. The *silent treatment*: Nothing but silence without any acknowledgement of receipt and without any response whatsoever in reply to the complaint.

2. The *pass-the-buck treatment*: Respond to the complaint but refuse to consider an investigation with the pretext of arguing that the integrity office must defer and deflect responsibility to another office, party, agency or jurisdiction.

3. The *sham investigation*: Consider the complaint, pretend to conduct an investigation, then issue a single sentence judgement declaring "the complaint unfounded" without conducting an actual investigation that reviews the evidence and then issues a report with rational logical analysis of that evidence.

4. The *kangaroo court investigation*: Consider the complaint, conduct an investigation in which all the denials and lies of the plagiarists are accepted and included in the report, while all the compelling persuasive and concrete evidence from the complainant proving the plagiarism is rejected and purposefully excluded from the report, which then further concludes by blaming the victim harmed by the misconduct, instead of finding fault with the perpetrators of the violations.

Will enforcement of rules against research misconduct only be possible when investigated by independent agencies outside of academia rather than academic research integrity offices? Or only when governments establish laws prohibiting such misconduct and mandating financial penalties against offenders?

Conclusion

Contributors to the PORTAL-DOORS Project have completed unpublished experiments conducted with trial participants who are students in high school and college, and to avoid bias, students who are not part of the PDP research group and who do not have any affiliation with Brain Health Alliance. Initial results from these unpublished experiments indicate that the high school and college students participating in the experiments have so far unanimously agreed with the statement that *Wilkinson et al. plagiarized Taswell*.

Therefore, this review concludes with the most important question that must be answered by any agency committee mandated to investigate research misconduct and violations of academic integrity including plagiarism: *Does enforcement of research integrity rules and academic integrity rules against plagiarism — which are intended to prohibit plagiarism and also to reprimand, censure or punish those who commit plagiarism — does this enforcement only apply to high school and college students hoping to receive a degree diploma? Or does enforcement of integrity rules against plagiarism also apply to faculty who are instructors, teachers, professors and investigators at the academic education and research institutions that award those diplomas?*

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The Divergence between Theory-Practice

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Introduction

Academicians for quite some time worried about the essence of scientific knowledge created in organization theory and wide application of this recognition to use. Nowadays scholars are frequently concerned with methodological accuracy since managers are striving to search the better way which can lead to real-world pertinence of knowledge. These discussions, which are stranded in the diverse habits where knowledge is generated and used up by managing scholars and practitioners, are revealed so far sociology domain (Jarzabkowski & Scherer, 2010). In one way or another scholar's practice in management was leaded by broader framed of institutions was more about the apparent appeal of the theory, articulated as respects to the problematic position of its 'applicability' for practice in management. Discussion regarding the overall issue of scientific knowledge produced in studies of M&O run into an abundant publicised specification of organization research on the foundation

of the level to which operators and generators of knowledge are for collaboration especially in western countries (Wagner et *al*, 2008).

Considering the link between theory and practice is a tenacious and challenging problematic as respect to academicians who work in professional domain. Their goal is being on the duty of emerging knowledge that can be interpreted into services that lead to advancing practice. However, the mention indication 'the gap between theory and practice' rest as an abstract, plentiful issues in directing publications upraised alarms that scientific investigation has not become much convenient for finding solutions to practical issues (Van de Ven, & Johnson, 2006).

It has been demonstrated by (Beer, 2001; Gibbons et *al*., 1994) that consulting studies don't seem to be useful to practitioners and don't get implemented due to the high disapproval of the academic discoveries. Likewise, academics who do not employ effectively their research are a subject of judgment, this what has been mentioned in several studies as Beyer & Trice, 1982; Hodgkinson, Herriot, & Anderson, 2001; Lawler, Mohrman, Morhman, Ledford, & Cummings (1985). The same case is observed for professional knowledge workers, Van de Ven, 2002; Weick, 2001, warn that are criticized for not considering the theory in their practice or in some case ignoring the importance to adjust practice by theory.

The proposed research will start with a literature review where challenge of using academic knowledge will be presented by highlighting the relation between theory-practice knowledge and the existing gap between academics and practitioners. For that, we emphasis on the divergence concerning theory-practice in the domain of M&O. Then we will present brief appraisal of the published works on the academic–practitioner divergence, we examine the involvement of the two chosen paradigms 'functionalist' and 'interpretivist'. In this article, we propose a comparative sight to see which paradigm is more oriented to practical problem-solving.

This standpoint assigns to our comprehension of the gap in several ways. First, the literature has not yet given a talk the concern of which paradigm has more practical implications. This question looks forward to being answered. By reflecting this

question, we determine a different reason for the divergence, explicitly, the challenge of using scientific knowledge in academia and whether it is efficient when it is applied for managerial practices. This is significant because our analysis displays that bridging the gap may only be effective when the management knowledge produced is focused on practical issues. In this discussion paper, we explains how practical knowledge research is undertaken under functionalist and interpretivism paradigms to benefit both researchers and practitioners. One major question was addressed: Under which paradigm more practical implications could assist researchers to gain deeper understanding of the theory – practice gap?

A scientific knowledge production challenge

Certain practices taken from prestigious journals about the divergence between theory – practice raised the question of how it is possible to reduce this gap. Many academic practitioners of business and management were clearly arguable with YES, the divergence exists, however it must be revised in a specific angle to truly apprehend the state of the issue knowing that several studies have showed to which extent research and practice match each one (Grönlund, 2008).

In past few years there was a turn with regards to practice which was considered as a systematic item in business studies. Practical issues as regards to strategy implementation in management and in marketing were upraised in academia. Some efforts to improve theoretical problems started to interest more scholars in M&O.

There is a tendency between researchers accepting that the divergence concerning theory and practice may be a problematic of knowledge generation. For that, various opinions on knowledge are debated in several books and papers, particularly in the organization theory and philosophy of social sciences (Van de Ven & Johnson, 2006). Diverse visions on knowledge lead to altered conceptualizations. The main objective of scientific knowledge is to recognize the explicit circumstances as a more than a wide-ranging example that can be served to describe whether what is done can be functional or at least be implicit. The significance of every sort of knowledge should be taken within the way the problematic is covered (Dewey, 1938).

A number of essential concerns imply provocations and demand plenty of considerations especially when it comes to examine the conceptualization of acquaintance, methodology and their structured connection. Understanding of how the applied knowledge is maintained to relevance standards and moral fairness have to be carried out is essential. Such matter in question has importance on how the theory might possibly call for advancement and refinement that is functional and beneficial for extent application in the pragmatic world (e.g. hypotheses & suppositions imply assumptions for the purpose of expertise transfer (Jarzabkowski, & Scherer, 2010).

Scientific Knowledge is the key to operative competition. The challenge for companies requiring participation in knowledge-intensive sectors of the global company is to organize them so that they can recognize that, for example, academicians should understand that commercial knowledge is different from philosophical and scientific knowledge (Marc, 1997). Point to, from the many existing scientific knowledge approaches two main thought can be distinguished. Those who concentrate on the benefits an organization can derive from managing its knowledge usually through information technology and those focusing on the control of knowledge process through management issues (Offsey, 1997).

By definition, knowledge is considered as a potential of different concept's relationships. As a result, scientific knowledge is the perception of several discussions based on information value, communication, human resources & intellectual capital assets, etc. It implies dealing with numeral matters in particular its transformation, practicality, and quality. By mean of this, till now, scholars could not carry out and managing the whole knowledge process (e.g. control of effectual business, strategies implementation, evaluation of knowledge...etc.) Though, to do so, the key for efficient operation is a partnership between researchers-practitioners (Quintas & al, 1997).

Besides, Hollway (1991) debates that knowledge and practice, mainly within the field of M&O is tied-up. Alvesson (1991) had a like reflection by identifying the influence of non-involving theory on M&O research. In more recent years, however, practitioners appear to have more interest to theory because there is no good theory without practice as a "knowledge-product" and vice versa, in fact, at the present

practitioners seem to expect more resolutions and novelty in methods and strategies that can address today's issues in work (Collins, 1996).

For instance, Van and Johnson (2006) suggested another recommendation to scholars about how they could address the issue of generating a practical instruction, asserting that apart of engaging academics to improve the relevance of research for practice, this will be useful to enhance the meaningless knowledge in different areas of M&O. The ability to manage the divergence between theories and practices in management is come to be more and more serious in today's knowledge economy (Dalkir, 2013). Hence, covering the divergence between theories and practices in M&O is not that easy because the knowledge produced in scientific arena depends in the first line on the utilized methods According to (Rana, 2018).

The divergence between theory-practice knowledge

It is challenging for not misunderstanding the link between practical implications and the theories engendered by scholars, this challenge came up with failure in connecting the two concepts to business environment. And since, the 'theory-practice' calls for a reciprocal interpretation, academicians are pushed to display their theoretical results into practice and practitioners are pushed to display their practices into theory, obviously, this logical consideration implemented a misleading orientation (Van de Ven & Johnson, 2006).

Scholars such as (Beyer & Trice, 1982; Lawler et *al*., 1985) criticized academic researchers for considering the transmission of scientific knowledge they produce. (Caswill and Shove, 2000) showed the fact that there are a lot of substantial questions and problems of theoreticians' growth which must be contingent on close commitment and partnership among scholar-practitioners. In his research paradigms in management (Huehn, 2008) proclaimed the fact that it is not surprising or even shocking to meet full time academicians of management who did not experienced what the business job looks like except as clients or consumers." Nevertheless, are those who make the rules in management which practitioners have no chance than follow.

In 2001, Beer recommends that researchers to be more committed for identifying how the generation of knowledge should be realistic. He likewise discussed the way the transfer of traditional knowledge to practice often hinder the application of proposed solutions (Beer (2001). As well, the work of scholars and practitioners differ in term of context, the purpose of practitioners is to find fast solutions to their problems that come across their daily activities, hence, the theory should not be complex to be accepted by them, is totally the contradictory for academics where time and money are not their ultimate concern, as such, academics give a deep examination to the problem and tasks that rise away in certain situations, and doing that might not lead all the time to finding consistent solution to sum up , practical knowledge is basically custom-built, coupled with know-how, and well oriented to changing aspects of precise situations and experience (Aram & Salipante, 2003).

Theory-Practice challenge in Philosophy of social sciences

Generally, scholars believe that theory and practice go in the same track and the integration concept 'theory–practice' is placed as respect to three types of challenges: Philosophical challenge, practical challenge and empirical challenge. Philosophy of social sciences might be defined as the use of the major ethics of philosophy to the practical labour issues of life. Hence, it compromises a certain conservative of main beliefs and approaches (epistemology, ontology, idealism naturalism etc.) as a definite set of aims and objectives (Leinhardt, McCarthy Young, & Merriman, 1995).

Theory-Practice challenge in practice

Theories are not designed to be put into practice. Theory describes practice but doesn't prescribe practice. Modern society is becoming more complex, information system is becoming available and changing more rapidly prompting uses to shift into new directions and change our reflections to problem-solving strategies. Practice could facilitate and enhance with, essential convolution and uncertainty of the professional environment. As a result, problem-based starts with issues and require scholars, students to research to select, analyze and apply information and consistent theories and approaches to solve it (Barry and Elmes 1997).

Theory-Practice challenge in empirical research

The goal of the challenge is to create enduing and dynamic connections between the ways research practices are done within practice, asking the questions (what is the problem? what was done to study the problem? What was found? What do the findings mean? The observation- based investing to discover and interpret facts and theories by relating human's interaction with useful concepts reflecting today's activities (Reason and Bradbury, 2001).

The paradigms discourse as a contribution to the special issue

During the mid-1960s, a special clue discussion in the field of organizational studies lined up whether the method of using knowledge or information is greatest ensure as of the theories and empirical studies of a distinctive research paradigm or as challenging ones. Well along in the mid-1990s, the accelerated discourse has been emboldened by other sights uttered by the US prominent scientist Jeffrey Pfeffer (1993, 1997). Projecting at this time is his following proposal "for attaining educational morality that suit practitioners, organizational study must go with generating a distinct paradigm of visibly which is relevant to practices and academics "(Hassard & Kelemen, 2002) advocate the prerequisite to transfer from a first and foremost scientific production perception on knowledge to one that holds actions of uptake and creation in a more reflexive way.

In managerial studies, the dispute on paradigms and their role in the research development was given impetus by the book of Burrell and Morgan's 1979 'Sociological paradigms and organizational inquiry'. This book drew numeral discussions vis-à-vis the knowledge produced in the field to bridge the gap between theory-practice. One of their chief opinions was that if we want to place the scientific consciousness in scene we must first possess a structuralism comprehension of the presumptions related to science. In the Burrell and Morgan's investigation, a consistent version of the concept of paradigm is incommensurability used. As these four incommensurable sociological paradigms: Functionalism, Interpretivism, Radical humanist and radical structuralist (See Fig 1).

Figure 16. Burrell and Morgan's paradigmatic Framework (1979).

Discussion

The contribution to the special issue

When we look at different approaches as regards to methods-theories, it is extremely instructive to look over the paradigms that originated with reference to altered lines of research. In the following discussion we mainly distinguish two empirically oriented approaches: Functionalist & Interpretivist. In overcoming some of the barriers of bridging the gap between theory – practice. This paper is contributing to the debate about which of the chosen paradigms in social research 'Interpretivism' vs. 'Functionalism' is more willing to produce effective knowledge that could support organizations and assist managers in their problem-solving issues (e.g. the choice of an appropriate methodology).

It might be argued in the literature of social sciences regarding the consideration of social reality in term of ontology and epistemology assumptions and in term of human's beings' nature (pre-determined or not) that the main leading approaches in knowledge management are those revealed as functionalist (Objectivist) and interpretivist (Subjectivist). For that reason, by doing a comparative analysis in a critical way, we are somehow contributing to ensure a complementarity between the

two paradigms and bringing an additional value to scientific knowledge practice produced by scholars and academicians (See Fig 2 below).
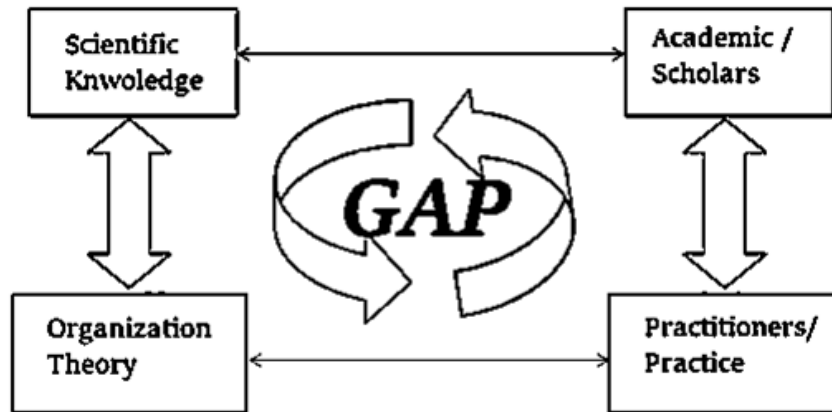

Figure 17. Model of the gap between research theory and practice

Realized by (Sihem Djidjik, 2023)

What we are going to discuss not either means that an interpretivist approach towards practice is upper- level to neither a functional approach nor the opposite. Both can be practiced in a one manner to another. However, it somewhat, to argument the efficiency of the research that can be more helpful for managers with respect to problem-solving of tendency issues they are facing at the present time. Edwards et *al* (2003) article titled knowledge management & research (vision & direction) highlighted how it is important for scholars to be open to multitude approaches and theories to enhance the knowledge management in the field of management and organization.

Functionalist/positivism: explanation and discussion

Epistemology has a vital consideration on the way research is conducted. It reflects the world view of researchers and guides the way research is implemented. Yet, positivistic epistemologies still the dominator of the managerial studies especially in human resource development research (Cal & Tehmarn, 2016). Moreover, the functionalist paradigm under the dimension of sociology of regulation has attention in providing clarifications regarding the status quo. It is focuses on the existing state of

affairs, especially regarding with social issues, and law which maintain the stability in scheme of linked social constructions & institutions, relations & customs, values & practices, which protect, preserve and impose certain shapes of connecting and acting, accepted opinion among a group of people, coexistence, collaboration and cohesion, common interest; mutual support within the society, and this paradigm is paid attention on the motivation to push the social members to become united (Sorm & Gunbayi, 2016).

Commonly connected with experiment and quantitative research, positivism is deliberated as a system of profession pragmatism which is one of the two forms of rationalist and empiricist approaches that considers knowledge as an objective and free from bias, that is, free from the values & beliefs of the research. And more, according to positivists (e.g. the prevailing prototype of sociology that applies the science of nature pattern to the study of community-based events, practice is considered purely like if we are applying a theory. When such paradigms used in application, managers will be apt to explain managerial circumstances, but also of foreseeing behavior and monitoring the organization (Ryan, 2018).

Research in a functionalist paradigm is in most of the scientific cases taken with an upgrade level of corresponding objectivity. Quantitative methods are highly used as determinant to provide accuracy to validate their scientific production (statistics), well-structured and seek for repeatability (objectiveness and generalizability) of the results (Steenhuis & de Bruijn, 2006).

Functionalism begins with the observation that behavior in society is structured; the dominant paradigm is accounting, finance and organizational theory. We can cite agency theory as well, positive accounting theory, systems theory, and contingency theory. This approach has an attention in basis reason and affect (this is produced by something else) and abstraction (the results are factual for everyone), the use of hypotheses testing, it also searches for fairness and trusts that an external entity of certainty exists, will emphasize connection, will perhaps be quantitative (statistical) and may also take in qualitative exertion such as face to face and online interviews. This clarifies that personal knowledge backed by scientific verification. Overall, it is

like thinking about an idea, after that test it then finally reports the results in a formal and scientific way.

Typical questions to functionalists are (what?) how much? Relationship between? Or (causes of this effect), it also uses longitudinal, cross sectional, correlational, experimental and methods. Useful examples that could be used in practice include Attitude of COV19 pandemic towards online based work or relationship between employee's motivation and their company achievements and/or the effect of experience on the job performance of freshly graduated students. The researcher under this paradigm is independent, and the central objective is to describe and explain the behavior of individuals, groups and organizations under this approach is explained based on the facts and observation, unquestionable, the data is gathered using for example, deductive models.

Furthermore, evocative research include whatever is variable to a definite level and which can be measured such as (case studies & surveys, comparative & correlation studies, development & trend studies), else ways, preliminary research comprise thoughtful operation of assured aspects under extremely measured circumstances, the objective is to detect pivotal links while maintaining the scales of some regular and influencing variables, And for those who search for to design & do policy evaluation, positivism approach is well applied. In principle, it is disputed that, on a general theoretical level, modeling simultaneous interpreting (SI) in the context of the common functionalist theory of Vermeer (Skopos theory) for example helps to get into attention the critical cross-national issues of state, text, target values, textual autonomy, and "coherence" to case studies (Pöchhacker, 1995).

In real practice, most of functionalist theories opt for mechanical and biological correspondence as prototypical to understand the social world (Burrell & Morgan, 1979). Theoretically, this paradigm relies on the evidence that the society or an organization cannot survive if their members do not share at least some mutual attitudes and values. Eventually, the functionalist paradigm was framed by the interaction of three sets of intellectual forces such as Marxist theory, German idealism, and sociological positivism. Among the three cited forces, sociological positivism has

been the most influential and prominent one. The principal theories basically fit in to this paradigm are integrative theory, social system theory, interactionism, social action theory and objectivism etc. (Sorm & Gunbayi, 2016).

Without a clue, a robust request for an instrument for combining business & science research into expressive framework that can be useful to practitioners is needed. Positivists for instance, use the methodological ideology of choice in many research areas like (management and marketing). Point out another example, performance management and evaluation (PME) which is identified as a settled element of any managerial system of human resources. Conversely, most of research for 'PME's is conquered by a fundamental methodology placed under positivism/ ontology) (McKen et *al*, 2011).

Lastly, as it is known in Burrell and Morgan sociological paradigms, the comprehension of engineering's is central under positivism paradigm because to understand human relations, we should have valid methods and models in it is realist approach (e.g. quantitative design) and nomothetic (e.g. methodological assumption) for social researchers. Adding to that, positivism in Mixed Methods Research (MMR) is well-matched with quantitative component of MMR, if we confer to its assumption, it uses methods of natural science to study its research scopes (e.g. experimental and manipulative design) after the verification of the assumptions (Gunbayi, 2020).

Interpretivism: Explanation and discussion

The interpretive approach is somehow considered like a rational system, as recognized clearly from Burrell & Morgan 1979, interpretive paradigm approves a subjective approach to analytical rationality & practice. The focal dissimilarity amid this approach and the functionalist approach is the epistemology arguments. Certainly, social reality doesn't widely interest interpretivists from the point of view subjectivity, instead of doing that they try to focus on understanding the intentions of human beings to conceptualise social reality. Interpretivists strive to generate methodologies that fit with how people think. (Jackson, 2000) defines interpretive as an approach that strives to find out integrative values from a number of angles. By doing such assistance, it can

be a helpful technique to support managers in forecasting and controlling their outcomes.

Referring interpretivist as an approach to management can benefit practitioners in their managerial tasks. For instance, in the interpretive approach Morgan description to metaphor of context was linked in the first point to culture and politics where everyone could assign meaning to his/ her situation. This could make an organization a better place in term of practice. As an example, to highlight the gap between theory and practice through this designated paradigm is the 'soft system tradition of work' this system is considered as one of the most glowing in the declination systems, it affords practitioners with more methodologies, models and techniques which are extremely involving into settling and determining practical issues (Jackson, 2000).

To understand the relationship between society and the individual in term of the proposed mode, people have consciousness and are not unbiased marionettes who respond to the external world which mean that humankind are intricate, multifaceted, and distinct individuals' knowledge and apprehend the identical independent reality in unalike ways. Indeed, individuals have motives for their activities and choices.

The essential point in focus stating of this social research paradigm is to understand profoundly the distinctiveness of respondents, to gain an empathetic thoughtful of the central question 'why individuals act in the way they do'. Scholars in this way prefer to deal with qualitative methods in which manner it allows them to close their interaction with respondents. On one hand, this criterion prefers humanistic qualitative methods, most of their research methods derive from social action theory. For weber this theory emphasizes is to understand the role of the active individual in shaping their identity. Plus, research in an interpretivist paradigm, would be likely to be take on in a more personal corresponding way in which societal researchers work.

There is a hope in the accentuation on qualitative approaches and scholars would have better do effort to justify the changeable environment of society when using applicable methods for the distinctive circumstances where they observe themselves. To help practitioners, the research methodology used in the interpretivism likely to be slightly

organized and focus more on analysis as another option as assumptions & arguments (Holden & Lynch, 2004).

It is indeed well seen in practice, the approach above use more qualitative, personal documents, participant observation, unstructured interviews. This approach seeks for something with bias and value laden. Additionally, research tends to be finished in better facet and stares at values and cultures. Therefore, in our opinion this paradigm has high validity because it is a true representation to the reality and reliable enough. Interpretivism under this statement represent what out to be (normative). Undoubtedly, the theory used has high-rise efficacy (e.g. data is more constant and truthful), qualitative data is detailed in depth and accurate into what is really happening. Interpretivists don't search for descriptions instead; they want reason to understand the habit of impeding consistency and emblematic. Consequently, the outcomes will be private and hard to be generalized. In fact, the thing that could be considered as disadvantageous is the incline to include emotions and leaning in their interpretations. Other drawbacks such as time efficacy, money, cost and the difficulty to replicate the events may not be seem beneficial.

For instance, Ragsdell (2009) urges management and organization instructors to opt for a functionalist approach in the early stages of their research. However, some called rigid problems have been wriggled to find pertinent clarifications to technological–softer problems which bring more challenges for practice because it applies social aspects. Ragsdell argued that if study actions are to persist proportional with the kind of the theme being researched and, thus, endure operational, then in this case it is suggested to better apply interpretive approach. And he debated that the move from a functionalist perception to a more interpretive perception bring into line the inception of innovative knowledge management that are more directed with handling implicit by contrast to explicit knowledge and progressively pressure the concepts of social communication instead of the role of technology.

For interpretivists empirical studies are crucial, for example, it is essential that the storytelling is told so build accurate interpretations. This can lead to idiographic study, which provides rich description focused on telling a story context in organizational

management. This kind of research can help in providing rich information; interpretivist approach could build theories instead of assuming hypothesis. What should be considered in this sort of study is its aim to unravel a practical problem. However, to make the work scientifically respected, it is necessary to apply other assessment standards (Steenhuis & de Bruijn, 2006).

As regards to (Steenhuis & de Bruijn, 2006). Another example that could be illustrated in this case is the conduction of a design study which is mostly interested in looking at 'if its works' rather than at 'what reality means? One 'mistake' made with this kind of research is that researchers improve an instrument to assess a company's performance. This instrument is utilized, and expectations are extracted about the performance of the company as an alternative to the instrument itself. This is a big error because the taken research in this case is not adapted to assessing if the instrument functions properly but moderately supposes that it does. This hypothesis is inacceptable seeing as how the instrument was validated. To clarify the issue, it is desirable to approach it in an interpretivist view, this means that the role of the study as well as the techniques of collecting the data and those of analysis have the duty to be transmitted since they are considered as a foremost matter in the overall evaluation.

Another case in point that we find crucial to talk about in as regards to this paradigm is the information systems field. In information system research field scholars take a strong stance on the interpretive view as the supreme useful in practice comparing to functionalist approach. The interpretive style is being anticipated as the utmost suitable paradigm for information management research which deals with persons and beliefs. The decision was justified by taking an example of information management research – the integrated foundational learning project and criticizing results in contradiction of epistemological assumptions of interpretivists. It was as well specified in the literature that "phenomenology' is the ideal methodology to study systems of information since it go with the deliberation of actors (Orlikowski & Baroudi, 1991).

Acquiring the mentioned paradigm can deliver deeply understanding of deginite perspectives for instance cross-cultural studies, factors that influence development over collection and interpretation of 'qualitative data' directing to profound

comprehension and suppositions that may be unlike from other results as argued by (Myers, 2008; Saunders *et al*., 2012). Implementation of the interpretivism paradigm would help in making high-level viability in data as it is founded on personal contributions with consideration of several variables and factors such as behavioral traits based on participants' experiences, and this would assist to designate reality given the suppositions of the interpretivist investigator (Alharahsheh, 2020).

One of the specific interpretive standards of (Klein & Myers) is cared about the relationship stuck between researchers & practitioners or in another manner "the principle of interaction between the researchers and subjects". This entails that empirical data building is perceived as a procedure of constructed meanings in social life, e.g. socially constructed by researchers and participants which signifies that lots of interpretive researchers seem to work close to the practice field might be indicate a connection in practical studies (Goldkuhl, 2012).

Finally the example is related to the integration of interpretivist method to looking for facts in supply chain management. It was founded that the interpretive approach can be used in SCM and the fact that this approach could help in evolving practices that recognize the essentials of a framework (e.g. contextualized logic). By starting with understanding behavior *in context* (i.e., in the focal domain), the interpretive approach facilitates understanding of how managers interpret, react to, and influence their environments. The empathetic understanding to interpretive research facilitates the reconciliation of the particulars of the domain with existing supply chain models (SCM) and practices to elaborate marginal rate of technical substitution (MRT). There is also amplification of the theory which wishes to settle theory with the cultural particularities to both refine and broaden existing frameworks by using interpretive approach (Darby et al, 2019).

The environment in which an organization comes upon is a product of past enactments of that organization (Hassard & Pym, 2012). Let's take a realistic illustration relating to the US Apple industry. This manufacturing views itself occupying a sluggish environment which, apart from its feature to compete foreign industries such as Samsung through an earlier move to the production of similar mobile phones, this is

independent of its own decision, however what the Apple industry will be like if it had emerged rapid technology like a phone with a robot features, or with an advanced system information processing industry. Up to that point, we might expect some change in the whole process of design making/conception. In this way, the Apple industry has not been innovative enough, and the non-actions in this regard in part account for its present circumstance. This is how interpretivist approach should be reflected by companies, as far as the world is functioning according to our own decision making, individuals require yielding meaningful perceptions to their ultimate choices (See in table 1 below the differences between Positivism vs. Interpretivism).

Table 1. Main differences between Interpretivism and positivits/Functionalists

Positivism/ Functionalist	Interpretivism
Mode terms	
Objective/ Generalisability	Subject/ Human being motives
Comparison and correlations	Emotions and Empathy
More scientific	More Humanistic
Detached from the participant	Close interaction with participants
Applied research methods	
Quantitative methods	Qualitative methods
Statistics	Documnetation
Surveys / Questionaires	Observation/ Controlling
Structured interviews	Unstructured interviews
Analytical framework and critical evaluation	
Predefined and generalized (organization theory, agency and contingency theories)	Emergent and more specific / research process
Causal and relations between many variables	Relation between particular variables
Nature of reality	
Reality is single	Realities are socially constructed

Research influence	
Practices and research are separate entreprises	Research affects context (action research)
Human Behaviour	
Believes that human behaviour is based on social norms	Believes that individuals are complex
Believes that society shapes individuals	**Each has a different experience**

Contributions to the special issue

The value of Burrell and Morgan framework in both practical and theoretical dimensions is slightly shrinking due to the fact that most of scholars in management and greatest number of the practitioners are positioned in one paradigm section which is the functionalist one. Our aim in this discussion paper is not to criticize those who prefer positivist view, rather, we choose to compare between the two paradigms as regards to the existing gap between theory and practice, we are quite subjective in our analysis since we see widely that the positivist approach could not care less a crucial consideration to instrumental tools, the link that exist between multitude circumstances , or in another way it does not arrive yet to explain explicitly the existing link in a consistent manner. Besides, the knowledge used in connection with the methodologies used in positivism paradigm to comprehend the world naturally could not be exchangeable or referable to our society which means that this approach is exposed to several limitations and challenges while trying to simplify and control certain assumed variables and hence, generalizability could lead to misleading the goal of individuals.

There is shadowing disagreements from here and there requesting the point that paradigms should not be mixed, they should be distinctive, alright, both have to do with right and wrong? It utterly depends on the purpose of the research and the chosen methodologies. For this comparison approach between interpretivism vs. positivism, what can be largely mastered referring to our discussion is that to bridge one of the divergences 'Theory-Practice' it is necessary to develop interpretivist approach since

it is tried to be used in so many recent issues (big data analysis, supply chain management, human resource development, information system and so on).

Noticeably, this gap exists because of the lack and the neglect of practical knowledge by scholars to guide their practice participation. The primary non – success within the theory–practice gap is the absence of research incorporation within current managerial practices. Sure, every paradigm contains different goals and perspectives, for that matter, the evaluation should different itself, as well as the distinction between the two paradigms. It is necessary to consider interpretive approach as a practical- theoretical portfolio. We see that interpretivism could be used to make the research design more scientifically precise in the real context of practice this means it more derived to be practical.

The difference between academic management literature and the perspective of managers is a significant explanation for the supposed implication of theory into practice. It would be more interesting to focus of multi-directions of contexts this will aid in making a choice of developing the research paradigm. By contributing to scientific knowledge, we need to ask the following question: What should the nature of the study be valued in? By making the study clearer of how it contributes/ relates to the theory, we better ask further question: What type of study could be more useful in practice?

Dealing with single case study to provide in-depth knowledge and clear communication to our data (in all its steps) needs an interpretive perspective since this paradigm response the question of what is proper for being interesting. So, the performance will be enhanced. To sum up, how researchers might engage with organizations, this is what matters more: by predefining of what is best practice instead of engaging in infinite judgments, useless arguments and sorry for the word some meaningless researches to provide best practice its more convenience to engage with practitioners to understand how practice change, evolve, make a progress in the business world , by doing that, researchers could bring new strategies and improve their theories which will have a practical value.

The question we would like to ask scholars dealing with practical issues 'in which way bridging the gap between theory-practice should be taken'? (Do we need more empirical studies, more theoretical tools, more qualitative research?). This question was not developed yet (See the created model (Fig3) below for more understanding of the gap).
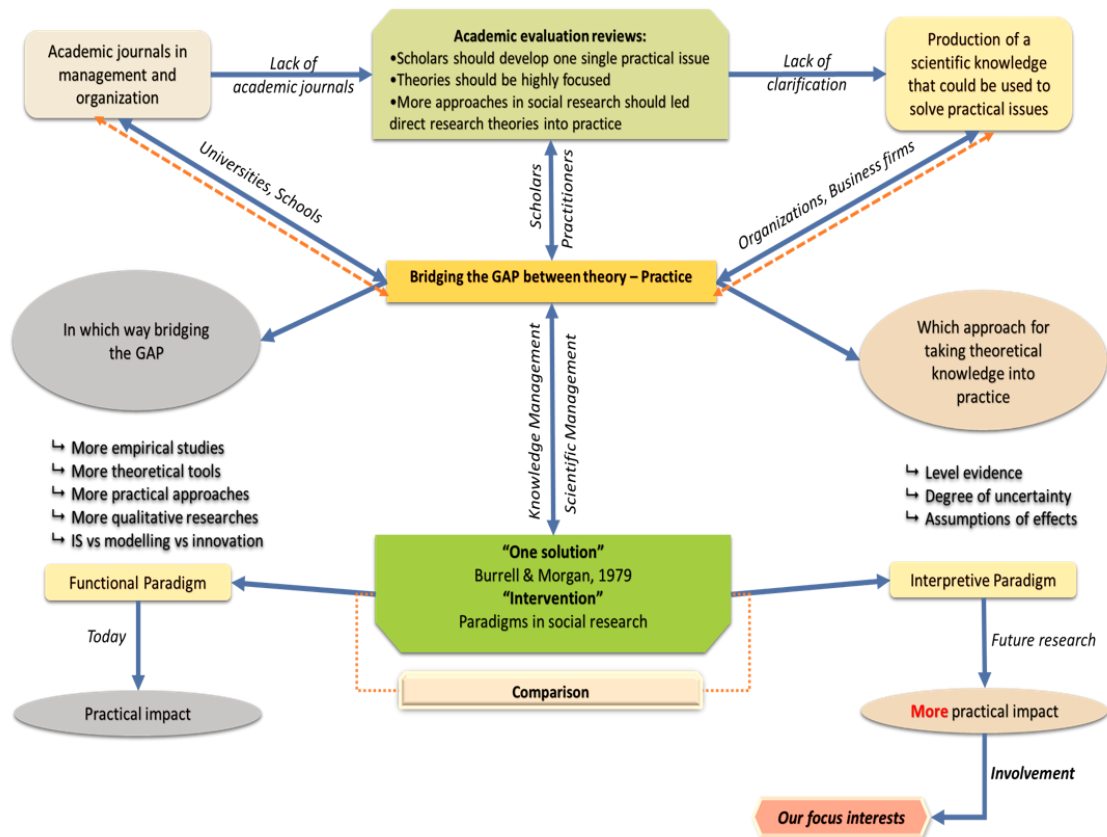

Figure 18. A model for analysing the gap between theory and practice by using Burrell & Morgan paradigms Realized by (Sihem Djidjik, 2023).

Conclusion

Without a doubt, academics have suggested on many occasions (conferences, scientific journals and books) the use of diversified research methods that can be used and applied significantly in real practice and clearly there is a robust urge for a tool that could be meaningful for management scholars to help practitioners. However, still today, most of scholars in the field of management have gone somehow to advocate

the use of multi-methods with 'functionalist/positivism approach' and which is obviously leading the field of M&O. This issue may limit the new generation of scholar's aptitude to open innovative toolbox to further theories under other paradigms (i.e. include interpretive research methods) and propose realistic explanations that could be workable to today's 'theory-practice' challenges.

As business arena is enlarged, and scholars pursue to investigate in the field of applied management, in the future there will be a better practical alignment in term of theory-practice. Though, today, this is not the case." Perhaps interpretive approach will find a way to the gap amongst the academic and industrial arena, context, and mindset do require a change in paradigms among practitioners and scholars intentionally.

If we arrive to overpass the interlude uniting theory and practice, we will be able to adopt novelties from management research into practical application. For future research suggestions/ challenges it is essential for us as future scholars to start focusing on contemporary organizational phenomena to enhance the effectiveness and maximise the profit of big firms and small enterprises. Which approach for taking knowledge into practice will be more appropriate? (Level of evidence, degree of uncertainty, assumptions of effects), that kind of studies have not been studied before and it is time to do so.

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