PROCEEDINGS

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Artificial Intelligence, Automation, Emerging Technologies & Interdisciplinary Integrations

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Proceedings of the International Conference on Global & Emerging Trends

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FOREWORD

The International Conference on Global & Emerging Trends (ICGET), now in its third iteration, has established itself as a vital platform for fostering interdisciplinary collaboration and exploring the far-reaching impacts of technological advancements on society. The Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia is proud to host this year's events and to welcome delegates from around the world to Johor and to Malaysia. The theme for this year, "*Artificial Intelligence, Automation, Emerging Technologies, and Interdisciplinary Integrations*," underscores the transformative potential of emerging technologies in reshaping our world.

ICGET2024 brings together thought leaders, researchers, and industry professionals from across the globe to engage in meaningful dialogue on the challenges and opportunities presented by the rapid growth of AI and automation. It is through such exchanges that we can build the frameworks necessary to harness these technologies responsibly, ensuring that they benefit society at large.

I extend my sincere gratitude to the organizing committee, sponsors, and partners for their tireless efforts in making this conference a reality. I am confident that the knowledge shared and collaborations formed during ICGET2024 will contribute to driving innovation and shaping a brighter, more equitable future for all.

Thank you for being part of this important event.

Prof. Dr. Wan Ahmad Jaafar Wan Yahaya
Director, Centre for Instructional Technology and Multimedia
Universiti Sains Malaysia
Patron, ICGET2024

PREFACE

ICGET2024 Proceedings represents the culmination of countless hours of research, collaboration, and intellectual exchange among a diverse and dedicated group of scholars, professionals, and innovators.

This year's theme, Artificial Intelligence, Automation, Emerging Technologies & Interdisciplinary Integrations, reflects the pressing need to address complex challenges with cross-disciplinary approaches. The contributions in these proceedings span a wide spectrum, from AI-driven education and sustainable development to advancements in consumer behavior, and the role and impact of emerging technologies in various fields. This diversity highlights the conference's commitment to fostering dialogue and collaboration across domains, bridging theoretical insights and practical applications.

The proceedings showcase over 60 papers and presentations from researchers representing more than ten (10) countries. Each work underscores the vital role of global collaboration in addressing technological, social, and educational challenges in our rapidly evolving world.

In the spirit of ICGET series' vision of fostering an environment for industry-academia collaboration and more importantly, creating a platform for mentoring and supporting upcoming researchers, ICGET2024 featured submissions from many Masters and PhD students. These budding researchers experienced exceptional learning opportunities through focused feedback from senior researchers and peers on their dissertations and theses during the Doctoral Consortium session.

On behalf of all the editors, I would like to express my deepest gratitude to the authors, reviewers, and editorial team for their unwavering commitment to excellence. Your efforts have ensured that these proceedings stand as a testament to the quality and relevance of ICGET2024.

May this publication serve not only as a record of the conference but as a beacon of knowledge, inspiring continued innovation and interdisciplinary exploration. Thank you for your contributions and for making ICGET2024 a resounding success.

With appreciation,
Bosede Iyiade Edwards, PhD
Chief Editor, ICGET2024 Proceedings

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KEYNOTES

Dr. Elizabeth Gross is a librarian, educator and researcher. She's an expert in libraries and learning design and technology and teaches teachers how to become school librarians. Dr. Gross is an Engineering education researcher and higher learning professional. His research also covers interactive technologies and eLearning as well as the promotion of social justice in schools. She loves books and reading.

Keynote Synopsis

Start Small, Think Big! Exploring GenAI Integration in Learning and Teaching.

Generative AI has the potential to change learning and teaching. However, many educators are still wary of its use, and some organizations have banned it outright. How do we ensure that policies we create will adequately protect users? How do we introduce GenAI to reluctant colleagues? This talk will touch on potential benefits of the use of GenAI and ways to familiar-ize users with its transformative power. What is its potential for supporting information literacy and critical thinking skills? How about ethical considerations like data privacy and the digital divide?

A/Prof Dr. Denise Dillon is Dean of Research (acting) and the Associate Dean Research Education at James Cook Universi-ty in Singapore, the latter of which involves her working with supervisors and HDR candidates to facilitate a strong culture of research supervision at JCU Singapore. Denise's disciplinary training is in cognitive and environmental psychology, and her research interests are primarily in the area of human-environment and human-animal interactions, and biophilia. She is a certified Forest Therapy Guide. As a newcomer to the AI conundrum (its greatest strength can also be its greatest weak-ness), Denise collaborated with ChatGPT to generate portions of her talk (one of those strengths) followed by prudent fact checking (a required consequence of AI weakness).

Keynote Synopsis

Pioneering Tomorrow: Embracing AI Innovation in a Global Landscape

The convergence of AI and interdisciplinary studies creates numerous unparalleled opportunities across various domains. By weaving together historical insights, contemporary examples, and future prospects of contemporary women leaders in AI, both in academia and industry, we celebrate the achievements of women in AI and inspire the audience to embrace diversity and collaboration in the pursuit of technological innovation. We review specific examples of innovative research, impactful projects, and leadership roles of women in shaping the future of AI. In the field of Early Disease Detection, interdisciplinary collaborations between AI experts and medical professionals enable the development of AI-powered diagnostic tools capable of detecting diseases like cancer at earlier stages and thereby improving patient outcomes. In the field of Biodiversity Conservation, interdisciplinary collaborations between ecologists, data scientists, and AI researchers enable the development of AI models to monitor and protect endangered species, track habitat changes, and combat illegal poaching and deforestation. In the field of Smart Cities, AI-driven analytics can process data from IoT sensors, traffic camer-as, and social media to optimize urban infrastructure, improve traffic flow, reduce energy consumption, and enhance public safety. The collaborative efforts of women across disciplines are driving transformative advancements in AI, reshaping industries, protecting ecosystems, and enhancing urban living.

Chet W. Sisk
President of Universal Basic Resources

Speaker Bio:

Mr. Chet W. Sisk is the President of Universal Basic Resources, Denver, Colorado, USA, and a renowned futurist and author. As the founder of The UBR Private Equity Fund, Chet is dedicated to supporting businesses and ventures focused on transforming communities into climate-resilient ecosystems. His work helps organizations and individuals navigate the ongoing paradigm shift by understanding emerging trends and the opportunities they present. As a dynamic and inspirational speaker, Chet blends real-time data, insightful stories, and humor to inspire audiences, showcasing a path forward filled with possibilities. In his role as a consultant, Chet leverages his partnerships with NVIDIA Technologies and Arrow Intelligent Solutions to integrate cutting-edge technology with human-centered strategies, helping organizations plan for the future. Chet's expertise as a trend analyst enables him to stay at the forefront of the major developments reshaping both professional and personal spheres. His holistic approach equips leaders to embrace change and turn challenges into growth opportunities, making him a highly sought-after speaker and thought leader in the global arena.

Keynote Synopsis

We are at the beginning of the Transition Economy: Adaptive, Resilient, Abundant.

A global economic framework has been functioning around the world for the past 200 years. That framework is based on the processing of oil into petroleum products. Climate crisis makes it clear that any economy based on this framework going forward is a suicide mission. Companies, governments and organizations around the world are now scrambling to figure what does this next framework look like and how do we get in on the ground floor. Based on everything I am seeing, 10 particular trends are coming together to help facilitate the change. It doesn't have a particular political ideology, religion or cultural emphasis. In fact, these trends are fairly agnostic.

The 10 trends now merging include the following:

Basics of the circular economy, ubuntu (everything is connected) as a philosophical guiding light, climate adaptation and resilience, the development and implementation of solid state super batteries, tech augmentation over tech replacement, distribution model government, social justice and equity, the re-commitment to indigenous wisdom. food forward societies, visionary leadership leading to a Level 1 civilization goal.

My speech addresses how the earth's two biggest trends - climate crisis and the tech evolution -have put these trends on a common path with a common goal,replacing the current structure with something more robust, agile and sustainable.

SECTION 1

Education, Art, Social Science, Humanities

ASSESSING ARTIFICIAL INTELLIGENCE READINESS IN MALAYSIAN LIBRARIES

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ABSTRACT

This study investigates the readiness of Malaysian libraries to embrace Artificial Intelligence (AI) technologies, focusing on six key dimensions: infrastructure, human resource, management support, policy and regulations, funding, and training. Utilizing a quantitative research approach, an online survey was conducted to collect data from library heads, providing insights into their preparedness for AI adoption. The survey instrument, developed based on preliminary interviews with librarians and refined through expert feedback and pilot testing, achieved good internal consistency. Findings reveal that while libraries exhibit moderate readiness in terms of internet infrastructure and management support, significant challenges remain in financial planning and policy and regulation formulation for AI integration. These challenges highlight critical areas that need addressing for successful AI adoption. The study provides valuable insights for library administrators and policymakers, emphasizing the need for comprehensive strategies to enhance AI readiness. The contributions of this study are threefold. Theoretically, it expands the understanding of AI readiness in the library sector, offering a validated framework for future research. Empirically, it fills a gap by providing data-driven insights into the current state of AI readiness among Malaysian libraries. Practically, it offers actionable recommendations to improve financial planning and policy development, essential for effective AI integration. These findings contribute to the limited empirical research on AI adoption in libraries and provide a foundation for future studies and practical guidelines for successful implementation.

Keywords: Artificial intelligence; technology integration; AI adoption; Malaysian libraries; library readiness.

INTRODUCTION

The integration of Artificial Intelligence (AI) into various sectors has sparked a global transformation, and libraries are no exception. As repositories of knowledge and hubs for information dissemination, libraries must evolve to keep pace with technological advancements. AI has the potential to revolutionize libraries by enhancing data analysis, improving remote access, and facilitating research using Big Data (Hussain, 2023). These advancements can significantly streamline many routine tasks, allowing librarians to focus more on providing in-depth expertise in advanced research areas and personalized services to patrons (Pence, 2022). The integration of AI into library systems can also lead to more efficient cataloguing, resource management, and user interactions, transforming the traditional library experience into a more dynamic and responsive service (Masrek, et. al, 2024). However, the successful implementation of AI in libraries is not without its challenges (Bassey & Owushi, 2023). While AI can be readily adopted for technical services and management, ensuring its effective integration requires meeting various technical, organizational, and human resource requirements. Libraries must address several research gaps. These include the need for comprehensive frameworks that assess library readiness for AI adoption and strategies to overcome resistance to change among library staff (Harisanty, et.al, 2023). The readiness of Malaysian libraries to embrace AI requires in-depth investigation. Academic libraries globally exhibit varied levels of awareness and

engagement with AI technologies. Studies indicate that many academic libraries show a lack of awareness or proactive response to AI. Only a few institutions are participating in or creating their own AI hubs (Wheatley & Hervieux, 2020). Moreover, research on AI readiness and adoption is still in its infancy. This leaves both researchers and practitioners without comprehensive guidance on how to effectively integrate AI into library systems (Jöhnk, Weißert & Wyrtki, 2021). In Nigerian university libraries, there is awareness of AI's potential for enhancing user satisfaction. However, there is also a significant fear of job loss among librarians, which acts as a major barrier to AI adoption (Abayomi, 2021). There are notable research gaps in the literature concerning the readiness of libraries to adopt AI, particularly in the Malaysian context. Theoretically, there is a lack of comprehensive frameworks that assess library readiness for AI, which can be applied across different types of libraries. Empirically, there is a scarcity of data on the actual implementation and outcomes of AI initiatives in Malaysian libraries, making it difficult to gauge progress and effectiveness. Practically, there is limited guidance available for library professionals on how to navigate the transition to AI-enhanced operations. This study focuses on assessing the readiness of Malaysian libraries to embrace AI. This investigation is crucial as it will shed light on whether Malaysian libraries are equipped to leverage AI technologies to enhance their services and operations.

METHODOLOGY

The research approach adopted for this study is quantitative, aiming to provide a comprehensive and systematic analysis of the readiness of Malaysian libraries to embrace Artificial Intelligence (AI). This approach was chosen to facilitate the collection of numerical data that can be statistically analyzed to identify patterns, trends, and relationships. The primary research method employed is a survey, which was facilitated through an online questionnaire. This method was deemed most appropriate due to its efficiency in reaching a large number of respondents across diverse geographical locations. Given the exploratory nature of this study, the questions in the survey were primarily self-developed. These questions were developed based on the findings from a preliminary study that involved in-depth interviews with librarians. This preliminary phase was crucial in ensuring that the survey questions were highly relevant and specific to the unique context of Malaysian libraries, addressing pertinent issues and potential barriers to AI adoption. To enhance the reliability and validity of the questionnaire, it underwent a rigorous pre-testing phase. The questionnaire was pre-tested with seven academicians who specialize in library science teaching and research. Their expertise and insights were instrumental in refining the survey instrument, ensuring that it effectively captured the key dimensions of AI readiness. The feedback received from these academicians was thoroughly analyzed, and necessary modifications were made to improve the clarity, relevance, and comprehensiveness of the questions. Following these improvements, a pilot test was conducted with 30 librarians from various institutions. This pilot test yielded a good Cronbach's alpha ranging from 0.72 to 0.85, indicating acceptable to excellent internal consistency and reliability of the survey instrument. The final questionnaire employed perceptual measures using a Likert scale, where respondents rated their agreement with various statements from 1 (strongly disagree) to 5 (strongly agree), allowing for nuanced and detailed responses. The unit of analysis for this study is the organization, specifically the library. Therefore, the targeted respondents

were library heads who are in positions to provide informed insights about their institution's readiness to adopt AI technologies. A total of 350 librarians were invited via email to participate in the survey, ensuring a broad and diverse sample. After a period of two months, 71 valid responses were obtained, representing a range of library types and sizes. The data collected from these responses were analyzed using SPSS version 24, a powerful statistical software package. This analysis aimed to uncover deep insights into the current state of AI readiness in Malaysian libraries, including existing capabilities, challenges, and the potential benefits that AI adoption could bring to this sector.

FINDINGS

The findings indicate that the majority of the respondents were male, comprising 52.1% of the total, while females made up 47.9%. The majority of respondents were in the 40-49 year age group, accounting for 43.7% of the total. This is followed by the 30-39 year age group, which comprises 40.8% of respondents. The 20-29 year age group represents 8.5%, while the 50-59 year age group is the smallest, making up 7.0% of the respondents. The positions of the respondents indicate that the majority fall into the "Others" category, comprising 52.1% of the total. This suggests a diverse range of roles not specified in the main categories. Head of Unit positions account for 35.2%, indicating a significant representation of individuals in leadership roles within specific departments or units. Senior Librarians make up 26.8% of the respondents, reflecting a substantial portion of experienced professionals in senior roles. Chief Librarians represent the smallest group, at 1.4%, indicating a limited number of top-level administrators among the respondents. The findings on library size show that nearly half of the libraries, 47.9%, are small, with fewer than 10 staff members. Medium-sized libraries, with 10-50 staff members, make up a smaller proportion at 8.5%. Large libraries, those with more than 50 staff members, constitute 40.8% of the total. With regard to working experience in the current library reveal that a significant portion of respondents, 43.7%, have been working in their current library for less than 1 year. Those with over 20 years of experience in their current library make up 35.2%, indicating a substantial number of long-term employees. Respondents with 11-20 years of experience in their current library constitute 26.8%, showing a considerable presence of mid-career professionals. Only 7.0% have been in their current library for 1-5 years, and the smallest group, with 6-10 years of experience, is 1.4%. In terms of education level, the majority hold a Diploma, accounting for 52.1%. Bachelor’s Degree holders make up 47.9% of the respondents, indicating a significant portion with undergraduate education. Master’s Degree holders constitute 8.5%, while those with a Doctorate/Ph.D. represent 40.8%. The overall mean score for infrastructure readiness aspects combined was 3.4296, reflecting a general moderate readiness of the libraries to support AI technologies. In terms of human resource readiness, the overall mean score combined was 3.2394, reflecting a moderate level of readiness among the library staff to effectively engage with AI technologies. Overall, the mean score for management's role in promoting and supporting AI technologies aspects combined was 3.4176, reflecting a generally positive but moderate level of managerial support and initiative in promoting AI technologies within the library. Overall, the mean score for financial readiness of libraries to support AI technologies aspects combined was 2.7237, reflecting a generally low level of financial readiness for AI technologies in libraries. The overall mean score for the

library's efforts in promoting continuous learning and skill enhancement in AI technologies is 3.1398, reflecting a moderate level of commitment.

CONCLUSION

This study provides a comprehensive assessment of the readiness of Malaysian libraries to embrace Artificial Intelligence (AI) technologies, focusing on six key dimensions: infrastructure, technical skills, management support, policy and regulations, financial readiness, and continuous learning culture. The framework developed for this study ensures a holistic examination of each dimension, revealing the multifaceted nature of AI readiness in the library sector. By exploring these dimensions, the study offers a detailed understanding of the strengths and weaknesses present in Malaysian libraries, providing a valuable benchmark for other institutions aiming to assess their AI readiness. Theoretically, this study significantly adds to the knowledge on AI readiness in the library sector. Empirically, this study provides data-driven insights into the current state of AI readiness among Malaysian libraries, addressing a significant research gap. The findings serve as a benchmark for other studies and offer a reference point for comparing AI readiness in libraries across different regions. Practically, the study offers actionable recommendations for library administrators and policymakers to enhance AI readiness. It identifies key areas for improvement and provides practical guidelines for overcoming barriers to AI adoption. These recommendations are tailored to the context of Malaysian libraries, making them relevant and applicable. Future research should consider a broader and more diverse sample, including libraries from different regions and types, to enhance the generalizability of the findings. Longitudinal studies could also provide deeper insights into how AI readiness evolves over time. Additionally, qualitative studies involving in-depth interviews with a wider range of library staff could complement the quantitative findings and offer richer, more nuanced insights into the practical aspects of AI adoption in libraries.

REFERENCES

Abayomi, O., Adenekan, F., Abayomi, A., Ajayi, T., & Aderonke, A. (2021). Awareness and perception of the artificial intelligence in the management of university libraries in Nigeria. *Journal of Interlibrary Loan, Document Delivery & Electronic Reserve*, 29, 13–28. https://doi.org/10.1080/1072303X.2021.1918602

Bassey, M. M., & Owushi, E. (2023). Adoption of artificial intelligence in library and information science in the 21st century: Assessing the perceived impacts and challenges by librarians in Akwa Ibom and Rivers States. *International Journal of Current Innovations in Education*, 6(1), 75–85. https://doi.org/10.1109/5.771073

Harisanty, D., Anna, N., Putri, T., Firdaus, A., & Azizi, N. (2023). Is adopting artificial intelligence in libraries urgency or a buzzword? A systematic literature review. *Journal of Information Science*. https://doi.org/10.1177/01655515221141034

Hussain, A. (2023). Use of artificial intelligence in the library services: Prospects and challenges. *Library Hi Tech News*, 40(2), 15–17. https://doi.org/10.1108/LHTN-11-2022-0125

Jöhnk, J., Weißert, M., & Wyrtki, K. (2021). Ready or not, AI comes—An interview study of organizational AI readiness factors. *Business & Information Systems Engineering*, 63, 5–20. https://doi.org/10.1007/S12599-020-00676-7

Masrek, M. N., Susantari, T., Mutia, F., Yuwinanto, H. P., & Atmi, R. T. (2024). Enabling education everywhere: How artificial intelligence empowers ubiquitous and lifelong learning. *Environment-Behaviour Proceedings Journal*, 9(SI18), 57–63. https://doi.org/10.21834/e-bpj.v9iSI18.5462

Pence, H. (2022). Future of artificial intelligence in libraries. *The Reference Librarian*, 63, 133–143. https://doi.org/10.1080/02763877.2022.2140741

Wheatley, A., & Hervieux, S. (2020). Artificial intelligence in academic libraries: An environmental scan. *Information Services & Use*, 39, 347–356. https://doi.org/10.3233/isu-190065

AI CHATBOTS IN UNIVERSITY HEALTH EDUCATION: A THOROUGH ANALYSIS

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ABSTRACT

A game-changing strategy for raising student engagement and learning results in health education is the incorporation of artificial intelligence, especially chatbots. This research investigates the potential of AI-powered chatbots as teaching aids in Malaysian university health education, emphasizing their effects on information acquisition, user acceptance, and emotional involvement. The study employed a mixed-methods approach, using questionnaires and chatbot interactions to enlighten students on prevalent illnesses. The results show that most students thought the chatbot was easy to use and helpful, indicating that it was well-received. Additionally, the chatbot greatly increased emotional involvement, decreasing boredom and increasing learning motivation. Students also showed improved health understanding, especially in identifying symptoms and realizing the value of getting medical attention. Some students showed indifference despite the strong welcome, maybe due to the small range of disorders treated. According to the study, increasing the chatbot's engagement and content could make it even more beneficial. The findings highlight how chatbots have the power to completely transform health education by offering individualized, interesting, and easily accessible learning experiences. Future studies should examine how chatbot-based learning affects health outcomes and behaviors over the long run and how applicable it is in other educational settings.

Keywords: Artificial Intelligence, Chatbot, Health Education, Instructional tools.

INTRODUCTION AND BACKGROUND

This study investigates the potential of AI-powered chatbots as a tool for enhancing health education among university students in Malaysia. With chatbots gaining prominence in various domains, their application in educational settings, particularly health education, remains underexplored. The primary objective of this research is to assess user acceptance, emotional engagement, and learning outcomes facilitated by an AI chatbot, focusing on prevalent health conditions. Given the increasing need for innovative approaches to health literacy, this study seeks to evaluate the chatbot's effectiveness in delivering health information, fostering user interaction, and enhancing overall learning experiences.

METHODOLOGY

A mixed-methods approach was adopted, combining quantitative and qualitative data collection. A cross-sectional survey was conducted in three phases: an initial questionnaire to gauge students' baseline knowledge and attitudes, a hands-on chatbot interaction phase, and a post-interaction survey to assess changes in learning and emotional engagement. The chatbot, designed using Dialogflow, covered 15 common health conditions, allowing students to input symptoms and receive tailored health information. Data were analyzed using descriptive statistics to evaluate user perceptions, while chatbot interaction data provided insights into its functionality and user behavior.

FINDINGS

The study revealed positive user reception, with most participants finding the chatbot easy to use and informative. Emotional engagement improved significantly, with users reporting

reduced boredom and increased motivation to learn. However, the chatbot's limited scope to 15 health conditions left some users indifferent. Despite this, there was a marked improvement in students' health literacy, particularly in identifying symptoms and understanding the importance of seeking medical attention. Recommendations for improving the chatbot's interactivity and expanding its content were provided, highlighting its potential as a transformative tool in health education.

CONCLUSION

This study demonstrates the promising potential of AI-powered chatbots as effective tools for health education in Malaysian universities. The chatbot used in this research facilitated improved student engagement, reducing boredom and enhancing motivation to learn about common health issues. Students also exhibited improved health literacy, particularly in recognizing symptoms and understanding the importance of seeking medical attention. However, the limited scope of diseases covered by the chatbot and its inability to provide more diverse, interactive content were noted as limitations. To optimize the chatbot's effectiveness, expanding its health topics and improving user interaction are recommended. Future studies should focus on refining chatbot design and exploring its long-term effects on students' health behaviors and learning outcomes, thereby contributing to the broader integration of AI in education.

REFERENCES

Azman, N., & Abdullah, D. (2021). A Critical Analysis of Malaysian Higher Education Institutions' Response Towards Covid-19: Sustaining Academic Program Delivery. *Journal of Sustainability Science and Management*, 16(1), 70–96. https://doi.org/10.46754/jssm.2021.01.008

Chatterjee, A., & Sengupta, S. (2020). Intent Mining from Past Conversations for Conversational Agent. *COLING 2020 - 28th International Conference on Computational Linguistics Proceedings of the Conference*, 4140–4152. https://doi.org/10.18653/v1/2020.coling_main.366

Chien, Y. H., & Yao, C. K. (2020). Development of an AI Userbot for Engineering Design Education Using an Intent and Flow Combined Framework. *Applied Sciences*, 10(22), 114. https://doi.org/10.3390/app10227970

Denecke, K., Abd-Alrazaq, A., & Househ, M. (2021). Artificial Intelligence for Chatbots in Mental Health: Opportunities and Challenges. *Lecture Notes in Bioengineering*, 115–128. https://doi.org/10.1007/978-3-030-67303-1_10

Fan, X., Chao, D., Zhang, Z., Wang, D., Li, X., & Tian, F. (2021). Utilization of Self-Diagnosis Health Chatbots in Real-World Settings: Case Study. *Journal of Medical Internet Research*, 23(1), 1–16. https://doi.org/10.2196/19928

Forbes, Klock, A. C. T., Gasparini, I., Pimenta, M. S., Hamari, J., González, C., Mora, A., Toledo, P., Dermeval, D., Bittencourt, I. I., Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2020). Tailored Gamification: A Review of Literature. *International Journal of Human Computer Studies*, 144, 73–91. https://doi.org/10.1016/j.ijhcs.2020.102495

Laumer, S., Maier, C., & Fabian, G. (2020). Chatbot Acceptance in Healthcare: Explaining User Adoption of Conversational Agents for Disease Diagnosis. *27th European Conference on Information Systems Information Systems for a Sharing Society ECIS 2019*, 0–18.

Shahriar, S., & Hayawi, K. (2023). Let's Have a Chat! A Conversation with ChatGPT: Technology Applications and Limitations. *Artificial Intelligence and Applications*, 1–16. https://doi.org/10.47852/bonviewaia3202939

Smith, I. A., & Griffiths, A. (2022). Microaggressions Everyday Discrimination Workplace Incivilities and Other Subtle Slights at Work: A Meta-Synthesis. *Human Resource Development Review*, 21(3), 275-299. https://doi.org/10.1177/15344843221098756

Wiedermann, C. J., Barbieri, V., Plagg, B., Marino, P., Piccoliori, G., & Engl, A. (2023). Fortifying the Foundations: A Comprehensive Approach to Enhancing Mental Health Support in Educational Policies Amidst Crises. *Healthcare (Switzerland)*, 11(10). https://doi.org/10.3390/healthcare11101423

A SYSTEMATIC REVIEW OF INSTRUCTIONAL DESIGN, LEARNING INTERVENTION, AND RESEARCH DESIGN IN IMMERSIVE VIRTUAL REALITY FOR GROSS ANATOMY EDUCATION

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ABSTRACT

This systematic review delves into the realm of instructional design, learning approaches, and research design within the context of immersive virtual reality (VR) as applied to gross anatomy education. As the adoption of VR technologies in educational settings continues to evolve, this study conducts a rigorous examination of the existing literature to synthesize the current state of knowledge. The review encompasses an extensive analysis of scholarly works published over the last several years, categorizing and scrutinizing instructional strategies, various pedagogical models, and the diverse assessment tools used in immersive VR settings for gross anatomy classrooms. Through this comprehensive analysis, the review aims to provide insights into the effectiveness and implications of these immersive technologies, offering a holistic view of their contributions to the advancement of anatomical education. The findings presented herein not only inform the academic community but also offer practical guidance for educators, instructional designers, and researchers seeking to optimize the use of immersive VR in gross anatomy instruction.

Keywords: VR; Research Design; Instructional Design; Gross Anatomy; Medical Science Education.

INTRODUCTION

This study explores the integration of virtual reality (VR) in gross anatomy education, highlighting its potential to transform teaching methods and enhance learning outcomes. VR, increasingly used in medical education, offers immersive and interactive experiences that surpass traditional approaches, making it an appealing tool for anatomy instruction. This review critically examines how VR technology is employed in teaching gross anatomy, focusing on its instructional design strategies for systemic, regional, and surface anatomy. By leveraging VR's spatial and interactive features, educators can create more engaging learning environments. The review also analyzes the different learning methods in immersive VR and how they address the unique challenges of teaching anatomy, aiming to optimize education across various anatomical dimensions. Additionally, the study evaluates the research designs used in current studies on VR and gross anatomy education, identifying trends, gaps, and opportunities for future research. Overall, this review synthesizes existing knowledge on the use of VR in anatomical education, offering insights for improving instructional practices and guiding future research on VR-enhanced medical pedagogy.

MATERIALS AND METHODS

The methodology of this systematic review involved a comprehensive search of research papers from 2018 to 2023 across four major databases: Google Scholar, Scopus, IEEE, and PubMed. A total of 547 papers were initially identified using targeted search phrases related to virtual reality, gross anatomy, and education. The inclusion criteria were based on PICO and SPIDER frameworks, focusing on factors like research design, sample populations, and

the technology employed. After screening for title relevance, abstract focus, full-text availability, and quality, 508 papers were excluded due to duplication, irrelevance, or inaccessibility. This left 39 papers for further review, from which 13 were removed for content or date issues, resulting in 26 papers being selected for the final analysis. The study followed the PRISMA guidelines to ensure a structured selection process.

FINDINGS

This systematic review analyzed 26 studies from 2018 to 2023, exploring different types of gross anatomy and learning interventions. "Regional Anatomy" was the most studied, representing 57.69% of research, followed by "Surface Anatomy" (23.08%) and "Systemic Anatomy" (15.38%). Virtual reality (VR) was the dominant intervention method, utilized in 76.92% of studies, often compared to cadaveric learning (38.10%) and computer-based learning (33.33%). Other methods, such as Mixed Reality (15.38%), Augmented Reality, and gamification (both 3.85%), were less frequently used. The review highlights the growing use of VR in anatomy education, with comparisons to traditional methods revealing a shift towards immersive technologies for enhancing learning outcomes.

DISCUSSION

This analysis highlights the prominence of regional anatomy studies (57.69%) in the selected research papers, reflecting a strong academic focus on precise anatomical investigations, likely driven by the need for detailed understanding. In contrast, systemic anatomy (15.38%) is less emphasized, though its relevance remains acknowledged. The merging of regional and systemic approaches underscores the importance of combining micro-level and broader anatomical perspectives. Virtual reality (VR) is extensively applied in regional anatomy, showcasing its adaptability in studying various anatomical structures. However, surface anatomy studies often lack detailed information, limiting their effectiveness. VR-based interventions dominate (76.92%) in gross anatomy training, indicating a preference for technology over traditional cadaver-based methods, though traditional approaches still hold value. Instructional design models like Bloom's Taxonomy, ADDIE, and Gagne's Model are underutilized, with only six of 26 studies incorporating them, raising concerns about the pedagogical foundation of VR anatomy interventions. The diverse research designs, particularly the frequent use of mixed methods, reflect an interdisciplinary approach to addressing complex anatomical education challenges. However, inconsistencies in reporting and imprecision in some studies limit broader applicability. The review suggests future research should explore other anatomical areas, such as microscopic and regional anatomy, and emphasizes the need for systematic application of instructional design methods to enhance VR- based anatomy education.

CONCLUSION

This systematic review analysed 26 research papers from 2018 to 2023 on the use of virtual reality (VR) in gross anatomy education. It found that "Regional Anatomy" was the most studied area, followed by "Surface" and "Systemic Anatomy." Studies of regional anatomy ranged from microscopic bone and muscle analysis to larger structures like the skull and heart. Learning interventions compared VR-based learning with cadaveric and computer-based

methods, and six studies highlighted the positive impact of instructional design models like Bloom's Taxonomy and ADDIE. The research emphasized the interdisciplinary nature of modern anatomical education, advocating for more exploration of interactive simulations and immersive VR technologies. This integration can help enhance anatomical understanding and improve educational outcomes, with a call for further collaboration across disciplines to advance VR-based anatomy training.

REFERENCE

Alsufyani, N., Alnamlah, S., Mutaieb, S., Alageel, R., AlQarni, M., Bukhari, A., Alhajri, M., AlSubaie, A., Alabdulkarim, M., & Faden, A. (2023). Virtual reality simulation of panoramic radiographic anatomy for dental students. Journal of Dental Education, 87(8), 1200–1209. https://doi.org/10.1002/jdd.13240

B. (2023). Immersive Virtual Reality and Cadaveric Bone are Equally Effective in Skeletal Anatomy Education: A Randomized Crossover Noninferiority Trial. Journal of Surgical Education, 80(7), 1028–1038. https://doi.org/10.1016/j.jsurg.2023.04.005

B. P. (2021). Development of a Virtual Three-Dimensional Assessment Scenario for Anatomical Education. Anatomical Sciences Education, 14(3), 385–393. https://doi.org/10.1002/ase.2055

Birbara, N. S., Sammut, C., & Pather, N. (2020). Virtual Reality in Anatomy: A Pilot Study Evaluating Different Delivery Modalities. Anatomical Sciences Education, 13(4), 445–457. https://doi.org/10.1002/ase.1921

Bogomolova, K., Sam, A. H., Misky, A. T., Gupte, C. M., Strutton, P. H., Hurkxkens, T. J., & Hierck,

Boomgaard, A., Fritz, K. A., Isafiade, O. E., Kotze, R. C. M., Ekpo, O., Smith, M., Gessler, T., Filton,

Brown, K. E., Heise, N., Eitel, C. M., Nelson, J., Garbe, B. A., Meyer, C. A., Ivie, K. R., & Clapp, T. R. (2023). A Large-Scale, Multiplayer Virtual Reality Deployment: A Novel Approach to Distance Education in Human Anatomy. In Medical Science Educator (Vol. 33, Issue 2, pp. 409– 421). https://doi.org/10.1007/s40670-023-01751-w

Cakmak, Y. O., Daniel, B. K., Hammer, N., Yilmaz, O., Irmak, E. C., & Khwaounjoo, P. (2020). The Human Muscular Arm Avatar as an Interactive Visualization Tool in Learning Anatomy: Medical Students' Perspectives. IEEE Transactions on Learning Technologies, 13(3), 593–603. https://doi.org/10.1109/TLT.2020.2995163

Castro, P. L., Ginés, R., Ramírez, J. A., Mompeó, B., Domínguez, L., Rodríguez, A., Maynar, M., & Rodriguez-Florido, M. A. (2023). Study on the acceptance of virtual reality as a complement to the study of human anatomy. Educacion Medica, 24(4). https://doi.org/10.1016/j.edumed.2023.100820

Chen, S., Zhu, J., Cheng, C., Pan, Z., Liu, L., Du, J., Shen, X., Shen, Z., Zhu, H., Liu, J., Yang, H., Ma, C., & Pan, H. (2020). Can virtual reality improve traditional anatomy education programmes? A mixed-methods study on the use of a 3D skull model. BMC Medical Education, 20(1), 1–10. https://doi.org/10.1186/s12909-020-02255-6

Du, Y. C., Fan, S. C., & Yang, L. C. (2020). The impact of multi-person virtual reality competitive learning on anatomy education: a randomized controlled study. BMC Medical Education, 20(1), 1–10. https://doi.org/10.1186/s12909-020-02155-9

Duarte, M. L., Santos, L. R., Guimarães Júnior, J. B., & Peccin, M. S. (2020). Learning anatomy by virtual reality and augmented reality. A scope review. Morphologie, 104(347), 254–266. https://doi.org/10.1016/j.morpho.2020.08.004

Fairén, M., Moyés, J., & Insa, E. (2020). VR4Health: Personalized teaching and learning anatomy using VR. Journal of Medical Systems, 44(5). https://doi.org/10.1007/s10916-020-01550-5

Javaid, M., & Haleem, A. (2020). Virtual reality applications toward medical field. Clinical Epidemiology and Global Health, 8(2), 600–605. https://doi.org/10.1016/j.cegh.2019.12.010

K. J., Cupido, C. C., Aden, B., Yokwe, N., Mayekiso, L., Gxowa, S., Levitt, A., Dlodlo, L., Madushana, N., & Souvestre, D. L. de L. (2022). A Novel Immersive Anatomy Education System (Anat_Hub): Redefining Blended Learning for the Musculoskeletal System. Applied Sciences (Switzerland), 12(11). https://doi.org/10.3390/app12115694

Kim, J. Y., Lee, J. S., Lee, J. H., Park, Y. S., Cho, J., & Koh, J. C. (2023). Virtual reality simulator's effectiveness on the spine procedure education for trainee: a randomized controlled trial.

Kim-Berman, H., Bui, D., Lee, K., & Mitchell, V. (2023). Student learning ofhead and neck anatomy using cone beam computed tomography and immersive virtual reality. Journal of Dental Education, 1180–1187.

Korean Journal of Anesthesiology, 76(3), 213–226. https://doi.org/10.4097/kja.22491

Koucheki, R., Lex, J. R., Morozova, A., Ferri, D., Hauer, T. M., Mirzaie, S., Ferguson, P. C., & Ballyk,

Krause, K. J., Mullins, D. D., Kist, M. N., & Goldman, E. M. (2023). Developing 3D models using photogrammetry for virtual reality training in anatomy. Anatomical Sciences Education, September 2022, 1033–1040. https://doi.org/10.1002/ase.2301

Methley, A. M., Campbell, S., Chew-Graham, C., McNally, R., & Cheraghi-Sohi, S. (2014). PICO, PICOS and SPIDER: A comparison study of specificity and sensitivity in three search tools for qualitative systematic reviews. BMC Health Services Research, 14(1). https://doi.org/10.1186/s12913-014-0579-0

Michalski, C., Cowan, M., Bohinsky, J., Dickerson, R., & Plochocki, J. H. (2023). Evaluation of cognitive load for a mixed reality anatomy application. Translational Research in Anatomy, 31, 100247. https://doi.org/10.1016/j.tria.2023.100247

Michelle, C. (2022). PICO and SPIDER and SPICE, oh my! Canterbury Christ Church University. https://blogs.canterbury.ac.uk/library/pico-and-spider-and-spice-oh-my/

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Mark, P., Paul, S., Lesley A, S., & Group, P.-P. (2015). Preferred reporting items for systematic review and meta-analysis protocols (prisma-p) 2015 statement. Systematic Review, 4(1). https://doi.org/https://doi.org/10.1186/2046-4053-4-1

Moro, C., Birt, J., Stromberga, Z., Phelps, C., Clark, J., Glasziou, P., & Scott, A. M. (2021). Virtual and Augmented Reality Enhancements to Medical and Science Student Physiology and Anatomy Test Performance: A Systematic Review and Meta-Analysis. Anatomical Sciences Education, 14(3), 368–376. https://doi.org/10.1002/ase.2049

Nguyen, J.-A., Jo, S., Angeles, R., Richardson, A., & Srivastava, S. (2022). Exploring Virtual Reality (VR) as an Anatomy Teaching Supplement. The FASEB Journal, 36(S1). https://doi.org/https://doi.org/10.1096/fasebj.2022.36.S1.L8004

Permana, R. H., Suryani, M., Adiningsih, D., & Paulus, E. (2019). The Storyboard Development of Virtual Reality Simulation (VRS) of Nursing Care in Respiratory System Disorders Course. Indonesian Nursing Journal of Education and Clinic (Injec), 3(2), 121. https://doi.org/10.24990/injec.v3i2.202

Pickering, J. D., Panagiotis, A., Ntakakis, G., Athanassiou, A., Babatsikos, E., & Bamidis, P. D. (2022). Assessing the difference in learning gain between a mixed reality application and drawing screencasts in neuroanatomy. Anatomical Sciences Education, 15(3), 628–635. https://doi.org/10.1002/ase.2113

Reymus, M., Liebermann, A., & Diegritz, C. (2020). Virtual reality: an effective tool for teaching root canal anatomy to undergraduate dental students – a preliminary study. International Endodontic Journal, 53(11), 1581–1587. https://doi.org/10.1111/iej.13380

Richards, S. (2023). Student Engagement Using HoloLens Mixed-Reality Technology in Human Anatomy Laboratories for Osteopathic Medical Students: an Instructional Model. Medical Science Educator (2023), 33, 223–231.

Sahin, T., & Çavuş, N. (2019). Education in the digital age: Technological trends in anatomy education. Folklor/Edebiyat, 25(97), 31–53. https://doi.org/10.22559/FOLKLOR.925

Schott, D., Kunz, M., Wunderling, T., Heinrich, F., Braun-Dullaeus, R., & Hansen, C. (2023). CardioGenesis4D: Interactive Morphological Transitions of Embryonic Heart Development in a Virtual Learning Environment. IEEE Transactions on Visualization and Computer Graphics, 29(5), 2615–2625. https://doi.org/10.1109/TVCG.2023.3247110

Wan, T., Liu, K., Li, B., & Wang, X. (2023). Validity of an immersive virtual reality training system for orthognathic surgical education. Frontiers in Pediatrics, 11(March), 1–6. https://doi.org/10.3389/fped.2023.1133456

Young, G. W., Stehle, S., Walsh, B. Y., & Tiri, E. (2020). Exploring Virtual Reality in the Higher Education Classroom: Using VR to Build Knowledge and Understanding. JUCS - Journal of Universal Computer Science, 26(8), 904–928. https://doi.org/10.3897/jucs.2020.049

Zhao, J., Xu, X., Jiang, H., & Ding, Y. (2020). The effectiveness of virtual reality-based technology on anatomy teaching: A meta-analysis of randomized controlled studies. BMC Medical Education, 20(1), 1–10. https://doi.org/10.1186/s12909-020-1994-z

ASSESSING THE USE OF AI TOOLS ON LANGUAGE COMPETENCE AMONG ENGLISH AS A FOREIGN LANGUAGE (EFL) LEARNERS

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ABSTRACT
This paper explores the role of AI tools in enhancing language competence, a crucial aspect of communicative competence, for EFL learners. It emphasizes how AI applications are being used in self-directed learning, though their impact on English learning, particularly in higher education, is still an emerging area of study. This research investigates how AI tools promote language competence among university students, offering insights that build on or challenge previous findings. The study also identifies key factors that aid learners and educators in selecting effective AI tools and suggests areas for future research.

Keywords: AI learning tools, EFL learners; language competence; communicative competence; educational technologies in EFL.

INTRODUCTION

English as Foreign Language (EFL) classroom dynamics are challenging in non-English-speaking nations because EFL students primarily encounter English only in the EFL classroom (Aprianto et al., 2020; Tao, 2019) and not in communicative settings. This introduction acknowledges the challenges faced by EFL learners in English-speaking countries, as they often encounter English only in classroom settings. It emphasizes the importance of using technological advancements, practical methodologies, and interactive strategies to enhance both linguistic accuracy and communicative competence. EFL programs in university settings are seen as essential in fostering fluency and communication in a globally connected world. The integration of computer-assisted learning and multimedia tools has transformed EFL education, offering immersive experiences. Educators have increasingly adopted ICT to inspire students and improve language instruction, particularly through multimedia, which combines various forms of technology (Klímová, 2013).

The background of the study focuses on the concept of communicative competence, which is the core goal of communicative language learning. Coined by Hymes (1972) as a response to Chomsky's notion of linguistic competence (Herdiawan, 2018; Nazari, 2007), communicative competence includes both implicit language knowledge and the appropriate use of language in real-life contexts (Jeong, 2018). It involves more than just grammar and vocabulary; it also includes understanding social and cultural norms. While communicative competence has four main components, this study focuses on one: language competence. This refers to the ability to connect sentences and ideas coherently in spoken or written communication, using cohesive devices and language markers to maintain coherence. The study explores how this aspect of competence can be enhanced through GenAI-assisted learning.

LITERATURE REVIEW

The literature review examines the use of AI, particularly Artificial Intelligence-Generated Content (AIGC), in EFL learning. AIGC, such as OpenAI's ChatGPT, has gained prominence

for its ability to generate language content based on user input, significantly advancing language education since its release in 2022 (Anh Vo & Nguyen, 2024). Studies show that ChatGPT supports students in improving their language skills by providing an active and productive learning environment, though concerns about academic integrity and the lack of theoretical grounding in some findings remain. There is also limited research on student perceptions of ChatGPT, which could influence its effectiveness and future improvements.

Traditionally, language educators were central to language acquisition, but the rise of the internet and AI tools has shifted learning paradigms. Students now have access to vast resources tailored to their individual needs. Generative AI (GenAI) systems, such as ChatGPT, offer immediate feedback on grammar, vocabulary, and sentence structure, helping students improve writing and expand their vocabulary. Research suggests that these tools can positively impact L2 writing and psychological factors like motivation and engagement (Law, 2024). GenAI systems offer benefits such as personalized learning, immediate responses, and enhanced language learning experiences, contributing to better outcomes and learner autonomy.

METHODOLOGY

The methodology section outlines a qualitative research design to explore the impact of AI on communicative competence among EFL learners at Universiti Sains Malaysia. A qualitative research design is appropriate for this study because it allows for a deep exploration of participants' experiences and perceptions (Creswell, 2014) . Data will be collected through an interview-like structured survey, targeting a sample of English learners. The survey consists of four key questions aimed at evaluating students' awareness and use of AI tools, their impact on language skills (reading, speaking, listening, writing), and the most useful features of these tools.

Nine respondents will participate in the study, with their answers recorded and analyzed using thematic analysis. Key phrases from the responses will be highlighted, coded, and grouped into themes related to AI's impact on language competence. These themes will then be analyzed to reveal insights about the learners' experiences with AI in EFL learning.

DATA ANALYSIS

The data analysis section summarizes respondents' insights regarding the use of AI tools in language learning, organized around four key questions.

AI Tools for Language Learning: Respondents identified several popular AI tools, including translators like Tencent Translation, Baidu AI Translator, Youdao, DeepL, and Google Translate. These tools help with writing assignments and understanding foreign languages. Additionally, grammar-checking tools such as Grammarly and QuillBot were mentioned for enhancing sentence fluency and clarity, particularly in academic contexts. Language learning apps like Duolingo, Fluent Speaking, Daily English, Keke English, Acasuo English, and Liulishuo English were noted for their structured resources that facilitate practice in listening, speaking, reading, and grammar. Daily English was highlighted for its self-monitoring features, which track progress and motivate learners.

Frequency of Use: Many respondents indicated that they use AI tools frequently, often on a daily basis, demonstrating their integration into the learners' daily routines for language practice, writing, grammar checking, and translation.

Impact on Language Learning: Respondents noted that AI tools significantly assist with writing, grammar refinement, and error checking, particularly with Grammarly, ChatGPT, Quillbot, and Pigai, which are beneficial for academic writing and test preparation. In terms of reading, tools like Liulishuo provide level-appropriate practice, while translation services help learners understand texts by translating words and phrases, enhancing vocabulary and comprehension. AI dialogue systems, such as ChatGPT and Liulishuo, facilitate speaking practice, particularly for Chinese learners who may struggle with spoken English.

Useful Features: Participants found translation tools especially beneficial for writing and reading, citing bilingual features that allow for comparisons between English and their native language, which aids comprehension and error correction. Authentic and standardized resources provided by AI tools were valued for offering exposure to language beyond traditional textbooks, creating a more realistic learning environment. Furthermore, chat features that promote interactive dialogue were appreciated for enhancing engagement and allowing flexible, informal practice, which helps build speaking and listening skills and boosts learners' confidence.

CONCLUSION

Several significant clues into how language learners use AI tools and which characteristics they find most beneficial for improving their English ability are revealed by a thematic analysis of the survey results. The capacity of AI tools to offer regular, everyday assistance in a variety of language skills—with a focus on writing, reading, translation, and grammatical correction—is highly valued by learners. For learners who depend on these tools for academic or professional purposes, programs like Google Translate, Grammarly, and ChatGPT are highly appreciated for their assistance with writing refinement, error correction, and bilingual translation. Numerous participants draw attention to the comprehensive characteristics of certain AI technologies, which facilitate integrated language practice including the four basics of reading, writing, speaking, and listening. Social media apps and platforms such as LIULISOU provide realistic and real-world content that makes it easier and more enjoyable for language learners to improve practical language skills. When it comes to speaking and listening practice, conversational AI technologies are especially helpful since they enable learners to mimic real-life conversations and enhance their oral fluency. In conclusion, AI technologies are essential for helping language learners, especially when it comes to translation, thorough language practice, writing and grammar correction, and conversational interaction. AI technologies are an effective tool for boosting well-rounded English competence because of their accessibility, ease of use, and genuine learning experiences.

REFERENCES

Aprianto, E., Purwati, O., & Anam, S. (2020). Multimedia-Assisted Learning in a Flipped Classroom: A Case Study of Autonomous Learning on EFL University Students. *International Journal of Emerging Technologies in Learning*, *15*(24).

https://doi.org/10.3991/ijet.v15i24.14017

Blanka Frydrychová Klímová. (2012). Multimedia in the teaching of foreign languages. Journal of Language and Cultural Education

Creswell, J. W. (2014). Research Design: Qualitative, Quantitative and Mixed Approaches. In Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (4th ed.). https://doi.org/10.2307/1523157

Dwika Herdiawan, R. (2018) Communicative Compentences in EFL Learning. Journal of English Language Learning (JELL), 2(1). https://www.researchgate.net/profile/Rama-Dwika-Herdiawan/publication/352992662_Communicative_Compentences_in_EFL_Learning/links/60e2b910299bf1ea9ee12348/Communicative-Compentences-in-EFL-Learning.pdf

KYEONG-OUK JEONG. (2018). Developing EFL learners' communicative competence through multimedia-assisted language learning. Journal of Theoretical and Applied Information Technology, 96(5)

Law, L. (2024). Application of Generative Artificial Intelligence (GENAI) in Language Teaching and Learning: A Scoping Literature review. Computers and Education Open, 6, 100174. https://doi.org/10.1016/j.caeo.2024.100174

View of Generative Artificial Intelligence and ChATGPT in Language Learning: EFL Students' Perceptions of Technology Acceptance. (n.d.). https://openpublishing.org/journals/index.php/jutlp/article/view/811/770

THE INTEGRATION OF AI IN STUDENTS' LEARNING: A PRELIMINARY STUDY AMONG HIGHER EDUCATION STUDENTS

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ABSTRACT
The potential of artificial intelligence (AI) in fostering inclusive education, especially in students' learning, is well-documented by current educational trends. This study aims to explore students' experiences, attitudes, acceptance, and challenges regarding AI integration in higher education as a preliminary investigation. A quantitative approach was employed in this study, specifically utilizing a structured questionnaire to collect data from a sample of 31 students enrolled in instructional technology educational programs. Data were analyzed using SPSS software. The findings include a diverse range of student attitudes, with some highlighting the enhanced learning opportunities and personalization provided by AI, while others express concerns about reduced human interaction. Overall, this research addresses fostering the inclusivity of AI among students to create an effective learning environment.

Keywords: Artificial intelligence; preliminary study; attitudes; acceptance; challenges.

INTRODUCTION AND BACKGROUND

This study investigates the integration of artificial intelligence (AI) in higher education, focusing on students' experiences, attitudes, acceptance, and the challenges they face. AI has the potential to transform learning environments by providing personalized, adaptive, and efficient educational experiences (Luckin et al., 2016; Holmes et al., 2019). AI tools such as intelligent tutoring systems and adaptive learning platforms are increasingly adopted by higher education institutions to enhance student outcomes, allowing for personalized learning and improved instructional strategies (Zawacki-Richter et al., 2019; Chen et al., 2020). However, despite these advancements, student acceptance and engagement remain critical factors in successful AI implementation. Various influences, including concerns over privacy, data security, and the reduction of human interaction, affect students' attitudes toward AI in education (Ifenthaler & Schumacher, 2019). This research employs a quantitative approach, gathering data from students enrolled in instructional technology programs, aiming to provide insights into how AI is perceived and utilized in academic settings. The findings will contribute to ongoing discussions on AI's role in education and offer recommendations for ensuring that AI technologies are inclusive and effective in supporting a positive learning environment. Understanding students' perspectives is crucial for shaping future AI-driven educational practices (Zawacki-Richter et al., 2019).

METHODOLOGY

This study employed a quantitative research design, using online questionnaires administered through Google Forms for data collection due to its efficiency in reaching respondents (Sekaran & Bougie, 2016). A total of 50 students enrolled in instructional technology educational programs at a public university in Malaysia were invited to participate, with 31 responses collected and analyzed. The sample size aligns with the suggested minimum for preliminary studies (Serdar et al., 2021). The questionnaire was divided into four sections: experiences with

AI, attitudes towards AI, acceptance of AI, and challenges in using AI, with responses rated on a five-point Likert scale. Data were analyzed using the Statistical Package for the Social Sciences (SPSS), which provided descriptive statistics, including central tendencies (mean, median, mode) and dispersion measures (range, variance, standard deviation). This analysis offered insights into students' general experiences, attitudes, acceptance, and challenges regarding AI integration in their studies, forming a foundation for further research (Loeb et al., 2017).

FINDINGS

This study investigates higher education students' experiences, attitudes, acceptance, and challenges related to the integration of artificial intelligence (AI) in their learning environments. Data collected from 31 students revealed that all participants had used AI tools in their studies, with 38.7% engaging with AI on a daily or weekly basis. The predominant AI tool used was chatbots, notably ChatGPT, which 96.8% of students found particularly useful for task completion. This finding is consistent with research suggesting that AI technologies, such as chatbots, can significantly enhance the learning process by providing interactive and responsive support (Lo, 2023). Attitudes towards AI were generally favorable, with 61.3% of students expressing comfort using AI in their studies and 83.8% agreeing that AI improves their learning experience. This aligns with prior studies indicating that positive perceptions of AI can enhance student engagement and learning outcomes (Kim et al., 2020). Despite these positive attitudes, students voiced concerns about AI's accuracy and reliability, with 77.4% expressing reservations about the quality of AI-generated information. Additionally, privacy issues were a concern for 54.8% of respondents, and 38.7% worried about the reduction of human interaction in their educational experience. The study also highlighted several challenges associated with AI integration. The most significant issue was a lack of training, with 61.3% of students identifying this as a barrier. Limited access to AI tools and technical difficulties were also noted. These challenges emphasize the need for more comprehensive training programs and improved access to AI resources to fully leverage the benefits of AI in education. Overall, the findings suggest that while AI has the potential to greatly enhance learning through personalized experiences and efficiency, addressing these challenges is crucial for its effective integration and to maximize its positive impact on educational outcomes.

CONCLUSION

This study concludes that while students have positive experiences and attitudes towards AI in their learning, they also face significant challenges. Students commonly use AI tools like chatbots to enhance their learning experience, with many expressing comfort and appreciation for AI's ability to provide personalized learning and real-time feedback. These findings align with previous research showing that AI enhances learning by saving time and improving engagement. However, challenges such as a lack of training, concerns about reduced human interaction, and ethical issues related to data privacy persist. Addressing these challenges, especially through training and ethical guidance, is crucial for the successful integration of AI in educational settings, ensuring it complements rather than diminishes the learning process.

REFERENCES

Chen, X., Xie, H., Zou, D., & Hwang, G. J. (2020). Application and theory gaps during the rise of artificial intelligence in education. Computers and Education: Artificial Intelligence, 1, 100002. https://doi.org/10.1016/j.caeai.2020.100002

Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Center for Curriculum Redesign.

Ifenthaler, D., & Schumacher, C. (2019). Student perceptions of privacy principles for learning analytics. Education and Information Technologies, 24(1), 87-104. https://doi.org/10.1007/s10639-018-9763-6

Kim, J., Merrill, K., Xu, K., & Sellnow, D. D. (2020). My teacher is a machine: Understanding students' perceptions of AI teaching assistants in online education. International Journal of Human–Computer Interaction, 36(20), 1902-1911.

Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. Education Sciences, 13(4), 410.

Loeb, S., Dynarski, S., McFarland, D., Morris, P., Reardon, S., & Reber, S. (2017). Descriptive Analysis in Education: A Guide for Researchers. Journal of Educational Research, 110(1), 1-7. https://doi.org/10.3102/0034654317752396

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence Unleashed: An argument for AI in Education. Pearson. https://doi.org/10.1177/0002764217718618

Sekaran, U., & Bougie, R. (2016). Research methods for business: A skill-building approach. John Wiley & Sons.

Serdar, C. C., Cihan, M., Yücel, D., & Serdar, M. A. (2021). Sample size, power and effect size revisited: simplified and practical approaches in pre-clinical, clinical and laboratory studies. Biochemia medica, 31(1), 27-53.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators?. International Journal of Educational Technology in Higher Education, 16(1), 39. https://doi.org/10.1186/s41239-019-0171-0

EDUCATIONAL ANIMATED-VIDEO USING SOCIAL MEDIA INTEGRATION TO RAISE AWARENESS OF CYBERBULLYING AMONG MIDDLE SCHOOL STUDENTS OF DIFFERENT GENDER IN CHINA

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ABSTRACT

This study explored the effects of combining an educational animated-video with media social to improve middle school students' awareness of cyberbullying, focusing on gender differences and the use of emerging technologies to enhance the animation. A quantitative research approach was used to assess students' awareness before and after the educational video intervention using the Cyberbullying Awareness Test (CAT). Results showed that students' awareness of cyberbullying increased significantly after the intervention, with clear gender differences and a strong correlation between awareness and understanding of cyberbullying. The study found that educational animated video was highly effective in conveying complex information and improving learning motivation, especially when combined with platforms such as media social that have a wide influence and high adolescent engagement. The use of emerging technologies in the production of this video made the content more interactive and engaging, further enhancing the video's effectiveness. The study highlights the importance of education in preventing and addressing cyberbullying, a major social issue affecting adolescents worldwide. It provides valuable suggestions for future research, recommending further exploration of integrating emerging technologies into educational content and developing strategies to address gender differences in learning outcomes. Overall, the combination of educational animated video and media social was shown to be an effective strategy to improve students' awareness and understanding of cyberbullying, offering practical insights for educators and researchers. This approach not only raises awareness but also empowers students by fostering a safer and more informed digital environment. Future research could further investigate the long-term impact of such interventions and explore additional ways to leverage emerging technologies to enhance educational outcomes.

Keywords: Cyberbullying prevention; Educational Animated-Video; Media social; Cyberbullying awareness; Gender differences.

INTRODUCTION AND BACKGROUND

The Internet has become an integral part of modern life, enabling activities such as online shopping, social media use, and remote learning (Fazil et al., 2024). However, it has also brought challenges like cyberbullying, which has become a serious public health concern. Cyberbullying, defined as online harassment, threats, and attacks, affects a significant number of young people (Santre, 2023). In China, nearly 200 million teenagers use the internet, and the country has one of the highest rates of cyberbullying, with 46.3% of students reporting incidents (Zhu et al., 2021). While internet usage continues to grow, students' awareness of the risks of cyberbullying remains weak, necessitating urgent interventions (Kavuk-Kalender & Keser, 2018). Studies have shown that educational videos, particularly animated videos, are highly effective in raising awareness and enhancing students' understanding of complex topics (Mayer, 2002; Shiu et al., 2020). Animation-based learning has been proven effective in enhancing motivation and comprehension, particularly in education settings that utilize visual elements and interactivity (Yalçın et al., 2023). With the rise of social media platforms,

combining educational animated videos with platforms like Media Social offers a promising approach to reaching adolescents and increasing their awareness of cyberbullying. However, gender differences play a role in how students experience and respond to cyberbullying. Some studies indicate that girls are more likely to be victims of cyberbullying, while boys are more likely to be perpetrators, though findings are mixed (CRC, 2023). This study aims to design and investigate the effectiveness of educational animated videos integrated with social media in raising awareness of cyberbullying among students, with a specific focus on gender differences to ensure targeted, effective intervention strategies.

METHODOLOGY

This study employed a quantitative approach using a pre-experimental one-group pre-test and post-test design to measure the impact of an educational animated video on cyberbullying awareness among middle school students in Shandong Province, China. The absence of a control group allowed the research to focus on analyzing changes in students' knowledge and awareness levels following the intervention, as suggested by Campbell and Stanley (2015). 60 students, aged 12 to 18, were selected through stratified random sampling to ensure gender balance. The students were divided into two strata based on gender, with an equal distribution of 30 males and 30 females. This sampling technique was chosen by Liu and Wu (2007) for its accuracy in reflecting population estimates and maintaining gender representativeness. The primary research instrument, the Cyberbullying Awareness Test (CAT), consisted of 10 questions totaling 100 points, assessing students' awareness levels before and after watching the educational video. The CAT was complemented by demographic data to analyze gender-based differences in cyberbullying awareness. The educational video, covered five key segments: 'What is Online Bullying?', 'Forms of Online Bullying', 'Dangers of Online Bullying', 'Cases of Online Bullying', and 'How to Prevent Online Bullying?'. Running for 4 minutes and 30 seconds, the video was designed to engage students through animated content and social media integration. The analysis employed both descriptive and inferential statistics to evaluate pre- and post-test score changes, with a particular focus on gender differences. By integrating educational content with social media, this study aimed to raise cyberbullying awareness effectively among adolescents.

FINDINGS

The results of this study demonstrate a significant improvement in students' awareness of cyberbullying following the intervention of an educational animated video integrated with social media. The Cyberbullying Awareness Test (CAT) revealed a marked increase in students' mean scores from 62.5 in the pre-test to 79.67 in the post-test, with the number of students achieving high scores rising from 23 to 51, and no students remaining in the low achievement category after the intervention. A paired samples t-test indicated a strong positive correlation ($r = 0.841$) between pre-test and post-test scores, confirming that the educational video significantly enhanced students' understanding of cyberbullying. Gender-specific analyses showed improvements for both males and females, with females exhibiting slightly higher gains. Female students’ mean post-test scores increased from 62.7 to 82.7, while males showed an increase from 62.3 to 76.7. Although the differences between genders were not

statistically significant, the results suggest a potential trend of greater improvement in females. Overall, the findings underscore the effectiveness of using animated videos integrated with social media to enhance cyberbullying awareness among middle school students, providing valuable insights for educational strategies and highlighting the need for further exploration into gender-based differences in learning outcomes.

CONCLUSION

This study provides compelling evidence that educational animated videos, when integrated with social media platforms, are highly effective in raising awareness of cyberbullying among middle school students. The findings underscore the potential of using animated videos as a dynamic and engaging educational tool, particularly in addressing complex social issues like cyberbullying. The research also highlights the importance of considering gender differences when designing educational interventions, as female students demonstrated a slightly greater increase in awareness compared to their male counterparts. Although the gender differences were not statistically significant, the results suggest that further research is needed to explore the nuances of gender-specific learning outcomes in educational video interventions. These findings underscore the importance of using innovative, technology-driven approaches to address the growing issue of cyberbullying among adolescents.

REFERENCES

Campbell, D. T., & Stanley, J. C. (2015). *Experimental and quasi-experimental designs for research*. Ravenio books.

CRC, Cyberbullying Research Center. (2023). *Cyberbullying data*. Retrieved from https://cyberbullying.org/cyberbullying-continues-to-rise-among-youth-in-the-united-states-2023

Fazil, A. W., Hakimi, M., Akrami, K., Akrami, M., & Akrami, F. (2024). Exploring the Role of Social Media in Bridging Gaps and Facilitating Global Communication. *Studies in Media, Journalism and Communications*, *1*(1), 13-21.

Kavuk-Kalender, M., & Keser, H. (2018). Cyberbullying Awareness In Secondary and High Schools. *World Journal on Educational Technology: Current Issues*, *10*(4), 25-36.

Liu, A. Q., & Wu, Y. X. (2007). A study on the method of sample size allocation in stratified sampling. Journal of Shandong College of Finance, (4), 49-53.

Mayer, R. (2002). The promise of educational psychology: Learning in the content areas. Upper Saddle River, N.J.: Merrill.

Santre, S. (2023). Cyberbullying in adolescents: A literature review. *International Journal of Adolescent Medicine and Health*, *35*(1), 1-7.

Shiu, A., Chow, J., & Watson, J. (2020). The effectiveness of animated video and written text resources for learning microeconomics: A laboratory experiment. *Education and Information Technologies*, *25*, 1999-2022.

Yalçın, G., Kocaöz, O. E., & Arslantas, T. K. (2023). Effectiveness of animation-based video modelling on daily living skills teaching to individuals with intellectual disabilities. *Education and Information Technologies*, *28*(12), 16233-16254.

Zhu, C., Huang, S., Evans, R., & Zhang, W. (2021). Cyberbullying among adolescents and children: a comprehensive review of the global situation, risk factors, and preventive measures. *Frontiers in public health*, *9*, 634909.

ERNIE BOT IN EDUCATION: A BIBLIOMETRIC ANALYSIS OF EMERGING TRENDS AND RESEARCH LANDSCAPE

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ABSTRACT

With the rapid advancement of artificial intelligence, various AI-powered tools have been introduced into the educational field. Among these, GenAI applications based on large language models, like ChatGPT, have gained prominence globally. In 2023, China introduced Ernie Bot (Wenxin Yiyan), developed by Baidu, as a competitor to ChatGPT. While Ernie Bot has gained significant usage across China, with over 200 million users, its potential as an educational tool remains underexplored. This study provides a bibliometric analysis to assess the research status of Ernie Bot in education, focusing on key themes, influential actors, research gaps, and future directions for exploration. Findings show that while research on Ernie Bot spans multiple disciplines, its application in education is underdeveloped. This study highlights Ernie Bot's potential in enhancing personalized learning, adaptive systems, and educational technology and identifies areas where further research is needed.

Keywords*: Bibliometric Analysis; Generative AI; Chatbot, Ernie Bot; Educational Technology*

INTRODUCTION AND BACKGROUND

The integration of technology into education has transformed traditional teaching methods, making them more dynamic and personalized (Aithal & Maiya, 2023; Criollo-C et al., 2024). GenAI technologies, including intelligent tutoring systems and automated grading, have significantly impacted education by enhancing learning experiences and administrative efficiency (Grassini, 2023). GenAI tools, such as Large Language Models, like OpenAI's ChatGPT, Google's Gemini, and Microsoft's Co-Pilot, are increasingly used in education to support various tasks (Grassini, 2023; Kong et al., 2024).

In 2023, Baidu launched Ernie Bot (Wenxin Yiyan) as a competitor to ChatGPT, rapidly amassing over 200 million users. Despite its growth, Ernie Bot's potential as an educational tool remains underexplored (Ivanova et al., 2024). This study aims to fill this gap through a bibliometric analysis of Ernie Bot, identifying patterns and trends in existing research to evaluate its educational potential.

RESEARCH OBJECTIVE

The primary aim of this study is to systematically explore the status of Ernie Bot as an educational tool through bibliometric analysis, drawing from a pool of 92 publications sourced from the Scopus database.

The key research questions guiding this analysis are follow:

RQ1: What are the emerging key themes and topics in Ernie Bot research?

RQ2: Who are the influential actors, such as journals, authors, and institutions, contributing to Ernie Bot research?

RQ3: What is the status of research on Ernie Bot in education, and how has it evolved over the past two years?

RQ4: What are the gaps in current knowledge, and what are the future research directions for Ernie Bot in education?

METHODOLOGY

This research employs a bibliometric analysis methodology to examine the literature on Ernie Bot (Pritchard, 1969, Springer et al., 1992). Following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, the study systematically reviews and screens relevant publications (Page et al., 2021). Using Scopus as the primary database, an initial search with the keyword "Ernie" yielded 941 articles. After applying inclusion criteria (open access, peer-reviewed, English-language publications between 2019 and 2024) and eliminating irrelevant documents, 92 articles were selected for in-depth analysis. These articles focus on the performance, advantages, and disadvantages of the Ernie Bot model. Knowledge mapping, thematic, descriptive, citation, and co-authorship analyses were conducted using tools VOSviewer, to the study aims (van Eck & Waltman, 2017). Fig. 1 shows the details of the screening and inclusion/exclusion procedure based on the PRISMA template:

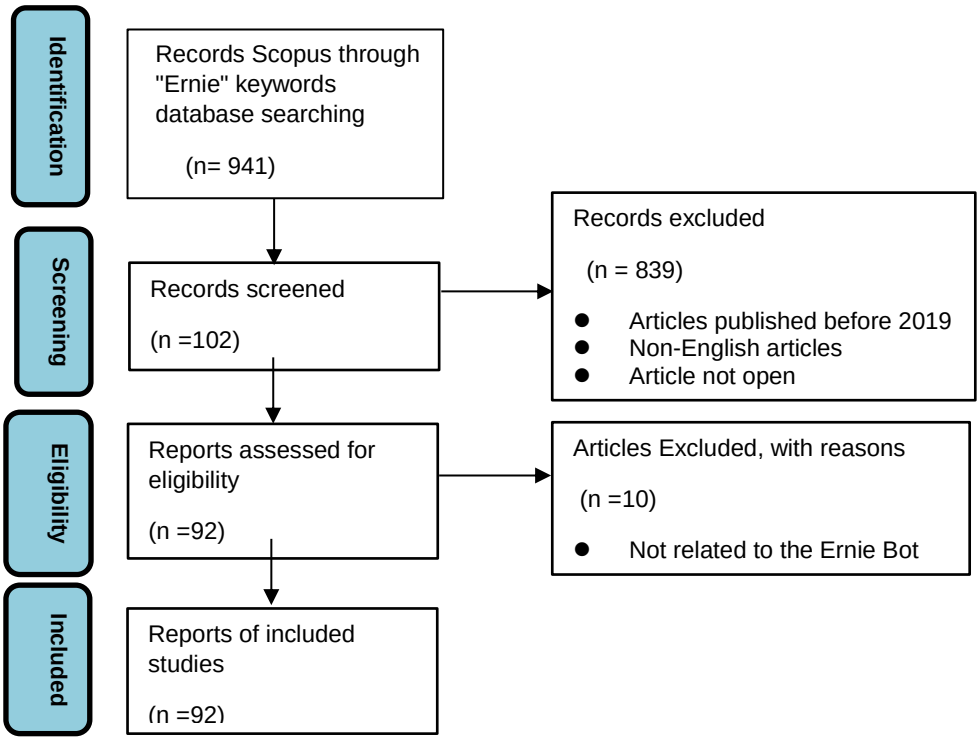

Fig. 1 The screening process using the PRISMA statement template

KEY FINDINGS

RQ1 Emerging Themes: Analysis as shown that Ernie Bot's research spans various fields, with computer science leading the academic disciplines, accounting for 62 papers (67.3%). However, education accounts for only 4 papers (4.3%), highlighting the limited focus on the role of Ernie Bot in educational settings. The prominent themes in existing research are “deep learning” “natural language processing” and “Semantic Analysis”. These technologies underpin the operation of Ernie Bot, but their educational applications remain underdeveloped.

RQ2 Influential Actor: We analyzed relevant journals and conferences, finding that "Applied Sciences Switzerland" has the highest number of publications with 9 articles, followed by "IEEE Access" with 6 articles. highlighting the interdisciplinary interest in its capabilities and applications. The top contributors to Ernie Bot research are primarily from Chinese institutions, with Baidu and the Chinese Academy of Sciences leading in publication output.
The most-cited publication, “War of the Chatbots: Bard, Bing Chat, ChatGPT, Ernie and Beyond” by Rudolph et al. (2023), emphasized the growing intersection of generative AI tools and higher education but pointed out that Ernie Bot's educational role is still emerging (Rudolph et al., 2023). Wangsa, Karim, Gide, and Elkhodr's 2024 article, “A Systematic Review and Comprehensive Analysis of Pioneering AI Chatbot Models from Education to Healthcare: ChatGPT, Bard, Llama, Ernie and Grok, highlights that Ernie Bot's application in education” primarily focuses on assisting Chinese language teaching and learning. It aims to improve students' engagement and learning efficiency by offering personalized experiences, instant feedback, and high-quality content. However, challenges such as the limited scope of knowledge, update frequency, and information accuracy need to be addressed. With ongoing technological advancements, Ernie Bot's educational applications are expected to expand significantly in the future (Wangsa et al., 2024).

RQ3 Status of Ernie Bot in Education: The bibliometric analysis found that the number of publications on Ernie Bot in education has seen modest growth since its release in 2019. However, the trend suggests a slow rate of adoption in educational research, with most studies focusing on its technical aspects rather than pedagogical ones. As a result, educational research on Ernie Bot accounts for a mere 4 out of 92 articles. Publications discuss how Ernie Bot enhances personalized learning and provides real-time feedback, but also highlights limitations in accuracy and infrequent updates.

RQ4 Gaps and Future Research Directions: The most significant gaps identified in the research are the lack of empirical studies evaluating Ernie Bot’s pedagogical effectiveness and its application in creative disciplines such as visual communication design and advertising planning education. Technological limitations, particularly related to knowledge accuracy and outdated content, were also noted. Future research should focus on improving these technical aspects and investigating the tool’s potential for fostering creativity and critical thinking. There is also a need to explore ethical considerations, such as data privacy and algorithmic bias, in educational GenAI use.

DISCUSSION

This analysis reveals that while Ernie Bot holds great promise in the educational sector, its application remains underutilized. One of the key observations is that Ernie Bot’s role in personalized and adaptive learning is a significant area of opportunity, given its potential to provide tailored content and real-time feedback. Moreover, sentiment analysis capabilities could enhance emotional intelligence in student-teacher interactions, offering a more nuanced educational experience, particularly in fields that rely on emotional feedback, like visual communication design education.

However, current research has largely overlooked pedagogical studies, limiting our understanding of how Ernie Bot can improve learning outcomes. Additionally, there is a need for longitudinal studies that examine Ernie Bot's impact over time, particularly in adaptive learning environments. Exploring its cross-disciplinary applications in creative fields will be crucial for expanding its use in education.

CONCLUSION

In conclusion, Ernie Bot represents a potentially transformative tool for education, particularly in its ability to provide personalized learning experiences and enhance adaptive systems. However, much work remains to be done to explore its full potential. The current research gaps in pedagogical effectiveness and cross-disciplinary applications need to be addressed to fully integrate Ernie Bot into education. Future research should also focus on technical improvements and ethical considerations, ensuring that Ernie Bot is a reliable and responsible tool for education. With further advancements and exploration, Ernie Bot could significantly contribute to the evolution of AI-driven learning in both China and the global educational landscape.

REFERENCES

Aithal, P. S., & Maiya, A. K. (2023). Innovations in Higher Education Industry – Shaping the Future. *International Journal of Case Studies in Business, IT, and Education*. https://doi.org/10.47992/ijcsbe.2581.6942.0321

Criollo-C, S., González-Rodríguez, M., Guerrero-Arias, A., Urquiza-Aguiar, L. F., & Luján-Mora, S. (2024). A Review of Emerging Technologies and Their Acceptance in Higher Education. *Education Sciences*, *14*(1). https://doi.org/10.3390/educsci14010010

Grassini, S. (2023). Shaping the Future of Education: Exploring the Potential and Consequences of AI and ChatGPT in Educational Settings. In *Education Sciences* (Vol. 13, Issue 7). https://doi.org/10.3390/educsci13070692

Ivanova, M., Grosseck, G., & Holotescu, C. (2024). Unveiling Insights: A Bibliometric Analysis of Artificial Intelligence in Teaching. *Informatics*, *11*(1). https://doi.org/10.3390/informatics11010010

Kong, S. C., Lee, J. C. K., & Tsang, O. (2024). A pedagogical design for self-regulated learning in academic writing using text-based generative artificial intelligence tools: 6-P pedagogy of plan, prompt, preview, produce, peer-review, portfolio-tracking. *Research and Practice in Technology Enhanced Learning*, *19*. https://doi.org/10.58459/rptel.2024.19030

Ma, F. and M. Xi. (19Fig.). "Status and trends of bibliometric," journal of information Science, Vol. 13, No.5:7-17.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. In *The BMJ* (Vol. 372). https://doi.org/10.1136/bmj.n71

Pritchard, A. (1969)." Statistical bibliography or bibliometrics," Journal of Documentation, Vol. 25, No.4:348-349.

Rudolph, J., Tan, S., & Tan, S. (2023). War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education. *Journal of Applied Learning and Teaching*, *6*(1), 364–389. https://doi.org/10.37074/jalt.2023.6.1.23

van Eck, N. J., & Waltman, L. (2017). Citation-based clustering of publications using CitNetExplorer and VOSviewer. *Scientometrics*, *111*(2). https://doi.org/10.1007/s11192-017-2300-7

Wangsa, K., Karim, S., Gide, E., & Elkhodr, M. (2024). A Systematic Review and Comprehensive Analysis of Pioneering AI Chatbot Models from Education to Healthcare: ChatGPT, Bard, Llama, Ernie and Grok. *Future Internet*, *16*(7), 219. https://doi.org/10.3390/fi16070219

Zipf, G.K. (1932). Selective Studies and the Principle of Relative Frequency in Language. Harvard University Press.

TRANSFORMING EDUCATION IN THE DIGITAL AGE: AN ANALYSIS OF ARTIFICIAL INTELLIGENCE AND DEEP LEARNING THROUGH BIBLIOMETRIC AND SYSTEMATIC LITERATURE REVIEWS

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INTRODUCTION

The integration of Artificial intelligence (AI) and Deep learning (DL) into education is witnessing rapid development. However, the impact of AI and DL on education requires further in-depth research.

METHOD

Using the PRISMA framework, this study employed a systematic methodology that combines bibliometric analysis and systematic literature review to assess the impact of AI and DL on education.

SAMPLING

Publication years, key countries, influential institutions, journals, leading authors, and prominent keywords are examined, aiming to provide a macro-level understanding of this domain. In the second part, the systematic literature review carefully examined 27 high-quality academic articles, offering an in-depth analysis of the research status, significant trends, challenges or issues, and future agendas of AI and DL in the education domain.

FINDINGS

This comprehensive analysis found that AI and DL technologies have huge potential in education, including providing personalized learning, real-time feedback, predicting student emotions, and improving the student's learning experience. Besides these advantages, some challenges or issues that AI and DL must face, including immature technology, high cost, limitations of human-computer interaction, data security, and ethical issues.

CONCLUSION

To sum up, this analysis not only presents the great prospect of AI in the education domain but also highlights the future direction for addressing these challenges.

THE IMPACT OF AI ON HIGHER EDUCATION, TRENDS, AND EDUCATIONAL HORIZONS

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INTRODUCTION

In the 21st century, artificial intelligence (AI) develops rapidly and penetrates every area of our lives. The use of AI, which may trigger the fourth revolution in education, aroused great interest in higher education.

OBJECTIVE

The purpose of this review is to examine the use of AI in higher education in the era of rapid developments of AI.

METHODS

This bibliometric analysis complies with the PRISMA framework to present studies of the use of AI in higher education. This study selected the Scopus database, which has wide coverage and prestige as a scientific publication resource. The search used a complete keyword retrieved 1,520 articles. Based on the inclusion and exclusion criteria, the number of relevant articles was narrowed down to 373.

RESULTS

Since 2020, the number of articles on the use of AI in higher education has increased, indicating more interest in this area. The list of publications, national or districts, and educational institutions that contribute to this field indicates a global impact. The most prolific author of this research is Chan, C.K.Y., and research keywords are summarized, showing the multidisciplinary feature of this field.

CONCLUSION

The use of AI in higher education is becoming more and more important for global education reform, as indicated by the growing number of publications, diverse researchers, and a wide range of areas, and numerous keywords. This indicates that research in this area is collaborative and diverse.

RECOMMENDATION

The study suggests more research and international collaboration to enhance educational resources and student learning. Comprehending and improving the impact of the use of AI on teaching and learning requires designing and developing technologies and expanding the knowledge base.

DEMOGRAPHIC FACTORS AND INNOVATIVE WORK BEHAVIOUR OF MALAYSIAN SCHOOL TEACHERS

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ABSTRACT
The emergence of Industrial Revolution 4.0 (IR 4.0) has changed several factors that drive worker capabilities and skills in a more inventive direction. Digital transformation necessitates digital literacy and technical expertise, as well as continual microlearning and personal development across employee engagement and commitment. However, studies found that, employees still seen not competent and innovative, which include teachers. Therefore, the objective of the study is to examine the perceived level of innovative work behaviour among Malaysian school teachers. In addition, it also explores the demographic factors against the innovative work behaviour. Adopting the survey research method, the study collected data using self-administered questionnaire. Drawing upon 356 usable responses the data were analysed statistically using descriptive and inferential statistic. The results showed that Malaysian teachers, generally perceived that their level of innovative work behaviour to be high. Except for length of service, no significant difference could be observed in terms of innovative work behaviour across other demographic factors, namely age, gender, grade level and education level. The findings suggest that innovation among Malaysian school teachers are very overwhelming and demographic factors have mixed bearing in shaping this form of behaviour.

Keywords: Innovative work behaviour; demographic factors; Malaysian school teachers; teacher's competency.

INTRODUCTION

In considering innovation, organisations are required to capitalise on innovative work behaviour (IWB) of employees which is an intriguing subject for both practitioners and researchers. By the same token, competitive advantage requires organisations to depend on human capital (Wang & Hou, 2023). Therefore, innovative work behaviour by employees is highly valued by organisations and is a priority. Various efforts have been made by the government to improve the level of innovative work behaviour among employees. This can be seen from the introduction of four concepts including *Cepat, Tepat, Integriti – Produktiviti, Kreativiti dan Inovasi* (CTI–PCI); National Blue Ocean Strategy (NBOS); principle of Value Innovation; and concept of *Merakyatkan Perkhidmatan Awam* (MPA). These four concepts can be achieved through effective management innovation for the improvement in efficiency, effectiveness or quality outcomes especially relevant for the public sector (Ab Rahman & Ismail, 2018). These efforts concentrated to civil servant in Malaysia including government school teachers. Industrial Revolution 4.0 (IR 4.0) has also given a new impetus to educational transformation (Xing & Marwala, 2017). In recent years, education experts have recognised the profound impact of technological innovations in information and communication technology (ICT) on education (Haseeb, 2018). Thus, it can be agreed that emergence of Education 5.0 will be shaped by innovations along with the need to train students to produce innovations (Mirzajani, et.al, 2016). With efforts to improve innovative work behaviour among teachers, it is seen to have an impact on students' well-being (Zainal & Matore, 2020). Teachers are seen to be more likely to explore in teaching where they use diverse sources of information, engaging teaching platforms,

and up -to -date teaching methods (Falloon, 2020). Another perspective is that the scope of teaching has become increasingly challenging with the introduction of online learning (Ghani, et.al, 2013; Md-Yunus, 2013) especially during COVID-19 pandemic (Kamal & Illiyan, 2021). Teaching methods need to be improved in line with development. As a consequence of this situation, it affects the performance and skills of teachers. Parthasarathy and Premalatha (2017) argued that research studies on innovative work behaviour have not yet received the level of attention in education. Meanwhile, Messmann, Mulder, and Palonen (2018) mentioned very few studies on how teachers are involved in innovation relating to work behaviour and how their active contributions can be encouraged and fostered. Although many studies on teachers have been done, the aspects on innovative work behaviour have been ignored. Various individual internal factors have been proven to have a role in producing individual innovative work behaviour in previous studies. These internal factors, according to Gulbahar (2017), are variances in individual characteristics and demographic factors. Internal factors such as age, gender, educational background, years of service, personality, cognitive capacities, and risk-taking behaviour all have a favourable impact on the different stages of the innovation process (Menidjel, Benhabib & Bilgihan, 2017). The individual factors related to this study's demographics are age, gender, grade, length of services and level of education. The challenge that arises is how to encourage teachers to implement innovation in their respective duties (Thibaut, 2018). Teachers are an important source for improving teaching and learning innovation through innovation. Based on the previous problems' description, the current study attempts to analyze innovative work behaviour among Malaysian school teachers based on demographic characteristics of age, gender, grade, length of services and level of education.

METHODOLOGY

The data for this study was collected using a survey questionnaire, which is a quantitative research method. Each variable is measure using multiple items and the respondents were asked to rate those items based on the following Likert scales between 1 till 7 namely: (1) Strongly Disagree, (2) Disagree, (3) Sometimes Disagree, (4) Neutral, (5) Sometimes Agree, (6) Agree, and (7) Strongly Agree are the seven levels of disagreement. To ensure that the questionnaire fulfilled the validity and reliability requirements, it was pre-tested and pilot tested. As for the pre-testing exercise, experts, including two Associate Professors specializing in education and innovative work behaviour and four school teachers were engaged. Comments and feedbacks obtained from the pre-testing exercise were used to revise the questionnaire. Accordingly, it was pilot tested with 30 school teachers and the results of the exercise showed that the measurement was acceptably reliable. The study population was school teachers from one type of selected school in Malaysia after sought of ethical clearance and approval from authorized bodies. The difficulty in obtaining the sampling frame, prohibited the researcher to employ probability sampling. Because of this reason, the researchers to use convenience sampling which is considered appropriate when the intent of the study is more towards theory generalization. The data collection exercised managed to collect 356 usable responses. These responses were analysed descriptively and inferentially. The SPSS Version 26.0 was used to analyse the data. Descriptive analysis was carried out on both demographic profiles and the innovative work

behaviour variables. An independent sample t-test and ANOVA were used to test the established hypotheses.

FINDINGS

The breakdown of the age of the respondents are as follows: between 30–39 years old (48.9%), between 40–49 years old (32.9%), and between 21–29 years old (12.6%) and above 49 years old (5.6%). Male teachers account for 96 (27%) of the 356 responses, while female teachers account for 260 (73%). The biggest number of teachers was DG44 (n=155, 43.5 percent), followed by DG41 (n=142, 39.9 percent), DG48 (n=43, 12.1 percent), and DG52 (n=14, 3.9 percent). Meanwhile, just 0.6 percent (n=2) of teachers in the DG54 grade responded to the survey. In terms of length of service, the majority of respondents (n=108, 30.3 percent) served 11 to 15 years, followed by 6 to 10 years (n=88, 24.7 percent), 1 to 5 years (n=74, 20.8 percent), 16 to 20 years (n=66, 18.5 percent), 21 to 25 years (n=13, 3.7 percent), and 26 to 30 years (n=4, 1.1 percent). The lowest number of participants (n=3, 0.8 percent) were those with more than 30 years of service. With regard to education level, most of the teachers involved in this study held Bachelor's Degree (n=304, 85.4%) followed by Master's Degree (n=51, 14.3%). Only 0.3% (n=1) of the respondents held a PhD. Based on the rating scale of between 1 (Strongly Disagree) and 7 (Strongly Agree), the mean score stood between 5.77 and 6.22 implying that the respondents have rated their level of innovative work behaviour as high. Opportunity exploration has the highest score followed by idea generation. Idea realization scored a mean value of 5.94 and ranked third among the four dimensions of innovative work behaviour. Idea promotion even though ranked fourth, still scored a mean value above the mid value 4, hence indicating that these teachers agreed that they engaged in activities promoting their innovative ideas. The results of ANOVA test between the four demographic characteristics and innovative work behaviour suggest that no significant difference could be observed on age, grade level and education level in terms of innovative work behaviour. However, for length of service the results showed that significant different could be detected. Upon further scrutiny unveiled that the longer that the teacher were in service, the higher is the tendency to indulge in innovative work behaviour.

CONCLUSION

The results suggest that the teachers assessed themselves relatively highly in terms of their degree of innovative work behaviour, based on the results of the descriptive analysis. Opportunity exploration received the greatest score out of the four innovative work behaviour aspects, followed by idea generation, idea realization, and idea promotion. Meanwhile, five hypotheses were developed to address demographic characteristics that work against innovative work behaviour among teachers. With the exception of length of service, no significant differences in innovative work behaviour could be found across other demographic parameters such as age, gender, grade level, or education level. This study implies that any teacher who has worked in education for a long time will be more interested in innovation work because they recognize the importance of a range of teaching methods. Based on the preceding description, it can be stated that length of service is a demographic element that influences the innovative work behaviour of teachers. Teachers' innovative work behaviour is unaffected by demographic

criteria such as age, gender, grade level, or education level. According to the results, Malaysian school teachers are quite innovative, and demographic factors play a mixed role in developing this type of behavior. Psychological and other factors, in addition to demographic considerations, can influence innovative work behaviour among teachers, therefore suggestions for further research can include these.

REFERENCES

Ab Rahman, Z. N., & Ismail, N. (2018). Determinant factors for managing innovation in the Malaysian public sector. *MATEC Web of Conferences, 150*, 1–5. https://doi.org/10.1051/matecconf/201815005042

Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development, 68*(5), 2449–2472. https://doi.org/10.1007/s11423-020-09767-4

Ghani, N. A., Mohamad, Z. A., Wan, C., Che, T., Abu, W., & Terengganu, K. (2013). Teachers' challenges in educating special children in special classes of three. *Education and Training Journal, 7*(3), 284–291.

Gulbahar, Y. (2017). A theoretical investigation on innovative work behaviours and fear of failure. *International Journal of Entrepreneurship and Management Inquiry, 1*(1), 40–59.

Haseeb, A. S. M. A. (2018, January 10). Higher education in the era of IR 4. *New Straits Times*.

Kamal, T., & Illiyan, A. (2021). School teachers' perception and challenges towards online teaching during COVID-19 pandemic in India: An econometric analysis. *Asian Association of Open Universities Journal, 16*(3), 311–325. https://doi.org/10.1108/aaouj-10-2021-0122

Md-Yunus, S. (2013). [Malaysia] Early education and development in Malaysia: Issues and challenges in providing a framework for a multiethnic society summary: Malaysia: A multiethnic country. *Eastern Illinois University USA*. http://www.childresearch.net/projects/ecec/2013_04.html

Menidjel, C., Benhabib, A., & Bilgihan, A. (2017). Examining the moderating role of personality traits in the relationship between brand trust and brand loyalty. *Journal of Product and Brand Management, 26*(6), 631–649. https://doi.org/10.1108/JPBM-05-2016-1163

Messmann, G., Mulder, R. H., & Palonen, T. (2018). Vocational education teachers' personal network at school as a resource for innovative work behaviour. *Journal of Workplace Learning, 30*(3), 174–185. https://doi.org/10.1108/JWL-08-2017-0069

Mirzajani, H., Bayekolaei, M. D., Kookandeh, M. R., Rezaee, S. S. R., Kamalifar, A. A., & Shani, H. R. (2016). Smart schools an innovation in education: Malaysian's experience. *Asian Journal of Education and Training, 2*(1), 11–15. https://doi.org/10.20448/journal.522/2016.2.1/522.1.11.15

Parthasarathy, J., & Premalatha, T. (2017). Impact of collective-efficacy and self-efficacy on the innovative work behaviour of teachers in the Nilgiris district, Tamil Nadu. *International Journal of Indian Psychology, 5*(1). https://doi.org/10.25215/0501.019

Thibaut, L., Knipprath, H., Dehaene, W., & Depaepe, F. (2018). The influence of teachers' attitudes and school context on instructional practices in integrated STEM education. *Teaching and Teacher Education, 71*, 190–205. https://doi.org/10.1016/j.tate.2017.12.014

Wang, P., & Hou, Y. (2023). How does commitment affect employee's innovative behavior? A time-lagged study. *Sage Open, 13*(4). https://doi.org/10.1177/21582440231216568

Xing, B., & Marwala, T. (2017). Implications of the fourth industrial age on higher education. *Computers & Society*.

Zainal, M. A., & Matore, M. E. E. M. (2020). Assessing the factors influencing teachers' innovative behaviour: A systematic review. *New Horizons in Education and Social Studies, 5*, 137–152.

A COMPREHENSIVE ANALYSIS OF E- LEARNING AND SUSTAINABLE DEVELOPMENT: A BIBLIOMETRIC AND SYSTEMATIC LITERATURE REVIEW

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INTRODUCTION

Governments strive to implement e-learning as a contemporary approach to achieve sustainable development. Nevertheless, a comprehensive analysis is necessary to fully understand the impact of this form of education on the attainment of sustainable development objectives.

METHOD

To fill this need, our study introduces a novel methodology that integrates bibliometric analysis and systematic literature review (SLR), led by the PRISMA methodology. The first phase included a bibliometric analysis that examined the primary nations, educational institutions, publications, keywords, and significant writers in the realm of e-learning and sustainable development. This phase provided a comprehensive overview of the overall terrain in this specific field. The next phase was a meticulous systematic literature review (SLR) of 14 a chosen scientific publication, aiming to provide a comprehensive analysis of the most significant electronic applications, finding, and future recommendations for e-learning and sustainable development.

RESULT

The results obtained from this dual methodology offer a thorough guide for educators, researchers, and individuals with an interest in the educational process. It highlights the significance of e-learning in attaining sustainable development objectives, including the reduction of environmental pollution, equipping students with 21st century competencies, promoting tolerance, and fostering acceptance of diverse perspectives.

CONCLUSION

This study highlights the significant potential of e-learning in attaining sustainable development goals. Additionally, it provides a framework for promoting the use of e-learning and its role in education.

THE PERCEPTION OF "LUMA AI DREAM MACHINE" AI APPLICATIONS BY POSTGRADUATE STUDENTS IN MALAYSIA

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INTRODUCTION
This study investigates the perception and acceptance of "Luma AI Dream Machine" among postgraduate students in Malaysia. The Technology Acceptance Model (TAM) is employed as the theoretical framework in the research. The research focuses on key TAM variables, namely perceived ease of use, perceived usefulness, and students' intention to use the Generative AI tool.

METHOD
A quantitative correlational design was adopted, which involved 35 postgraduate students from a Malaysian university. Data were collected using a close-ended questionnaire and analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM).

FINDINGS
The findings reveal that perceived ease of use significantly influences perceived usefulness, which in turn positively affects students' intention to use the tool. Both perceived usefulness and ease of use were found to significantly impact students' overall satisfaction with the AI application. These results highlight the importance of usability and perceived benefits in promoting the adoption of Generative AI tools in academic contexts.

CONCLUSION
The study provides valuable insights for integrating Generative AI technologies into higher education to enhance learning outcomes.

IMPROVING THE LEARNING EXPERIENCE OF THE ELDERLY: STRATEGIES AND PRACTICES BASED ON MOBILE TEACHING VIDEOS

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ABSTRACT

Mobile teaching is a hot topic in the current elderly education and has received common attention from lifelong education theory research and elderly teaching practice. However, due to the deterioration of the elderly's learning ability, the characteristics of the elderly's learning organization conflict with the traditional teaching model, etc., the efficiency of elderly mobile teaching is not high and the learning experience is not obvious. Based on the analysis of the characteristics of the elderly's learning ability, combined with the mobile teaching videos used by WeChat, teaching videos that meet the learning characteristics of the elderly are produced, and can be verified by practice, so as to improve the learning experience of the elderly.

UNLOCKING THE POTENTIAL OF MULTIMEDIA PERSONALIZED-VOICE AND COMPUTATIONAL THINKING IN STOICHIOMETRY LEARNING VIA A MOBILE APP

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ABSTRACT
In today's rapidly changing learning environment, there is an increasing need to investigate innovative and effective approaches that may assist matriculation students comprehend challenging chemistry concepts such as stoichiometry. Although stoichiometry is a fundamental concept in chemistry, matriculation students in Malaysia frequently struggle with it. To address these challenges, incorporating multimedia principles in the design of learning materials and integrating computational thinking techniques into mobile learning applications offers enormous potential. This study aims to investigate the effect of integrating the Multimedia Personalized-Voice Principle (MPVP) and Computational Thinking (CT) in a mobile application on the learning of stoichiometry among matriculation students. Using a qualitative approach, this study involved in-depth interviews with participants to identify factors contributing to low academic achievement in stoichiometry as well as analyse how these two approaches increase positive emotions and reduce cognitive load in learning. The findings indicate that using MPVP and CT in the mobile application significantly enhances positive emotions in learning stoichiometry, reduces cognitive load, and improves learning motivation, conceptual understanding, and problem-solving skills among matriculation students.

Keywords: Multimedia Personalized-Voice Principle, Stoichiometry, Computational Thinking, Mobile Applications, Matriculation Students

INTRODUCTION AND BACKGROUND

In today's rapidly changing learning environment, there is an increasing need to investigate innovative and effective approaches that may assist matriculation students in comprehending challenging chemistry concepts such as stoichiometry. Chemistry is a compulsory subject for all Malaysian matriculation college students in the science stream, encompassing lectures, tutorials, and practical components (Bahagian Matrikulasi Kementerian Pendidikan Malaysia, 2020). Completion of this one- or two-year pre-university program is a prerequisite for pursuing a degree at public universities. Despite its fundamental importance, stoichiometry often presents difficulties for matriculation students in Malaysia (Nurul Fatni et al., 2021), primarily due to the complexity of the concept and conventional approaches to teaching (Lee, 2020), which can lead to low academic achievement and high cognitive load. In addressing these challenges, incorporating multimedia principles into the design of learning materials offers substantial promise (Mayer, 2014). Multimedia Principles underscore the importance of creating instructional materials that effectively integrate verbal and visual elements to enhance understanding and retention. The principles of personalization, voice, and embodiment, which Mayer emphasizes, are crucial for making learning materials more engaging and accessible. Personalization, for instance, suggests that students learn better when information is presented in a conversational style rather than in a formal manner. The personalized-voice principle can help alleviate negative emotions by making the content feel more accessible and engaging (Shah, 2020). Additionally, the integration of computational thinking (CT) as outlined by (Wing, 2006) plays a vital role in modern education. CT approach can reduce cognitive load

by providing a systematic problem-solving framework (Chen & Wang, 2023). This synergistic effect has the potential to empower matriculation students to develop a deeper understanding and appreciation for this critical chemistry concept, ultimately setting them up for success in their future chemistry studies and beyond. Combining these insights, this study explores the integration of the Multimedia Personalized-Voice Principle (MPVP) and Computational Thinking (CT) in a mobile learning application aimed at improving stoichiometry learning among matriculation students. By leveraging multimedia principles to create interactive and personalized learning experiences and incorporating CT to foster systematic problem-solving skills, this research seeks to address the issues of low achievement, high cognitive load, and negative emotions associated with learning stoichiometry, ultimately enhancing students' performance and motivation.

METHODOLOGY

This study adopts a qualitative research approach to explore the impact of integrating the Multimedia Personalized-Voice Principle (MPVP) and Computational Thinking (CT) into mobile applications on stoichiometry learning among matriculation students. By employing a basic qualitative inquiry, the study aims to gain a deep understanding of participants' experiences and perceptions regarding these educational tools. Data were collected through in-depth interviews with five purposively selected matriculation students who faced challenges in understanding stoichiometry and utilized mobile applications for learning. Interviews, supported by observations, provided insights into how students interact with the mobile applications and their learning experiences. Data analysis was performed using manual coding and thematic analysis, to identify and organize key themes. Ethical considerations were addressed by obtaining institutional approval, ensuring participant confidentiality, and allowing participants to withdraw at any time. The validity and reliability of the findings were enhanced through triangulation of interview and observational data and a rigorous analysis process. This methodology facilitates a comprehensive understanding of how MPVP and CT influence learning outcomes, cognitive load, and emotional responses in the context of stoichiometry education.

FINDINGS

The study reveals several key insights into the effects of integrating the Multimedia Personalized-Voice Principle (MPVP) and Computational Thinking (CT) into mobile applications for learning stoichiometry among matriculation students. Interviews with participants highlighted that factors such as less interactive and engaging learning materials, and insufficient guidance outside of class, were major contributors to low academic achievement in stoichiometry. Participants reported that traditional learning materials were often dry and lacked interactivity, which negatively impacted their understanding and motivation. Conversely, the integration of MPVP and CT into mobile applications was met with positive feedback. Participants found that mobile applications, enhanced with MPVP, provided more interactive and engaging content, which made learning more enjoyable and less monotonous. They appreciated features like video tutorials, interactive exercises, and a personalized voice that catered to their learning styles, which helped to clarify complex

concepts and reduce cognitive load. Additionally, the use of CT facilitated a systematic approach to problem-solving, making it easier for students to tackle stoichiometry problems step-by-step. Overall, the findings suggest that mobile applications incorporating MPVP and CT significantly enhance students' understanding of stoichiometry, reduce cognitive load, and foster positive emotions, thereby improving academic performance. Despite these improvements, some students still faced challenges, indicating that while MPVP and CT are effective, additional support may be necessary for optimal learning outcomes.

CONCLUSION

The study concludes that the integration of MPVP and CT into mobile applications represents a significant advancement in the teaching of stoichiometry. By addressing the limitations of conventional teaching methods, this approach enhances student positive emotions, reduces cognitive load, and improves academic performance. The use of personalized voice features in MPVP provides a more tailored and interactive learning experience, while CT offers a systematic approach to problem-solving, making it easier for students to grasp and apply complex concepts in solving stoichiometry problems. The "Mobile App with Personalized Voice Principle and Computational Thinking (CT) in Stoichiometry Learning Model" demonstrates the potential of technology to transform science education by providing innovative and effective tools for learning. This model highlights the importance of incorporating advanced educational technologies to address the challenges of teaching complex subjects and improve student outcomes. Future research should focus on further testing and refining this model to ensure its effectiveness and explore its applicability to other areas of chemistry topics or science subjects. Additionally, it is essential to consider the broader implications of integrating technology in education, including issues related to accessibility, usability, and the potential for technological disparities among students. Overall, the findings of this study contribute to the growing body of evidence supporting the use of technology to enhance educational practices and improve learning experiences in chemistry and beyond.

REFERENCES

Bahagian Matrikulasi Kementerian Pendidikan Malaysia. (2020). *Chemistry Syllabus Specification*.

Chen, X., & Wang, X. (2023). Computational Thinking Training and Deep Learning Evaluation Model Construction Based on Scratch Modular Programming Course. *Computational Intelligence and Neuroscience, 2023*, 1–12. https://doi.org/10.1155/2023/3760957

Lee, M. J. (2020). Chemistry Teachers' Pedagogical Content Knowledge and Belief on Integrating Proportional Reasoning in Teaching Stoichiometry. In *Paper Knowledge . Toward a Media History of Documents*. Columbia University.

Mayer, R. E. (2014). Principles Based on Social Cues in Multimedia Learning: Personalization, Voice, Image, and Embodiment Principles. *The Cambridge Handbook of Multimedia Learning, Second Edition*, 345–368. https://doi.org/10.1017/CBO9781139547369.017

Nurul Fatni, A., Rohaida, M. S., & Norlidah, A. (2021). Teaching and Learning Practices in Chemistry Practical Work of Malaysian Matriculation Programme : a Needs Analysis.

Malaysian Online Journal of Educational Sciences, *9*(October), 13–26.

Shah, S. J. (2020). *Measuring the Additive Effects of Multimedia Social Cue Principles on Learners' Cognitive Load, Emotions, Attitude, and Principles on Learners' Cognitive Load, Emotions, Attitude, and Learning Outcomes*. https://doi.org/10.25777/5bzy-dp86

Wing, J. M. (2006). Wing, J. M. (2006). Computational thinking. *Communications of the ACM*, *49*(3).

MOBILE LEARNING AS A TOOL TO EDUCATE GRAPHIC DESIGNER COMPETENCY IN HIGHER INSTITUTIONS

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ABSTRACT
Particularly in higher education, the quick development of mobile technology has drastically changed the way that education is taught. Students may interact with course materials, tutorials, and design tools at any time and from any location thanks to mobile learning, which offers an inventive, adaptable, and accessible approach to education. The advantages of mobile learning are emphasized in this research, which include improved accessibility, dynamic and interesting information, opportunity for real-time feedback, and collaboration. It also discusses the difficulties and factors to be taken into account when putting m-learning into practice, such as making sure that devices are compatible, keeping up with software changes, and offering sufficient assistance and training to teachers and students. However, there is a lack of information about mobile learning as a tool to educate graphic designers' competency in higher institutions. The purpose of this study is to determine the effectiveness of mobile learning as a tool to educate graphic designer competency in higher institutions This quantitative study was conducted using a questionnaire with a 0.99 alpha-Cronbach value. The questionnaire uses 5 Likert-scale and open-ended questions as instruments for this study. There were 10 respondents selected randomly from the graphic design sector in Malaysia region and 10 respondents selected randomly from University Sains Malaysia. The findings show that the respondents have positive feedback on mobile learning as a tool to educate graphic designers' competency in higher institutions. Higher education institutions may provide a more dynamic and successful graphic design education by utilizing the capabilities of mobile learning.

Keywords: Mobile learning, graphic design, graphic designer competency, educate, tools, institutions.

INTRODUCTION

The need for graphic designers has been constantly shifting in recent years, as the graphic design business continues to flourish and contribute significantly to the nation's economy. Employees who are proficient in many tasks within each design subfield as described by Dziobczenski and Person (2017) are known as graphic designers. According to the Bureau of Labor Statistics (2019), employment of graphic designers was expected to expand by 8% between 2019 and 2029, which was much faster than the average for all occupations. With a 19.12% employment rate, specialist graphic design services had the highest employment level in the sector. Labor Statistics Bureau, 2019).

BACKGROUND STUDY

It has been demonstrated via research that the mobile learning system's communication system with students is supportive and that the course contents may be engaging and contextualized in a variety of ways. The research claims that mobile learning is one of the most effective methods of teaching and learning (Kabir and Kadage, 2017). This is primarily because it makes it possible for anybody to participate in the educational process at any time, from any location (Bidin and Ziden, 2013). Higher education institutions have virtually adopted mobile learning due to its excellent teaching quality and ease of use for instructors. According to the majority of students polled, mobile-friendly websites and courses are crucial, and they want to be able

to utilize their mobile devices for coursework (Capranos, & Dyers, 2020; Gierdowski, 2019; Magda et al., 2020). Because university graduates typically aren't exposed to the graphic designer competency criteria in the design profession, customers in Ghana typically hire graphic designers with informal training (Okyere, 2017). The skills, subject knowledge, and tools that designers employ to educate their graduates about the problems of the twenty-first century were the focus of Bridges' (2013) research. According to Bridges' theory, competency is a related notion that is described as an individual's ability to effectively do a task or activity within a certain employment through a mix of skill, knowledge, qualities, and behaviors (Leach, 2008).

METHODOLOGY

This research conducted a quantitative methodology in Malaysia. The main criteria for selecting this area of the region is for quality of the data and information from the instructors, designers, and students in higher institutions. The participants were selected randomly from Malaysia. The instrument for this study is a questionnaire adopted from Halim et al., (2020) and the reliability of this questionnaire is 0.99. In quantitative research, the researcher uses a quantitative survey instrument to collect data which is the research questionnaire. The data was analyzed using descriptive analysis that included mean and standard deviation.

FINDINGS

The information obtained from the questionnaire was analyzed using descriptive statistical analysis. Studies using surveys have been conducted to determine the efficiency of mobile learning as a tool to educate, as well as to gain a deeper understanding of the present state of graphic designer competency. Figure 1 shows that 55.5 % of respondents are from the graphic design sector with experience. 20 % of respondents which is the second highest respondent come from creative officers who have higher positions than graphic designers who are working in the graphic design sector. 10 % of respondents are currently working as instructors and another 10 % are students from higher institutions in Malaysia. This study aims, that the students in higher education will be able to learn about and assess their levels of graphic designer competency using new mobile learning technologies that align with designer competency standards. The researcher hopes that instructors conducting graphic design classes at higher education institutions will be able to access and use the product. Higher education institutions and design educators must reevaluate how they determine the requirements for graphic designers to meet the demands of professional design practice in light of this occurrence (Dziobczenski, Person, & Meriläinen, 2018; Okyere, 2017). By producing the final product and giving the other instructors from higher education institutions the information and guidelines they need, they can oversee, supervise, and train the students on how to become competent graphic designers. Numerous design disciplines fall under specific job categories that are present in practically every business. Students from higher education institutions can be taught and have their designer competency levels measured using the mobile learning system. One of the main factors influencing students at HEIs to acquire 21st-century skills is the use of digital learning tools and remote learning (Meier, 2021). The results will add information to the National Education Policy's needs, particularly concerning the curriculum and co-curriculum, the educational support system, and the educational system itself. This

enables the utilization of designer competency data from mobile learning to continually enhance the demands of the business, institutions, and students. Subsequently, this research would satisfy Shifts 1 and 10 of the Malaysian Education Blueprint. To improve the higher education system at the worldwide level and develop student abilities and competency in learning and co-curricular education, Shift 1 would examine the data gathered from mobile learning for designer competency. In the meanwhile, Shift 10's mobile learning system for designer competence may assess and train college students to meet industry requirements for designer competency and thrive in the workforce.

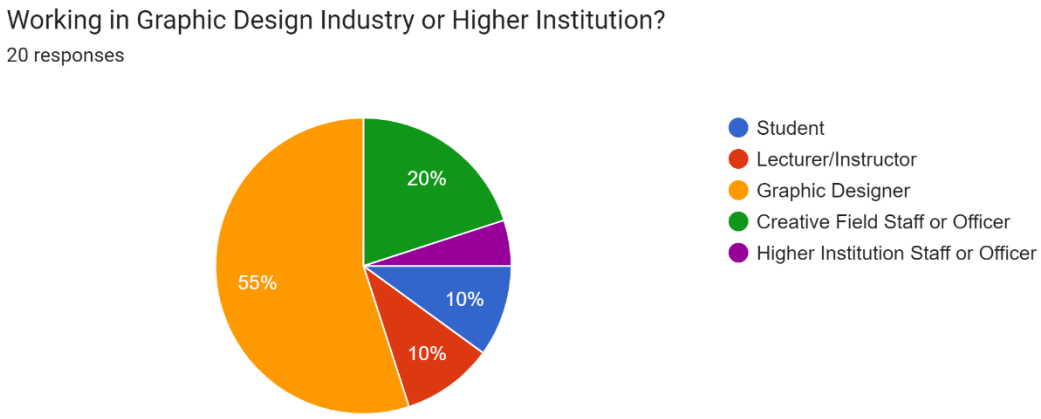

Table 1. Instructors, Designers, and Students know Graphic Designer Competencies

No.	Item	Mean	SD	Interpretation
1	COMPETENCY 1 KNOWLEDGE: Do we need to know about the principle of arts as a graphic designer?	3.85	1.13	High
2	COMPETENCY 1 KNOWLEDGE: What are the elements in the principle of arts?	3.75	1.11	High
3	COMPETENCY 1 KNOWLEDGE: What are the sub-elements in creative fields?	3.90	1.18	High
4	COMPETENCY 2 SKILLS: What are the skills needed as a graphic designer?	3.75	1.10	High
5	COMPETENCY 3 TOOLS: What is the daily software used by graphic designers?	3.85	1.08	High

Average of mean = 3.82, Reliability = 0.99.

High interpretation for every item as shown in Table 1 presents that instructors, designers, and students know of graphic designer competency and their understanding in graphic designer competency elements.

Table 2. The Needs of Graphic Designer Competency in Higher Institutions

	Item	Mean	SD	Interpretation
1	Is the graphic designer job becoming an important position in our economic sector?	3.80	1.13	High
2	Is it true graphic designer position becoming more popular and trending nowadays?	3.97	1.19	High
3	Is it true graphic designer position is needed in the private sector and government sector?	3.92	1.19	High
4	To become a graphic designer there is a certain requirements or levels of expectation from the industry sector.	4.00	1.15	High
5	Do You Think It Is Importance For Students in Higher Institutions to Learn and Prepare Themselves with Graphic Designer Competency Before They Enter The Industry Sector and Work as Graphic Designer?	3.89	1.10	High

Average of mean = 3.88, Reliability = 0.99.
Results in Table 2 present a high interpretation of the needs of graphic designer competency in higher institutions. The highest consideration of the need for graphic designer competency in higher institutions is to determine that there are certain requirements or levels of expectation from the industry sector.

Table 3. Mobile Learning as a Tool to Educate Graphic Designer Competency in Higher Institutions

	Item	Mean	SD	Interpretation
1	What is a suitable platform to raise awareness about the importance of graphic designer competency?	3.85	1.13	High
2	Is mobile learning a suitable platform for students in higher institutions to learn and raise awareness about graphic designer competency?	3.70	1.19	High
3	Do you think if the graduates from higher institutions have fully learned about graphic designer competency from mobile learning they will be more prepared and able to do better than other participants during the interview session for the graphic designer job?	3.75	1.19	High
4	How much you will state the importance of mobile learning as a tool to educate graphic designers competency or criteria to be	3.89	1.15	High

	implemented in the higher institution before the graduates go to the industry and work?			
5	Will the graphic design industry sector grow bigger and have more professional workers if the graduates had been educated with graphic designer competency?	3.89	1.10	High

Average of mean = 3.82, Reliability = 0.99.

Results in Table **3** present a high interpretation of mobile learning as a tool to educate graphic designers' competency in higher institutions. The highest consideration of mobile learning as a tool to educate graphic designers competency in higher institutions is to determine the importance of mobile learning as a tool to educate graphic designers' competency or criteria to be implemented in higher institutions before the graduates go to industry and work.

CONCLUSION

In conclusion, a graphic designer's competency is more than just a skill. It is a combination of knowledge and a variety of expertise that enables graphic designers to produce designs that both meet the demands of the customer and stand out in a crowded market. To be relevant in this ever-changing sector, graphic designer competency must be upheld and learned in higher institutions for the learner to learn and keep up with the current graphic designer competency needs. Higher education institutes in Malaysia have embraced mobile learning as a useful tool. Using a range of learning resources, including infographics, posters, videos, images, audio, and more, mobile learning can be an effective tool for teaching graphic designer competency in higher education. It can also inspire learners and enhance the quality of the curriculum. Instructors and graphic designers are aware of the benefits of mobile learning and are enthusiastic about its potential for enhancing graphic designer skills. However, there are challenges including financial burdens on the researcher, the need for the researcher's abilities and knowledge to create a mobile learning system and material, the availability of current technology, and the need for policies that facilitate the successful deployment of mobile learning for graphic design competency. Instructors and graphic designers place a strong emphasis on clear and efficient lessons as successful mobile learning needs for graphic designer proficiency. To guarantee that learning objectives are met, mobile learning for graphic design competencies should be integrated with appropriate multimedia concepts and theory. All things considered, mobile learning for graphic designer competency is a great technique to reach students in higher education and assist them in becoming ready for a range of jobs in the graphic design industry.

REFERENCES

356 B. A. Dharma and A. Septiana14. J. Wong, M. Baars, D. Davis, T. Van Der Zee, G.-J. Houben, and F. Paas, “Supporting Self-Regulated Learning in Online Learning Environments and MOOCs: A Systematic Review,” Int. J. Human–Computer Interact., vol. 35, no. 4–5, pp. 356–373, 2019.15.

Alghazi, S. S., Kamsin, A., Almaiah, M. A., Wong, S. Y., and Shuib, L. (2021). For Sustainable application of mobile learning: an extended UTAUT model to examine the effect of

technical factors on the usage of mobile devices as a learning tool. *Sustainability* 13:1856. doi: 10.3390/su13041856

B. M. A. Faraj, "Designing a web-based English language program for new-coming university students (English for University) Basim M. Abubaker Faraj University of Benghazi, Libya,"AsiaCALL Online J., pp. 2013–2015, 2014.13.

Belli, S. (2021). Affordance in socio-material networks: a mixed method study of researchers' groups and analog-digital objects. Front. Psychol. 12:672155. doi: 10.3389/fpsyg.2021.672155

Belli, S., and Gonzalo-Penela, C. (2020). Science, research, and innovation infospheres in Google results of the Ibero-American countries. Scientometrics 123, 635–653. doi: 10.1007/s11192-020-03399-4

Bidin, S., & Ziden, A. A. (2013). Adoption and application of mobile learning in the education industry. Procedia-social and behavioral sciences, 90, 720-729.

Bjerkan, K. Y., Bjørgen, A., & Hjelkrem, O. A. (2019). E-commerce and prevalence of last mile practices in Norway. In The 11th city logistics conference, Dubrovnik, Croatia.

Bjørgen, A., Fossheim, K., & Macharis, C. (2021). Criteria for successful stakeholder participation in collaborative urban mobility planning. In the VREF conference on urban freight, 17-19 October 2018, Gothenburg, Sweden.

Bond, M. (2020). Facilitating student engagement through the flipped learning approach in K-12: A systematic review. Computers & Education, 151, 103819. https://doi.org/10.1016/j.compedu.2020.103819

Bridges, A. W. (2013). Identification of perceived 21st-century graphic design skills, content knowledge, and tools needed in an effective university-level graphic design program. ProQuest Dissertations and Theses. Retrieved from https://search.proquest.com/docview/1429501618?accountid=29391

Briggs, T. (2015). Graphic design curricula: Visualizing design processes and skills. In S. Heller (Ed.), The education of a graphic designer (pp. 280--283). New York, NY: Allworth Press.

Buasuwan, P. J. A. E. and Studies, D., "Rethinking Thai higher education for Thailand 4.0," Asian Education and Development Studies, vol. 7, no. 2, pp. 157-173, 2018

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Graphic Designers, at https://www.bls.gov/ooh/arts-and-design/graphic-designers.htm (visited June 06, 2023).

Capranos, D. & Dyers, L. (2020). Online student behaviors and attitudes: A survey of prospective students, current learners, and recent graduates. Wiley Education Services. https://edservices.wiley.com/wp-content/uploads/2020/04/202404-Online-Student-Behaviors and-Attitudes-Report-WES-Final-for-Web_x.pdf

Chiang, W. S., Idris, M. Z., & Chuen, T. W. (2018). What makes an undergraduate graphic design education valuable? Journal of Education and Social Sciences, 11(1), 73–82.

Chiang, W. S., Idris, M. Z., & Chuen, T. W. (2019). Is graphic design being taken seriously as a profession? Journal of Arts and Social Sciences, 3(1), 1–9.

Debbie, G. S. S. (2011). A nation's visual language: Nation branding and the visual identity of contemporary Malaysia. Nottingham Trent University.

Debbie, G. S. S. (2011). A nation's visual language: Nation branding and the visual identity of contemporary Malaysia. Nottingham Trent University.

Dziobczenski, P. R. N., and O. Person. 2017. "Graphic Designer Wanted: A Document Analysis of the Described Skill Set of Graphic Designers in Job Advertisements From the United Kingdom." International Journal of Design 11 (2): 41–55

E. Haryani, W. W. Cobern, B. A. S. Pleasants, and M. K. Fetters, "Analysis of teachers'resources for integrating the skills of creativity and innovation, critical thinking and problemsolteachers resourcesving, collaboration, and communication in the science classroom," J. Pendidik. IPA Indones., vol. 10, no. 1, pp. 92–102, 2021, https://doi.org/10.15294/jpii.v10i1.27084.10.

E. Winarsih, F. C. Wibowo, and C. E. Rustana, "Desain Bahan Ajar Hukum Newton Berba-sis Wix Website Untuk Melatih Keterampilan Argumentasi Siswa SMA," … Fis., vol. X,pp. 97–104, 2022, [Online]. Available: http://journal.unj.ac.id/unj/index.php/prosidingsnf/article/view/24414.12.

El-Hussein, M. O., & Cronje, J. C. (2010). Defining mobile learning in the higher education landscape. Educational Technology & Society, 13 (3), 12-21.

F. Sekarningsih, A. Budiman, and G. R. Gustiaji, "Wix web-based Dance Learning Media toSupport Teaching in the Pandemic Era in High School," Harmon. J. Arts Res. Educ., vol. 21,no. 1, pp. 178–191, 2021, https://doi.org/10.15294/harmonia.v21i1.27420.3.

G. S. Megahantara, "Pengaruh Teknologi Terhadap Pendidikan di Abad 21," Academia, 2019, https://doi.org/10.31227/osf.io/72sqb.6.

H. Li, "Developing a Website for Nordic Inn Travel Oy by Wix," Thesis Publ. Univ. Appl.Sci., 2020, [Online]. Available: https://www.theseus.fi/handle/10024/341852.4.

J. Holland, "Learn How to Create a Wix Website: Current Best Practices," J. Natl. Soc. Sci.Technol., vol. 8, no. 2, pp. 50–58, 2020.20. D. Mali and H. Lim, "How do Students Perceive Face to Face/Blended Learning as a Result of the Covid-19 Pandemic?," Int. J. Manag. Educ., vol. 19, no. 3, p. 100552, 2021, https://doi.org/10.1016/j.ijme.2021.100552.21.

Kabir and Kdage, A. (2017). Quality and Equality Questions in Technology-Mediated Distance Learning. Journal of Educational Media and Technology, Volume 17, Number 1, 17(1).

M. D. Kembara, R. W. A. Rozak, and V. A. Hadian, "Research-based Lectures to ImproveStudents' 4C (Communication, Collaboration, Critical Thinking, and Creativity) Skills," vol.306, no. Isseh 2018, pp. 22–26, 2019, https://doi.org/10.2991/isseh-18.2019.6.8.

M. Sholihin, R. C. Sari, N. Yuniarti, and S. Ilyana, "A New Way of Teaching Business Ethics:The Evaluation of Virtual Reality-Based Learning Media," Int. J. Manag. Educ., vol. 18, no.3, p. 100428, 2020, https://doi.org/10.1016/j.ijme.2020.100428.

Magalhães, Paula & Ferreira, Diogo & Cunha, Jennifer & Rosário, Pedro. (2020). Online vs traditional homework: A systematic review on the benefits to students' performance. Computers & Education. 152. 103869. 10.1016/j.compedu.2020.103869.

Masrura AF, Aditya MF, Isron MH, Dermawan DA, Nerisafitra P. CUBID EC: Aplikasi edukasi berbasis android menggunakan augmented reality. Explore IT! Jurnal Keilmuan dan Aplikasi Teknik Informatika. 2020;12(1):29-36.

Meier, E. B. (2021). Designing and using digital platforms for 21st-century learning. Educational Technology Research and Development, 69(1), 217–220. https://doi.org/10.1007/s11423-020-09880-4

Michael W. Meyer, Don Norman, Changing Design Education for the 21st Century, She Ji: The Journal of Design, Economics, and Innovation, Volume 6, Issue 1, 2020, Pages 13-49, ISSN 2405-8726, https://doi.org/10.1016/j.sheji.2019.12.002.

Naciri, A., Baba, M. A., Achbani, A., and Kharbach, A. (2020). Mobile learning in Higher education: unavoidable alternative during COVID-19. Academia 4, 1–2. doi: 10.1504/ijmc.2023.10042533

Pelealu, B., Afirianto, T., & Wardhono, W. (2018). Pengembangan Game Edukasi Mobile Augmented Reality untuk Membantu Pembelajaran Anak dalam Membaca, Menulis, dan Berhitung. Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer, 3(2), 1492-1499.

R. A. Carter Jr, M. Rice, S. Yang, and H. A. Jackson, "Self-Regulated Learning in Online Learning Environments: Strategies for Remote Learning," Inf. Learn. Sci., 2020.16. C. B. Andoh, "Factors influencing teachers' adoption and integration of information andcommunication technology into teaching: A review of the literature," EDULEARN19 Proc.,vol. 1, no. 1, pp. 4041–4047, 2019, https://doi.org/10.21125/edulearn.2019.1027.17.

R. Cerezo, A. Bogarín, M. Esteban, and C. Romero, "Process Mining for Self-Regulated Learning Assessment in E-Learning," J. Comput. High. Educ., vol. 32, no. 1, pp. 74–88,2020.18. S. Gustiani, "Research And Development (R&D) Method As A Model Design In EducationalResearch And Its Alternatives," Holistics, vol. 11, no. 2, 2019.19.

R. Rahayu, S. Iskandar, and Y. Abidin, "Inovasi Pembelajaran Abad 21 Dan PenerapannyaDi Indonesia," J. Basicedu, vol. 6, no. 2, pp. 2099–2104, 2022, https://doi.org/10.31004/basicedu.v6i2.2082.9.

R. Rahmawati, Y. Achdiani, and M. N. Handayani, "Pengembangan Media PembelajaranBerbasis Website Wix Pada Mata Pelajaran Produksi Pengolahan Hasil Nabati Di Smkn 2Cilaku Cianjur," Edufortech, vol. 6, no. 2, 2021, https://doi.org/10.17509/edufortech.v6i2.39293.11.

R. S. Jansen, A. Van Leeuwen, J. Janssen, S. Jak, and L. Kester, "Self-Regulated LearningPartially Mediates the Effect of Self-Regulated Learning Interventions on Achievement in higher Education: A Meta-Analysis," Educ. Res. Rev., vol. 28, p. 100292, 2019.22. A. T.Cahyadi, N. Miftahuddin, N. S. Islahiyah, F. D. Yulianti, and B. N. H. Masturah, "WebsiteDesigning for Business Enterprises Using Wix. com," 2022.

Salmia and A. M. Yusri, "Peran Guru dalam Pembelajaran Abad 21 di Masa Pandemik Covid-19," Indones. J. Prim. Educ., vol. 5, no. 1, pp. 82–92, 2021, [Online]. Available: http://ejournal.upi.edu/index.php/.7.

T. Rahayu, T. Mayasari, and F. Huriawati, "Pengembangan Media Website Hybrid Learningberbasis Kemampuan Literasi Digital dalam Pembelajaran Fisika," J. Pendidik. Fis., vol. 7,no. 1, p. 130, 2019, https://doi.org/10.24127/jpf.v7i1.1567.2.

Thomas, M. S. C., Mareschal, D., & Dumontheil, I. (2020). Educational neuroscience: Development across the lifespan. London: Routledge.

Toquero, C. M. (2020). Challenges and Opportunities for Higher Education Amid the COVID-19 Pandemic: the Philippine Context. Pedagog. Res. 5, 1–5.

W. Wartono, M. N. Hudha, and J. R. Batlolona, "How are the physics critical thinking skills of the students taught by using inquiry-discovery through empirical and theorethical overview?,"Eurasia J. Math. Sci. Technol. Educ., vol. 14, no. 2, pp. 691–697, 2018, https://doi.org/10.12973/ejmste/80632.5.

Walker, S. (2017). Research in Graphic Design. Design Journal, 20(5), 549–559. https://doi.org/10.1080/14606925.2017.1347416

THE EFFECT OF SCENARIO-BASED INTERACTIVE VIDEO LEARNING SYSTEM ON PRIMARY SCHOOL PRONUNCIATION OF ENGLISH

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ABSTRACT

This quasi-experimental research investigates the effect of a scenario-based interactive video learning system on English pronunciation among primary school students. The research involved 128 participants; it was conducted in two groups. Data was collected through questionnaires after the experiment and data was analyzed using SPSS. A pre-test and post-test design was employed to measure the effectiveness of the intervention. The research aims to contribute to the growing body of literature on technology-enhanced language learning, particularly in the context of young learners' pronunciation skills.

Keywords : Scenario-based; interactive; video; primary school; pronunciation of English.

INTRODUCTION AND BACKGROUND

English language proficiency has become increasingly important in today's globalized world, with pronunciation playing a crucial role in effective communication (Ngo et al., 2023). For student, especially for primary school students, developing proper pronunciation skills early on can significantly affect their overall language learning journey. Traditional methods of teaching pronunciation have shown limited success, prompting educators and researchers to explore innovative approaches.

In recent years, technology-enhanced language learning has gained well development, with interactive video systems emerging as a promising tool for language instruction (Shadiev & Yang, 2020). In previous studies, most of the language pronunciation learning is aimed at middle and high school students or adults, and very few have set up appropriate phonics learning techniques for primary school students (Kunnan et al., 2022).

One objectives of this research is the implementation of a scenario-based interactive video learning system designed to improve English pronunciation achievement among primary school students, to cover the gap which is stated by scholars. And to investigate the effect of SIVLS on the primary school students' pronunciation achievement score in English learning comparison to CVLS.

This research questions are to explore: Does a scenario-based interactive video learning system enhance primary school students' pronunciation of English? And is there any significant difference in the student's pronunciation achievement score between two different systems (SIVLS and CVLS)?

METHODOLOGY

Research Design:

The research employed a quantitative research technique due to its deductive nature, involving the collection of measures, application of analysis, and drawing of conclusions. One of its distinctive features is its capacity to systematically evaluate theories by creating hypotheses

and employing statistical analysis. The treatment lasted for a duration of four weeks. The independent variable was the use of the Scenario-based Interactive Video Learning System (SIVLS) and Conventional Video Learning System (CVLS), while the dependent variable was the students' English pronunciation skills (PSkill). This research employed a quasi-experimental design. It because quasi-experimental investigates cause and effect, so the effect is got in this research.

A total of 128 primary school students participated in the research. Participants were selected using simple random sampling to ensure a representative sample across different proficiency levels and demographic characteristics. Simple random sampling is a technique where every item in the population has an even chance and likelihood of being selected. G-power analysis was used to determine the appropriate sample size for detecting medium effect sizes with a power of 0.80 and an alpha level of 0.05. This software was utilized due to its utility in assisting researchers in finding the optimal sample size and doing power analysis. (Kang, 2021)

Data were analyzed using a two-way ANOVA to examine the main effects of the intervention and any interaction effects with student characteristics.

RESULTS

Descriptive Statistics:

Include tables with means and standard deviations for pre-test and post-test scores for both groups. Include additional analyses of specific pronunciation features or subgroups of students. Considering the multicollinearity problem, the variance inflation factor (VIF) of the two independent variables is 1.047, which is much lower than the commonly considered multicollinearity threshold (such as 10), so it can be considered that there is no serious collinearity problem between the independent variables. The F value of the whole model is 18.337, and the sig value is 0.000, which proves that the whole regression model is highly statistically significant, that is, at least one independent variable has a significant impact on pronunciation skill. An R-square value of 0.227 indicates that the model can explain 22.7% of the pronunciation skill variability, which exceeds the common benchmark value (such as 0.19), indicating that SIVLS has some predictive power.

CONCLUSION

The results of this research provide evidence for the effectiveness of scenario-based interactive video learning systems in improving English pronunciation skills among primary school students, compared to conventional video learning methods. The significant main effect of the intervention suggests that this interactive approach offers advantages over traditional video-based instruction.

The interaction effect between the type of video learning system and initial proficiency levels indicates that the interactive video system may be particularly beneficial for students who are struggling with pronunciation (Aboe et al., 2024).

As technology continues to advance, further research and development in this area could lead to even more effective and personalized approaches to pronunciation teaching. By leveraging the power of interactive video systems and scenario-based learning, educators can create more

engaging and effective language learning experiences for young learners, moving beyond the limitations of conventional video instruction.

REFERENCES

Aboe, R. M., Thalib, S. B., & Bundu, P. (2024). The role of interactive media in teaching pronunciation through communicative language teaching approach. *International Journal of Integrative Sciences*, *3*(7), 723–736. https://doi.org/10.55927/ijis.v3i7.10586

Kang, H. (2021). Sample size determination and power analysis using the G*Power software. *Journal of Educational Evaluation for Health Professions*, *18*(17), 17. https://doi.org/10.3352/jeehp.2021.18.17

Kunnan, A. J., Qin, C. Y., & Zhao, C. G. (2022). Developing a scenario-based english language assessment in an asian university. *Language Assessment Quarterly*, *19*(4), 368–393. https://doi.org/10.1080/15434303.2022.2073886

Ngo, T. T. N., Chen, H. H. J, & Lai, K. K. W. (2023). The effectiveness of automatic speech recognition in ESL/EFL pronunciation: A meta-analysis. *ReCALL*, *36*(1), 1–18. https://doi.org/10.1017/s0958344023000113

Shadiev, R., & Yang, M. (2020). Review of studies on technology-enhanced language learning and teaching. *Sustainability*, *12*(2), 524. https://doi.org/10.3390/su12020524

MAPPING THE MOST UTILIZED BLENDED LEARNING ENVIRONMENTS: A BIBLIOMETRIC REVIEW OF THE LAST FIVE YEARS OF RESEARCH

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INTRODUCTION
Blended learning, which combines traditional face-to-face instruction with online learning activities, has gained significant momentum globally. This bibliometric review analyzes the trends, contributions, and key themes in blended learning environments research over the past five years.

METHOD
Utilizing the PRISMA framework and VOSviewer software, this study examines the yearly distribution of publications, the impact of different nations, the contributions of educational institutions, and the influence of leading authors.

FINDINGS
The analysis reveals a dynamic research landscape, with a significant increase in publications during the COVID-19 pandemic, highlighting the necessity for blended learning models. The United States and China are identified as leading contributors, while institutions like Purdue University and Deakin University play pivotal roles in advancing the field. Prominent authors such as DeBoer J. and Jeffrey F. Rhoads have made substantial contributions to the research. Key research terms include "blended learning," "e-learning," and "distance learning," reflecting the comprehensive exploration of various aspects of blended learning environments.

CONCLUSION
The findings underscore the global engagement and diverse research interests in blended learning, providing a foundation for future studies to enhance educational outcomes.

ARTIFICIAL INTELLIGENCE IN THE ISLAMIC EDUCATION TO ENHANCE PERSONALIZED LEARNING: OPPORTUNITIES, CHALLENGES, AND FUTURE ASPIRATIONS

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INTRODUCTION

Artificial Intelligence (AI) has the capacity to significantly change education by improving tailored learning, offering numerous possibilities and difficulties, and setting the stage for future goals. AI-driven educational systems, like Artificial Intelligence in Education (AIEd), can provide immediate formative assessments, identify changes in learner confidence and motivation, and customize learning materials to meet individual needs, resulting in a more personalized learning experience. Integrating AI into Islamic education can enhance individualized learning by using intelligent learning systems that adapt to students' profiles and academic achievements, hence increasing engagement and improving learning results.

METHODS

The main aim of this research article is to carry out a Systematic Literature Review (SLR) that offers new perspectives on the use of Artificial Intelligence in Islamic Education to improve personalized learning. This analysis explores the potential, difficulties, and future goals within this field.

FINDINGS

The research revealed that incorporating AI into education has the capacity to revolutionize education systems and improve student learning, with individualized learning emerging as a notable benefit. AI-powered systems can analyze student data to customize lessons, assessments, and feedback based on individual learning preferences and requirements, enhancing engagement, motivation, and retention. Simultaneously, our inquiry emphasizes the need to tackle these problems as an essential step towards optimizing the advantages of AI in education while reducing any disadvantages.

CONCLUSION

Ensuring that AI tools make a constructive contribution to human progress and educational achievements is crucial. This work has presented new perspectives on the use of artificial intelligence in Islamic education, aiming to enhance tailored learning.

EMERGING TECHNOLOGIES AND FUTURE TRENDS IN HIGH SCHOOL LANGUAGE LEARNING: A PRELIMINARY STUDY

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ABSTRACT
The integration of emerging technologies in education is rapidly transforming traditional learning environments, particularly in the domain of language acquisition. This preliminary study investigates the potential impact and future trends of advanced technologies such as artificial intelligence (AI), augmented reality (AR), virtual reality (VR) and 3D holograms in high school English language learning. By exploring current implementations and projecting future advancements, this research aims to identify how these technologies can enhance language comprehension, engagement, and retention among students. The study employs a quantitative approach, utilizing questionnaires to gather data from educators and students on their experiences and perceptions of these technologies. Findings suggest that AI, AR, VR and 3D holographic technologies offer significant promise in creating immersive and interactive learning experiences that cater to diverse learning styles and needs. This research highlights the necessity for educational stakeholders to embrace these innovations, fostering a more inclusive and effective English language learning environment.

Keywords: Emerging technologies; future trends; high school; language learning.

INTRODUCTION AND BACKGROUND

The rapid advancement of technology has significantly influenced various aspects of individual's lifestyle (Cui et al., 2024), altering the way we communicate, work, and learn. Particularly in the language acquisition, the integration of emerging technologies such as augmented reality (AR) and virtual reality (VR) become a new way to revolutionize high school English language learning. AR and VR technologies have revolutionized the way educational content is delivered, making learning more immersive and interactive. In the context of language learning, these technologies can create virtual environments that simulate real-world scenarios, allowing students to practice language skills in authentic contexts. For example, a social robot was used with tablet for second language learning to increase performance and students' engagement among primary school children (Konijn et al., 2022). A study by Logothetis et al. (2021) illustrates using AR game to transforming class learning games with AR technology in learning language, improving students' language skill and engaging them in blending learning environment during the pandemic period. A study by Hein et al. (2021) have shown that immersive experiences, such as living in a country where the target language is spoken or participating in bilingual immersion programs, lead to higher levels of fluency. This gap has led to the exploration of emerging technologies that can offer more dynamic and engaging learning environments (Wekerle et al., 2022). The potential of emerging technologies to transform language learning is immense, yet their implementation in educational settings is still in its early stages and not widely in used (Shadiev et al., 2023). This preliminary study aims to explore the current use and future potential of AI, AR, VR, and 3D holographic technologies in high school English language learning. The insights gained from

this preliminary study, through a quantitative approach, this research seeks to gather insights from students regarding their experiences and perceptions of these technologies.

METHODOLOGY

This paper investigates emerging technologies such as AI, AR, VR, and hologram in high school language learning. A quantitative approach with a quasi-experimental design will be implemented for the research. SPSS software will be used to interpret output from the respondents. Data will be collected through online questionnaires administered via Google Forms. This online platform was chosen for its speed and convenience in reaching respondents (Sekaran & Bougie, 2016). One set of 20 questions was designed in 5-point Likert Scale was preliminary proposed to study about the emerging technologies and future trends in high school language learning. In details, there are two categories of questions: (1) Emerging technologies applied in English language learning, (2) Students' perceptions towards the technologies used in English–learning. In this study, a non-probability sampling technique was conducted to generalize findings the whole population due to it is useful for exploratory research and researcher's selection (Acharya et al., 2013). The population for this sample consists of age 13 students from public high school, the size of the class should be within range of 20 to 30, held in city area where it is accessible to complete infrastructure such as data and internet access. Purposive sampling was chosen regarding to several criteria: (1) The selected school is first batch of "Transformation School" that leading ahead in 21st century of teaching and learning. (2) It is also a "STEMEC School" which leading ahead with advance science and technology facilities, equipped with 3 computer labs and 5 hybrid classrooms in that school. (3) The size of each classroom is around 20 students which is suitable for group-pairing learning activities. Thus, researcher conducted the preliminary study to analyze the respondent's feedback from age 13 students in English language learning through online questionnaire.

FINDINGS

There are total of 20 respondents' response to online questionnaire that being distribute to school during 8th to 10th August 2024. There are 6 questions related to emerging technologies such as AI-powered tools, VR apps, AR apps, 3D holographic, mobile apps, and digital storytelling tools. There are 4 questions such as online collaboration tools, e-books, computers, and multimedia tools are non-emerging technologies. The results indicated that mobile apps or smart devices are the most used (60%) while AR apps are the least used (5%) in English language learning. Additionally, the results reported that multimedia tools (80%) and computers (75%) are highly in used among non-emerging technologies in English language learning. In this study, the results also reported most of the respondents perceived that AI-powered tools (60%) and mobile apps or smart devices (75%) are the best emerging technologies to motivate them in learning English. In addition, the results also reported most of the respondents perceived that computers (80%), multimedia tools (75%) and online collaboration tools (75%) motivate them in learning English although it is not emerging technologies.

CONCLUSION

In conclusion, incorporating advanced technologies like AI, AR, VR, and 3D holograms offers significant potential to revolutionize high school English language learning. This study underscores the potential of these emerging technologies to create immersive and interactive learning experiences that address diverse student needs and learning styles. While mobile apps and smart devices are currently the most utilized tools, the potential benefits of AR and VR highlight a need for broader adoption and teacher training. Future trends suggest a shift towards more personalized and engaging learning environments, driven by AI and AR technologies. As education continues to evolve, creating inclusive and effective language learning environments will rely on utilizing these advanced tools to boost student engagement and achievement.

REFERENCES

Annamalai, N., Uthayakumaran, A., & Zyoud, S. H. (2023). High school teachers' perception of AR and VR in English language teaching and learning activities: A developing country perspective. *Education and Information Technologies*, *28*(3), 3117-3143.

Azimova, D., & Solidjonov, D. (2023). Learning English Language As A Second Language

Barkhaya, N. M. M., Abd Halim, N. D., & Yahaya, N. (2018). Development of 3DPH:

HoloRead for preschool children's learning. In *2018 IEEE 10th International Conference on Engineering Education (ICEED)* (pp. 246-250). IEEE.

Huang, X., Zou, D., Cheng, G., Chen, X., & Xie, H. (2023). Trends, research issues and applications of artificial intelligence in language education. *Educational Technology & Society*, *26*(1), 112-131.

In *Learning and Collaboration Technologies: Games and Virtual Environments for Learning,* pp. 47–64; Springer International Publishing.

Konijn, E. A., Jansen, B., Mondaca Bustos, V., Hobbelink, V. L., & Preciado Vanegas, D. (2022). Social robots for (second) language learning in (migrant) primary school children. *International Journal of Social Robotics*, *14*(3), 827-843.

Logothetis, I.; Papadourakis, G.; Katsaris, I.; Katsios, K.; Vidakis, N. (2021). Transforming Classic Learning Games with the Use of AR: The Case of the Word Hangman Game.

Rajendran, T., & Yunus, M. M. (2021). A systematic literature review on the use of mobile-assisted language Learning (MALL) for enhancing speaking skills among ESL and EFL learners. *International Journal of Academic Research in Progressive Education and Development*, *10*(1), 586-609.

Shadiev, R., Wen, Y., Uosaki, N. (2023). Future language learning with emerging technologies. *J. Comput. Educ.* 10, 463–467.

Tai, T. Y., & Chen, H. H. J. (2024). Improving elementary EFL speaking skills with generative AI chatbots: Exploring individual and paired interactions. *Computers & Education*, 105112.

Wekerle, C., Daumiller, M., & Kollar, I. (2022). Using digital technology to promote higher education learning: The importance of different learning activities and their relations to learning outcomes. *Journal of Research on Technology in Education, 54*(1), 1-17.

With Augmented Reality. *Qo 'Qon Universiteti Xabarnomasi*, *1*, 112-115.

ENHANCING CREATIVE SELF-EFFICACY IN FILM ART DESIGN: A NEW COLLABORATIVE APPROACH TO UTILIZE ARTIFICIAL INTELLIGENCE-BASED SMART SKETCHPAD

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ABSTRACT

Students can't present the film scene images imagined by their minds through painting design, which will lead to students losing confidence in the course and producing fear in the film scene art design course. However, film art scene design is the most important pre-production stage of film production, and film scene design is a test of students' ability to transform their imagination into painting products. Currently, artificial intelligence in the field of art and design has become an important tool to improve the learning experience. This study proposes an AI-based generative intelligent sketchpad (AISS) application to assist in teaching film art design in a multimedia environment. The AI will recognize students' scene sketches and generate them into final scene design renderings. This study aims to investigate the impact of (AISS) on the creativity and self-efficacy of film art and design students in a multimedia environment. For this purpose, a quantitative research method was used. The study was evaluated on 30 university students over a 5-week period. Feedback from students indicated that the generative AI tool provided greater creative freedom and possibilities, easily transformed idea sketches into high-quality design drawings, stimulated their creative thinking, and increased their motivation to learn.

Keywords: Generative AI; multimedia teaching environment; Film Art; Self-efficacy.

BACKGROUND

Current AI technology is advancing at a rapid pace and has significantly impacted various sectors, including education (Schwab, 2017). One notable development is the integration of artificial intelligence (AI) into educational practices (Zhang, Shankar, & Antonidoss, 2022), aimed at enhancing teaching effectiveness and enriching the learning experience (Chen, Chen, & Lin, 2020). AI technology, with its growing presence in the field of art and design, offers students unprecedented creative freedom and opportunities.

RESEARCH FOCUS/OBJECTIVE

This study proposes an AI-based generative intelligent sketchpad (AISS) application to assist in teaching film art design in a multimedia environment. The AI will recognize students' scene sketches and generate them into final scene design renderings. In order to solve the problem that students have difficulty in presenting the movie design images they imagine in their minds through painting design.

Firstly, the main goal is to explore how AISS pedagogical tool approach can improve the creative self-efficacy of students in visual arts and film design courses. In this context, this study explores the impact of using Sketchpad multimedia teaching software on the creativity self-efficacy of art and design students. Secondly, by using the AISS artificial intelligence tool for collaborative learning, explore whether the tool can promote independent learning and enhance interactive and practical classroom experience. Finally, there are still limited quantitative studies on creativity self-efficacy, especially empirical studies on art and design

students. Therefore, this study aims to fill this gap and evaluate the effectiveness of Sketchpad multimedia teaching software in improving students' creativity self-efficacy.

METHODOLOGY

This study adopts a quantitative approach, including a theoretical literature review in the theoretical framework and a quasi-experimental approach. The research subjects included 30 undergraduate students in the film art and design course. The experimental group learned using the AI-driven Smart Drawing Board multimedia teaching software. Data collection consisted of assessing student performance through the Creativity Self-Efficacy Scale.

FINDINGS

The most immediate observation from the data is the significant improvement in the upper range of scores. The proportion of students achieving an A+ nearly tripled from 10% in the pre-test to 26.6% in the post-test. Similarly, the A- and B+ categories both saw an increase to 26.6% post-test, compared to 16.6% and 20%, respectively, in the pre-test.

Conversely, there was a marked reduction in the number of students scoring in the lower ranges (B-, C+, and C-). Notably, the B- category decreased from 20% to 6.6%, and the C+ category shrank from 16.6% to 3.3%. However, the C- category saw an increase from 16.6% to 20%, indicating that while some students improved significantly, a few others may have struggled despite the intervention.

However, the increase in the C- category raises some concerns. It suggests that a subset of students may have found the transition to AI-driven tools challenging or that they struggled to adapt to the new mode of learning. These students might require additional support, perhaps through personalized tutoring or alternative instructional strategies that better align with their learning preferences.

This study conducted pre- and post-tests on 30 art and design students, and the results showed that after using the Sketchpad multimedia teaching software, students' creativity self-efficacy generally improved. In particular, the proportion of students in the A+ (36-40 points) and A- (31-35 points) ranges increased from 10% and 16.6% in the pre-test to 26.6% and 26.6% respectively, indicating a significant increase in high-scoring students. In contrast, the proportions of students in the B- (21-25 points) and C+ (16-20 points) ranges decreased, which may mean that some students in the middle and lower ranges have improved their effectiveness after using the tool and have jumped to a higher effectiveness range.

CONCLUSION

The data suggests that the Sketchpad software had a generally positive impact on students' creativity self-efficacy, as evidenced by the increase in higher scores. This study investigates the effect of collaborative learning in the multimedia environment of an AI-based Smart Drawing Board on the enhancement of students' creativity and self-efficacy. The results of the study show that the multimedia interactive function and real-time feedback mechanism of the Smart Board significantly enhanced students' creativity self-efficacy in the field of film art and design. Through collaborative learning with AI, students were able to expand their thinking and develop richer design concepts inspired by each other. This collaborative learning model helped stimulate students' creative thinking and increased their self-efficacy in complex design tasks.

REFERENCES

Abdulwahed, M., & Nagy, Z. K. (2009). Applying Kolb's experiential learning cycle for laboratory education. Journal of Engineering Education, 98(3), 283-294.

Bandura, A. (1997). Self—eh'icacy: The exercise ofcontrol. In: New York: Freeman.

Cetinic, E., & She, J. (2022). Understanding and creating art with AI: Review and outlook. ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM), 18(2), 1-22.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. Ieee Access, 8, 75264-75278.

Chiang, C., Wells, P. K., & Xu, G. (2021). How does experiential learning encourage active learning in auditing education? Journal of Accounting Education, 54, 100713.

Chiu, M.-C., Hwang, G.-J., Hsia, L.-H., & Shyu, F.-M. (2022). Artificial intelligence-supported art education: A deep learning-based system for promoting university students' artwork appreciation and painting outcomes. Interactive Learning Environments, 1-19.

Davis, A. L. (2013). Using instructional design principles to develop effective information literacy instruction: The ADDIE model. College & Research Libraries News, 74(4), 205-207.

Deci, E. L., & Ryan, R. M. (2012). Motivation, personality, and development within embedded social contexts: An overview of self-determination theory. The Oxford handbook of human motivation, 18(6), 85-107.

Dixit, A. C., Harshavardhan, B., Ashok, B., Sriraj, M., & Prakasha, K. (2024). Innovative Pedagogical Approaches for Diverse Learning Styles and Student-Centric Learning. Journal of Engineering Education Transformations, 37.

Fischer, M., & Lam, M. (2016). Smart Sketchpad: Using Machine Learning to Provide Contextually Relevant Examples to Artists. Paper presented at the Hybrid Artificial Intelligent Systems: 11th International Conference, HAIS 2016, Seville, Spain, April 18-20, 2016, Proceedings 11.

Holmes, W., & Tuomi, I. (2022). State of the art and practice in AI in education.

DANCE MOBILE INTERACTIVE LEARNING SYSTEM: ENHANCING DANCE SKILLS OF UNIVERSITY STUDENTS

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INTRODUCTION

Many university students majoring in preschool education have not been exposed to dance skills training since they were young, and those with a weak foundation tend to have difficulties in remembering movements and physical incoordination when learning dance, all of which need to be overcome for a good level of dance skills.

METHODOLOGY

This study examines the problems and difficulties encountered by university students with learning dance skills. The most appropriate approach is to provide exercises efficiently to help university students to improve their memory dance movements associated with dance skills. To this end, we have designed Mobile Interactive Learning System, an app for university students, to help them through interactive exercises that address their unique needs.

FINDINGS

This study is an attempt in designing and evaluating the Mobile interactive Learning System that provides an interactive experience for university students to practice dancing and know the feedback results immediately.

CONCLUSION

This study was conducted in certain university in China, with 30 participants (aged 18-19) who were observed and evaluated for five weeks. Data was compiled through dance performance basics knowledge test and dance performance observation list. The results of a preliminary evaluation of “MILS” found that this application fulfilled its role in terms of optimizing learning dance skills among university students.

THE IMPACT OF LEADERSHIP STYLE ON TEACHERS' USE OF ICT: A SYSTEMATIC REVIEW

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INTRODUCTION

Leadership philosophies play a significant role in the integration of ICT into educational systems, which is essential for improving teaching and learning on a global scale. This systematic review examines the impact of various leadership styles on teachers' incorporation of ICT in educational environments. The findings seek to offer valuable insights to educational leaders in Oman, enabling them to improve educational outcomes in accordance with Oman Vision 2040.

METHODOLOGY

This study used the Prisma framework as the theoretical approach, Scopus database was used in this study; 1129 articles were included as the initial search, and after applying the filters, 333 articles were included in this analysis.

FINDINGS

The most significant result of this research is that different leadership styles have a profound and multifaceted impact on teachers' attitudes towards integrating ICT into their teaching practices.

CONCLUSION

It is important to analyze emerging leadership methods, such as dispersed and digital leadership. Conducting comparative research in various educational settings and cultures, together with emphasizing the importance of continuous professional development, will aid in identifying successful approaches to improving teachers' digital skills.

FRAMEWORK INTEGRATION AI IN ONLINE-PROJECT BASE LEARNING (PJBL): A CONCEPTUAL FRAMEWORK

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ABSTRACT

Online learning has been introduced as an alternative to the fully physical classes. The online platform has become transparent in connecting both learner and instructor, however there are several factors that arise. With the barrier and difficulties, learners are facing their motivation decreases would result in lack of participation in the class. This paper explores the integration of Artificial Intelligence (AI) in a Project-Based Learning (PjBL) within online education, proposing a comprehensive framework that addresses both teaching and cognitive presence. While PjBL is recognized for its innovative, student-centered approach, its implementation poses challenges, including the need for significant resources and the varying ability of students to engage in self-directed learning. To mitigate these challenges by providing real-time knowledge assistance, personalized support, and enhanced interactivity tailored to individual student needs. Drawing on the pedagogy of technology integration and the Design Thinking methodology, a conceptual framework was developed to outline the instructor role, student role and their shared role across the key phases of PjBL: empathy, definition, ideation, prototyping, and testing. AI tools facilitate the scaffolding of learning experiences, promote creativity through generative models, and ensure user-centered design by enabling rapid prototyping and iterative testing. The AI-driven approach not only streamlines the instructional design process but also empowers learners to engage more deeply with real-world problems, fostering both cognitive and practical skills. By bridging the gap between theoretical knowledge and practical application, this AI-integrated framework prepares students for future challenges, positioning them to succeed in a dynamic and increasingly AI-driven world.

Keyword: online learning; AI integration; sense of presence

INTRODUCTION

Online learning has been introduced as an alternative to the fully physical classes. In the process of adapting to the new behaviour of student normalities, the hybrid learning space provides flexibility in the class orientation. Online learning reduces many of the barriers associated with attending the campus for a face-to-face class. The accelerated growth of online learning due to the quarantine imposed on the population is making learner and instructor focus on antecedent and the consequences of its successful implementation. Online learning reduces many of the barriers associated with attending the campus for a face-to-face class. E-learning has numerous advantages like interactivity, personalised instruction, and independent learning (Carrillo & Flores, 2020) nevertheless, all instructors and learner are required to be in the online learning space.

With sudden changes of atmospheric in learning space, most instructors try to simulate the traditional classroom but in an online space. In this matter, all class processes remain the same except it is online. This approach has not been very effective and successful, resulting in distress, disengagement, and much less personal interaction and learning than traditional face-to-face situations (Amatriain, 2024; Darby, 2020). This paper sought to explore how students experience within this environment with reference to the sense of presence in an online learning space.

REVIEW OF THE LITERATURE

The sense of presence in an online class refers to the feeling of being present and connected to the class and the instructor. This sense can be influenced by various factors, current research shows that when there is a sense of presence in online learning, it can greatly enhance the instructor - learner relationship (Munro & Munro, 1991). In the application of an online space (Biocca et al., 2001) discuss the concept of presence as two interrelated phenomena: telepresence (the sense of "being there") and social presence (the sense of "being together with others," including people, animals, avatars, and so on). The sense of togetherness through the application of technology that was used in the visual of the online class were contributing factors in the concept of creating a sense of presence.

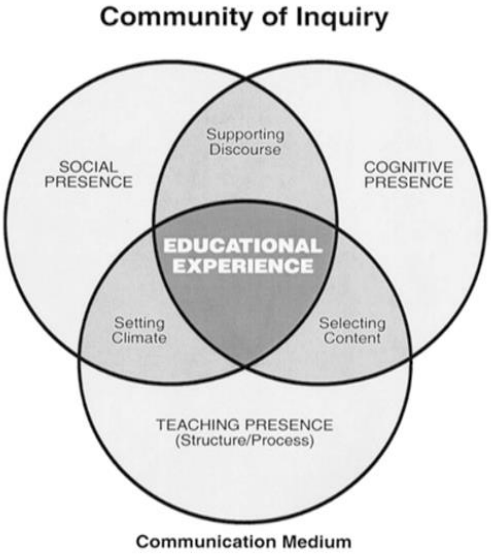

Figure 1: Community of Inquiry framework (Garrison et al., 2000)

The Community of Inquiry or acronym CoI are explained in the figure above. The three key elements or dimensions of the CoI framework are social, cognitive, and teaching presence.
It is at the convergence of these three mutually reinforcing elements that a collaborative constructivist educational experience is realized. The element is outlined below:

- Social presence creates the environment for trust, open communication, and group cohesion.
- Cognitive presence has been defined "as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community.
- Teaching presence is associated with the design, facilitation, and direction of a community of inquiry. This unifying force brings together the social and cognitive processes directed to personally meaningful and educationally worthwhile outcomes.

Recent study by Li (2022) suggests that teaching presence has a stronger relationship with cognitive presence than social presence. Students' online activity in the form of posts demonstrates that they are more intellectually engaged than socially active, implying that students are more focused on knowledge building rather than attempting to be linked in the

community. Garrison et al. (2011) mentions much attention needs to be focused on teaching presence setting up the condition of higher order of learning. Studies on teaching presence in e-learning have documented the vital role of teaching presence in facilitating students' participation and proved that interaction is the essence of a community of inquiry experience (Shea et al., 2006).

CONCEPTUAL FRAMEWORK

Integrating AI into online classrooms revolutionizes modern education by enhancing both teaching and learning experiences. The proposed framework seeks to harness AI's potential to create a dynamic, personalized, and efficient learning environment. By incorporating AI-driven tools, it will offer real-time knowledge assistance, personalized learning support, and immediate interaction tailored to each student's needs. AI can serve as a personal educational assistant for students, enabling instructors to provide targeted facilitation and resources, thus promoting a more inclusive and effective educational experience.

A design thinking framework from 'School of Design Thinking' of the Hasso-Plattner-Institute in Potsdam, Germany ("HPI D-School") (Plattner, 2015) were used as a setting for this framework. In this process, design thinking processes were analysed, and an AI integration process was identified in each phase.

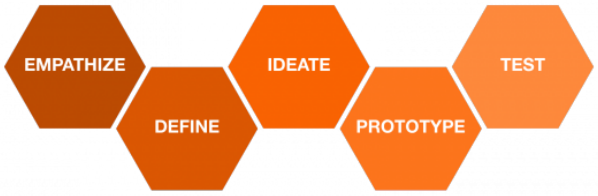

Figure 2: Design thinking process (Plattner, 2015)

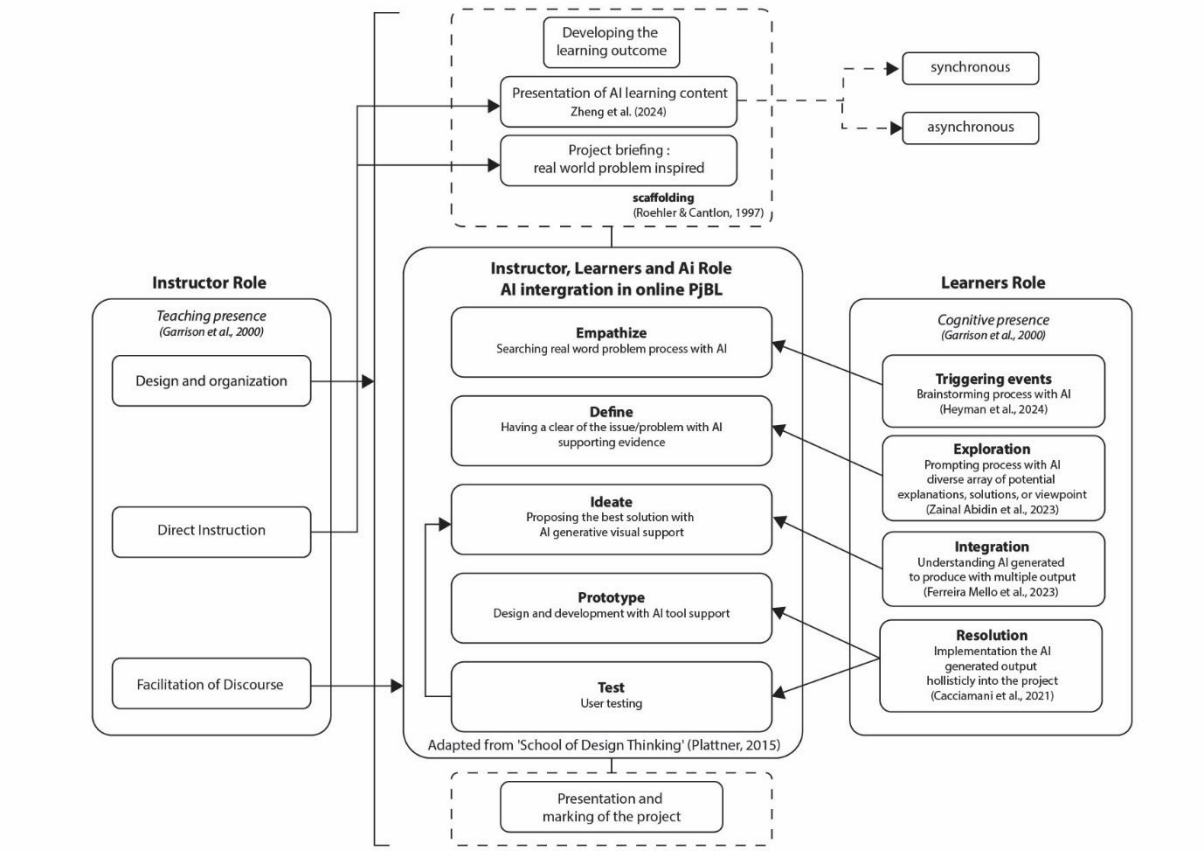

Figure 3: The integration of AI in online-PjBL conceptual frameworks

The first pillar of the framework is the developing design and organization. The entire class must be designed with the thought of AI to be integrated the learning process. The process must be scaffolded to the learners before the start of the framework (Roehler & Cantlon, 1997). The scaffolding component has three-sub, component which developing the learning outcomes, presentation of learning content with AI, project briefing – real world inspired problem. It notified by Zheng et al. (2021) that new learner unable to envision the AI application in their projects.

Empathize

To understand the real-world problems, the learners will have a brainstorming process with AI. A chain of question technique was applied in OpenAI's GPT4o systems has facilitated general access to inferencing models that rapidly produce large-scale human-quality text output from a small input (Amatriain, 2024). A variety of ideas will be able to generate to offer a wide-ranging selection of idea generation. Prior research suggests producing more ideas might lead to better creativity, therefore it is achievable that employing generative AI will assist people in generating more ideas, resulting in more creativity (Heyman et al., 2024).

Define

In the process to define the clear issue and problem, the learners going into an exploration stage of cognitive presence the learners begin to start to dive deeper into the problem or question that was presented in the triggering event. The aim is to produce a diverse array of potential

explanations, solutions, or viewpoints concerning the problem or question (Zainal Abidin et al., 2023). Learners gather pertinent information from a variety of sources, such as academic literature, online resources, and peer discussions (Renninger et al., 2019). In this case, the task is convergent with the application AI.

Ideate

In this integration phase of cognitive presence, learners combine the information and ideas they have explored, merging new knowledge with their existing understanding to create a coherent and comprehensive perspective (Cacciamani et al., 2021). Learners begin to connect distinct pieces of information gathered during the exploration phase. Learner's construct meaning through reflective and critical thinking. However, with generative AI, the outcome is generated, and it would be able to produce with multiple output (Ferreira Mello et al., 2023).

Prototype and User Testing

Within the cognitive presence, in this phase, the learners implemented the knowledge they've gained to solve problems, answer questions, or make decisions (Cacciamani et al., 2021). The emphasis is on practical application and showcasing the understanding built throughout the previous phases. This process involves employing critical thinking and problem-solving skills to develop solutions or make informed decisions (Walters-Williams, 2022). Learners confirm the effectiveness of their outcomes through feedback, testing, or further discussion. In confirming their effectiveness of solutions, it will find out that there is a right answer now, due to alterations feedback the solution that they were providing might need changes in the future.

CONCLUSION

The proposed framework, inspired by the principles of Design Thinking and technology integration pedagogy, highlights the multifaceted roles that AI can play in online Project-Based Learning (PjBL). AI's involvement in PjBL goes beyond simple automation, serving as a critical tool in establishing both teaching and cognitive presence within virtual learning environments. It helps guide learners through complex problem-solving tasks, offering real-time feedback and adaptive learning paths tailored to individual needs. Throughout the stages of Design Thinking AI enhances creativity, efficiency, and user-centered design by providing intelligent support during the ideation phase, AI can generate diverse ideas and solutions that learners might not have considered. In the prototyping and testing phases, AI tools can simulate scenarios and provide valuable data analytics to refine designs. This integration not only improves the efficiency of the learning process but also fosters deeper engagement and innovation among students. The framework ultimately positions AI as a transformative agent in PjBL, driving deeper learning outcomes and promoting an innovative mindset that by bridging the gap between theory and practice, AI becomes a cornerstone of modern, technology-enhanced education.

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REFERENCES

Amatriain, X. (2024). *Prompt design and engineering: introduction and advanced methods*. http://arxiv.org/abs/2401.14423

Biocca, F., Burgoon, J., Harms, C., & Stoner, M. (2001). Criteria and scope conditions for a theory and measure of social presence. *Presence 2001 : Fourth International Workshop*. https://www.academia.edu/14537225/Criteria_and_scope_conditions_for_a_theory_and_measure_of_social_presence

Cacciamani, S., Perrucci, V., & Fujita, N. (2021). Promoting students' collective cognitive responsibility through concurrent, embedded and transformative assessment in blended higher education courses. *Technology, Knowledge and Learning*, *26*(4), 1169–1194. https://doi.org/10.1007/s10758-021-09535-0

Carrillo, C., & Flores, M. A. (2020). COVID-19 and teacher education: a literature review of online teaching and learning practices. *European Journal of Teacher Education*, *43*(4), 466–487. https://doi.org/10.1080/02619768.2020.1821184

Darby, F. (2020). *Coronavirus Hits Campus 5 Low-Tech, Time-Saving Ways to Teach Online During Covid-19*. https://www.chronicle.com/article/5-Low-Tech-Time-Saving-Ways/248519?utm_source=at&utm_medium=en&utm_source=Iterable&utm_medium=ema

Ferreira Mello, R., Freitas, E., Pereira, F. D., Cabral, ; Luciano, Tedesco, P., & Ramalho, G. (2023). *Education in the age of Generative AI Context and Recent Developments*. https://arxiv.org/abs/2309.12332

Garrison, D. R., Anderson, T., & Archer, W. (2000). *Critical inquiry in a text-based environment: Computer conferencing in higher education*.

Garrison, D. R., Vaughan D. Norman, & Cleveland-Innes, M. (2011). E-Learning in the 21st century: A framework for research and practice, Second edition. In *E-Learning in the 21st Century: A Framework for Research and Practice, Second Edition*. Taylor and Francis. https://doi.org/10.4324/9780203838761

Heyman, J. L., Rick, S. R., Giacomelli, G., Wen, H., Laubacher, R., Taubenslag, N., Knicker, M., Jeddi, Y., Ragupathy, P., Curhan, J., & Malone, T. (2024). Supermind ideator: how scaffolding human-ai collaboration can increase creativity. *Proceedings of the ACM Collective Intelligence Conference*, 18–28. https://doi.org/10.1145/3643562.3672611

Li, F. (2022). "Are you there?": Teaching presence and interaction in large online literature classes. *Asian-Pacific Journal of Second and Foreign Language Education*, *7*(1). https://doi.org/10.1186/s40862-022-00180-3

Munro, P. J., & Munro, J. (1991). *Presence at a distance: the educator-learner relationship in distance education and dropout*.

Plattner, H. (2015). *An introduction to design thinking process guide*. https://web.stanford.edu/~mshanks/MichaelShanks/files/509554.pdf

Renninger, K. A., Bachrach, J. E., & Hidi, S. E. (2019). Triggering and maintaining interest in early phases of interest development. *Learning, Culture and Social Interaction*, *23*. https://doi.org/10.1016/j.lcsi.2018.11.007

Roehler, L. R., & Cantlon, D. J. (1997). Scaffolding: A powerful tool in social constructivist classrooms. In *Scaffolding student learning: Instructional approaches and issues.* (pp. 6–42). Brookline Books.

Shea, P., Sau Li, C., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *Internet and Higher Education*, *9*(3), 175–190. https://doi.org/10.1016/j.iheduc.2006.06.005

Walters-Williams, J. (2022). H-cup: Increasing higher order thinking skills levels through a framework based on cognitive apprenticeship, universal design and project based learning. *Creative Education*, *13*(09), 2878–2902. https://doi.org/10.4236/ce.2022.139181

Zainal Abidin, N. S., Muhamad Zamani, N. F., Mohd Kenali, S. F., Kamarulzaman, M. H., Soopar, A. A., & Rahmat, N. H. (2023). Exploring the relationship between teaching, cognitive presence and social presence in online learning. *International Journal of Academic Research in Business and Social Sciences*, *13*(5). https://doi.org/10.6007/ijarbss/v13-i5/16817

Zheng, J., Jia, W., Li, Z., Duan, C., Liu, G., Qi, X., Wang, L., & Cao, W. (2021). Application of Educational Decision based on Artificial Intelligence in Subject Construction. In *BCP Business & Management EMSD* (Vol. 2021).

POTENTIAL OF ANTHROPOMORPHIC GRAPHICS IN MULTIMEDIA LEARNING MATERIALS IN CAPTURING LEARNERS' ATTENTION.

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INTRODUCTION

This article explores the impact of using anthropomorphic graphics in multimedia learning materials on learners' attention allocation and learning outcomes. Anthropomorphic graphics refer to images that possess human-like characteristics, meaning they are described and conceived based on human traits (Salles et al., 2020). In the context of multimedia education, the integration of anthropomorphic graphics has been widely discussed as a means to enhance learners' attention and overall learning outcomes.

FINDINGS

This paper reviews multiple studies, summarizing the role of anthropomorphic graphics in attracting and maintaining students' attention, and whether this attention can improve learning outcomes. The authors hold that while the effect of anthropomorphic graphics on final learning outcomes is not yet clear, several studies indicate that they play a positive role in enhancing student attention, promoting deeper understanding, and facilitating knowledge transfer.

CONCLUSION

Anthropomorphic graphics play an important role in the process of information acquisition, comprehension, and memory, effectively boosting students' learning motivation and understanding of knowledge. Although their impact on final learning outcomes may not be significant, their potential to enhance learning effectiveness should not be overlooked.

THE ROLES OF INSTRUCTIONAL DESIGNERS IN ASSISTING TEACHERS THROUGHOUT THE EFFECTS OF GLOBAL RISKS ON ONLINE LEARNING

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ABSTRACT
This research investigates key issues surrounding online teaching and learning, informed by a comprehensive review of literature and empirical data. The COVID-19 pandemic of 2020 forced many educators to swiftly transition to online education, resulting in heightened stress and increased workloads as they adapted to this new teaching paradigm. A central issue is the limited experience and reluctance of many teachers to engage effectively with online instruction. Successful online learning requires instructors to integrate new technologies while also serving as content providers and motivators. Previous research highlights the need for educational institutions to prioritize training in online pedagogy and instructional design. However, further research is needed to assess the role of instructional designers in supporting educators during global crises. This study emphasizes the importance of instructional designers in overcoming challenges faced by teachers, advocating for a reevaluation of their role to better support educators in navigating global disruptions.

Keywords: Instructional designer; global risks; online learning.

INTRODUCTION AND BACKGROUND

When the World Health Organization (WHO) declared it a global pandemic on March 11, 2020, most educational institutions had to cancel their traditional face-to-face classes and turn to emergency online teaching within a short notice. This sudden shift to online learning brought many challenges to students, teachers, and other stakeholders connected to education because there are huge differences between well-planned online learning and crisis-response remote teaching (Adedoyin & Soykan, 2023). Many institutions were reluctant to accept online learning or intend to make preparations in case of emergency (Aboagye et al., 2020). This emergency shift has not only stressed many teachers out in coping with extra workload from the preparation for remote learning but also forced students to accept a new learning paradigm (Heng & Sol, 2021). The biggest issue is that most teachers have little experience or lack the readiness for online teaching (Chang & Fang, 2020). According to the World Economic Forum's global risks report 2024 (19th edition), the fastest-growing jobs are currently driven by technology, digitalization, and sustainability, and the education sector is likely to see massive job growth, with 3 million additional jobs created in vocational education teachers, university teachers, and higher education teachers (Coulson-Thomas, 2024). Instructional designers are trained experts in designing online courses with various learning technologies and teaching skills (Ritzhaupt et al., 2023). Instructional designers know what to do with low Internet bandwidth, one of the most common complaints, by using images of smaller pixel size or less video since they have been trained in various software used in ICT. In addition, they are also equipped with the knowledge of different assessment methods and pedagogy to meet the required learning outcomes (Weng & Chiu, 2023). Hence, the demand for instructional designers has been constantly on the rise. In context, it is essential that the roles of instructional

designers be explored and evaluated for their relevance in the face of a crisis, particularly in assisting teachers. Van Wart et al. (2020) describe that a good instructional design could motivate students to adopt online learning willingly. The issue that many teachers lack experience in online teaching or the ability to create technological pedagogical design within a short time frame can have a negative impact on students' success. To succeed in online teaching, instructors or teachers should embrace new teaching technology as a content provider. Therefore, it is crucial to emphasize the role of instructional designers in assisting teachers to learn the operation of related equipment and tools, as well as in promoting knowledge-sharing and skill development.

METHODOLOGY

The qualitative research approach was employed in this study to understand the responsibilities that instructional designers play in supporting teachers during the pandemic of online learning. One of the key reasons is that a qualitative approach is more ideal for focusing on in-depth experiences of how COVID-19 affects teachers, and this does not require a large group of participants. Eight lecturers from a university, selected through purposive sampling from a population of 1,200, were chosen to enhance the accuracy of the findings and minimize potential errors in line with the study's objectives. Key variables in this research include teachers' experience with online learning, proficiency with instructional technologies, workload, anxiety levels, and the support provided by instructional designers. These factors are explored in relation to one another, as they significantly influence the effectiveness of online teaching (Chung et al., 2020; Heng & Sol, 2021). Data collection is carried out through one-on-one interviews and focus group discussions. The individual interviews allow for a deep exploration of participants' personal experiences, while the focus group enables the investigation of shared attitudes and perspectives on the importance of instructional designers' roles and the impact of global trends on education. Interviews and discussions are conducted via Google Meet, facilitating real-time interaction and data collection. Data analysis will involve content analysis, thematic analysis, phenomenological analysis, and grounded theory methods to identify key patterns and insights.

FINDINGS

The findings highlight the important roles of instructional designers during COVID-19 in assisting teachers. Most of the issues faced by the teachers are linked to poorly planned online teaching courses due to the lack of knowledge and support from instructional designers. A qualitative online course needs to be carefully designed, tested, and evaluated on its effectiveness in virtual teaching in advance by instructional designers; otherwise, it can be a disaster if it is poorly prepared by teachers without knowledge of online learning (DeMillo & Harmon, 2020). Instructional designers are trained experts not only in finding the right e-learning technology tools and teaching materials but also in identifying the learning needs and the right pedagogy approach. Lastly, the findings also revealed and presented many challenges caused by COVID-19 to those without online teaching experience, which may heighten the need for teachers to go for retraining to develop online instructional teaching skills. To ensure the accuracy and comprehensiveness of the final findings, purposive sampling was used based

on different ages, genders, teaching experience, etc. Teachers could be easily grouped into different strata based on their characteristics, features, and behaviors. Purposive sampling is one of the most effective research tools that could help in identifying trends or detecting phenomena during the sudden shift to online learning during the post-pandemic era. Finally, eight teachers from various faculties were selected and interviewed at a Shandong university in China.

CONCLUSION

To conclude, this research explores the role of instructional designers in assisting teachers during the COVID-19 pandemic, aiming to highlight the challenges of emergency remote learning through the impact of the epidemic to boost the teachers' preparedness for inevitable global risks and ability to respond to emergencies in the field of educational technology, as well as to seek solutions to the problems. Although this study confirms and strengthens the questions, the requirement for instructional designers to assist teachers needs further research, as different situations require different strategies and should not be a "one size fits all" approach.

REFERENCES

Aboagye, E., Yawson, J. A., & Appiah, K. N. (2020). COVID-19 and E-Learning: the Challenges of Students in Tertiary Institutions. *Social Education Research*, *2*(1), 1–8. https://doi.org/10.37256/ser.212021422

Adedoyin, O. B., & Soykan, E. (2023). Covid-19 pandemic and online learning: the challenges and opportunities. *Interactive Learning Environments*, *31*(2), 863–875. https://doi.org/10.1080/10494820.2020.1813180

Chang, C. L., & Fang, M. (2020). E-Learning and Online Instructions of Higher Education during the 2019 Novel Coronavirus Diseases (COVID-19) Epidemic. *Journal of Physics: Conference Series*, *1574*(1). https://doi.org/10.1088/1742-6596/1574/1/012166

Chung, E., Subramaniam, G., & Dass, L. C. (2020). ERIC - EJ1267359 - Online Learning Readiness among University Students in Malaysia amidst COVID-19, Asian Journal of University Education, 2020-Jul. *Asian Journal of University Education (AJUE)*, *19*, 46–58. https://eric.ed.gov/?id=EJ1267359

Coulson-Thomas, C. (2024). AI, sustainability and the future of work. *Management Services*, *68*(1), 13–19. https://doi.org/10.1515/9789048538744-006

DeMillo, R., & Harmon, S. (2020). *Remote learning vs. online instruction: How COVID-19 woke America up to the difference*. Big Think.

Heng, K., & Sol, K. (2021). Online learning during COVID-19: Key challenges and suggestions to enhance effectiveness. *Cambodian Education Research Journal*, *1*(1), 1–20.

Ritzhaupt, A., Kumar, S., & Martin, F. (2023). The Competencies for Instructional Designers in Higher Education. *A Practitioner's Guide to Instructional Design in Higher Education*, 7–15. https://doi.org/10.59668/164.4268

Van Wart, M., Ni, A., Medina, P., Canelon, J., Kordrostami, M., Zhang, J., & Liu, Y. (2020). Integrating students' perspectives about online learning: a hierarchy of factors. *International Journal of Educational Technology in Higher Education*, *17*(1). https://doi.org/10.1186/s41239-020-00229-8

Weng, X., & Chiu, T. K. F. (2023). Instructional design and learning outcomes of intelligent computer assisted language learning: Systematic review in the field. *Computers and Education: Artificial Intelligence*, *4*(December 2022), 100117.

https://doi.org/10.1016/j.caeai.2022.100117

BRIDGING THE DIVIDE: A REVIEW OF GENDER DISPARITIES IN TEACHING AND LEARNING CODING IN PRIMARY SCHOOLS

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ABSTRACT
The extended abstract critically reviews the ongoing gendered inequalities in the teaching of coding in primary schools. While there is an increase in the inclusion of coding within early years' education, a gap is already evident in how boys and girls approach such subjects. The literature identifies curriculum design, pedagogical approaches, and societal factors as contributory to the gap. Yet, even as boys develop higher self-efficacy in coding tasks, the actual performance difference by gender remains marginal, so that the problem is more a matter of perception than ability. The following abstract synthesizes findings from several studies that were place on how such disparities could be addressed through the use of more inclusive and gender-sensitive teaching methods, such as educational robotics and interactive programming, and also how societal norms and stereotypes influence girls' engagement in coding. Following this, recommendations are made to educators and policymakers based on how to design equitable coding curricula that allow both girls and boys to excel in this important field.

Keywords: gender disparity; coding education; primary schools; gender-sensitive curriculum; STEM.

INTRODUCTION AND BACKGROUND

In any case, coding is taken to be the new literacy of the 21st century and therefore finds its way increasingly into primary schooling, as it plays an extremely important role in developing computational thinking, problem-solving, and creative skills. Since early exposure to coding provides foundational skills that are very crucial for later STEM careers, it would be important if it was started during primary school years. For instance, early coding programs such as ScratchJr have shown that even young school-going children are capable of developing their computational capabilities through well-structured learning processes. In this regard, Yang and Bers (2023) provided motivation in this respect. Similar domains also represent the realms of gender disparity, where boys consider themselves more confident and eager to learn programming compared to their female classmates (Montuori et al., 2022). This may be attributed to factors such as the nature of the design of the curricula for coding, stereotypical views within society, and gender biases in academia. For example, most coding kits and activities are themed to appeal more toward boys, with things like coding robots and doing challenges in teams, thereby excluding girls during such vacations. This review investigates such aspects in detail, including interventions to cater for the gender gap within coding education.

METHODOLOGY

An SLR approach was adapted to investigate issues of gender disparities in primary school-level coding education. Searches were conducted in the Scopus and Web of Science database using keywords such as "teaching and learning coding," "primary school students," and "gender" (Milutinovic, 2024). It targeted peer-reviewed journal papers between 1999 and 2024. A total number of thirty-eight reports were identified, although after including only relevant

ones and excluding book chapters and non-English studies, six articles were finally selected for review in this paper. The analyses have been done on the selected articles regarding key themes on curriculum design, teaching methods, and societal influences on gender disparities in coding. The SLR used a mixed-methods approach, combining analyses of quantitative, qualitative, and mixed-method studies to provide an all-rounded understanding of the issue. Of these, selected articles were reviewed for extracting data on students' participation in coding activities, their self-efficacy, and the impacts that come with using gender-sensitive teaching strategies. These themes, regarding curriculum bias, instructional methods, and cultural factors, were then synthesized to conclude the underlying causes of gender disparities in the education of coding.

FINDINGS

The review highlighted three key issues that arise in the development of curricula: pedagogical methods and sociocultural factors that contribute to gender differences in the learning of coding skills. Traditional coding programs are often designed around themes known to engage boys, such as robots and competition-style activities, which have the effect of turning girls off because girls are generally more interested in collaborative and creative work. Works such as El-Hamamsy et al. (2023), and Montuori et al. (2022) point out that gender neutrality and diversity at the level of themes are relevant for girls' participation.

Pedagogical approaches also make a great difference: with hands-on interactive approaches in educational robotics and unplugged activities, coding really generates higher interest among girls. The latter are, according to Sigayret et al. (2022), overall effective, but the unplugged approaches have a tendency to be more effective in increasing girls' confidence in their coding abilities compared to plugged-in approaches. The last yet discouraging factor for the girls is stereotyping-related factors, including those that are related to the view that coding is a male domain. These stereotypes, as emphasized by Xu and Yu (2023), were encouraged by mass media, family dynamics, and even teachers themselves at times. Stereotype challenging, as Yang and Bers suggested, can be done through early interventions by pointing out that girls, while exposed to coding in nurturing environments, show increased interest and participation, hence a need for inclusive learning spaces where girls feel equally capable of and motivated toward coding.

CONCLUSION

These findings from this review have teased out a complex multidimensionality of the gender disparities in the education of coding, which societal, cultural, and educational factors widen the gap in participation and self-efficacy between girls and boys despite their coding ability not showing significant differences. The following recommendations are important in addressing the disparities: design of the curriculum that will clearly include gender-neutral and contextually relevant themes that will make coding more interesting for them; move away from male-centric topics and foster creativity and collaboration. A mix of plugged-in and unplugged teaching approaches shall also help in creating an inclusive environment for learning. Unplugged activities are good at demystifying coding, and hands-on collaboration has proved

particularly effective among girls. Educators and policymakers must also take pains to challenge, through active means, the societal stereotypes that equate coding with masculinity: using gender-sensitive teaching methodologies, introducing positive female role models in STEM, and encouraging inclusive classrooms where girls are also called upon to participate on equal terms. In the process, any or all of these strategies would become imperative in establishing an equitable system of coding education in which both boys and girls can thrive. Longer-term longitudinal studies than those conducted to date might establish how well these interventions pay off in the longer run and explore new ways for gender equity in science, technology, engineering, and mathematics education.

REFERENCE

Åkerfeldt, A., Kjällander, S., Mannila, L., & Heintz, F. (2022). Exploring programming didactics in primary school from a gender perspective. *Frontiers in Education*. https://doi.org/10.1109/FIE56618.2022.9962386

Ben-Ari, A., Levinson, T. G., Umaschi Bers, M., Rinat B., & Rosenberg-Kima, M. (2022). Coding as a self-expression tool. *ACM Computing Surveys*, 54(5). https://doi.org/10.1145/3545947.3573244

Chiang, F.-K., Tang, Z., Zhu, D., & Bao, X. (2023). Gender disparity in STEM education: A survey research on girl participants in the World Robot Olympiad. *International Journal of Technology and Design Education*. https://doi.org/10.1007/s10798-023-09830-0

Cruickshank, V. J., Scott, J., Pedersen, S., Cooley, D., & Hill, A. (2020). How do male primary teachers negotiate expectations to perform gendered roles in their schools? *Australian Educational Researcher*, 47(1), 15-35. https://doi.org/10.1007/s13384-019-00337-z

Dağ, F., Şumuer, E., & Durdu, L. (2023). The effect of unplugged coding on computational thinking skills in primary school students. *Journal of Computer Assisted Learning*. https://doi.org/10.1111/jcal.12850

El-Hamamsy, L., Bruno, B., Audrin, C., Chevalier, M., Avry, S., Dehler Zufferey, J., & Mondada, F. (2023). How are primary school computer science curricular reforms contributing to equity? Impact on student learning, perception of the discipline, and gender gaps. *arXiv*. https://arxiv.org/abs/2306.00820

Geerdink, G., Bergen, T. C. M., & Dekkers, H. (2011). Diversity in primary teacher education: Gender differences in student factors and curriculum perception. *Teachers and Teaching*, 17(5), 575-592. https://doi.org/10.1080/13540602.2011.602211

Kang, D.-H., Stough, L. M., Yoon, M., Yoon, J., & Liew, J. (2023). The association between teacher-student relationships and school engagement: An investigation of gender differences. *Educational Psychology*, 43(5), 531-547. https://doi.org/10.1080/01443410.2023.2225816

McGeown, S., & Warhurst, A. (2020). Sex differences in education: Exploring children's gender identity. *Educational Psychology*, 40(4), 478-493. https://doi.org/10.1080/01443410.2019.1640349

Milutinovic, V. (2024). Unlocking the code: Exploring predictors of future interest in learning computer programming among primary school boys and girls. *International Journal of Human-Computer Interaction*. https://doi.org/10.1080/10447318.2024.2331877

Montuori, C., Ronconi, L., Vardanega, T., & Arfé, B. (2022). Exploring gender differences in coding at the beginning of primary school. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2022.887280

Murphy-Hill, E., Dicker, J., Horvath, A., Morrow, M. H., Egelman, C. D., Weingart, L. R., & Yu-Hsuan, C. N. (2023). Systemic gender inequities in who reviews code. *Proceedings of the ACM on Human-Computer Interaction*, 7(CSCW2), Article 138. https://doi.org/10.1145/3579527

Ojeda-Ramirez, S., Parker, M. C., Garcia, L. P., Tate, T. P., Villa, J. R., & Warschauer, M. (2022). Computational thinking and attitudes towards computing: An emerging relationship in elementary students. *Proceedings of the ACM*, 54(6). https://doi.org/10.1145/3545947.3576256

Price-Mohr, R., & Price, C. (2017). Gender differences in early reading strategies: A comparison Of synthetic phonics only with a mixed approach to teaching reading to 4–5-year-old children. *Early Childhood Education Journal*, 45(4), 581-590. https://doi.org/10.1007/s10643-016-0813-y

Read, B. (2008). 'The world must stop when I'm talking': Gender and power relations in primary teachers' classroom talk. *British Journal of Sociology of Education*, 29(5), 537-548. https://doi.org/10.1080/01425690802423288

Sigayret, K., Tricot, A., & Blanc, N. (2022). Unplugged or plugged-in programming learning: A comparative experimental study. *Computers & Education*, 104505. https://doi.org/10.1016/j.compedu.2022.104505

Skelton, C., Carrington, B., Francis, B., Hutchings, M., Read, B., & Hall, I. (2009). Gender 'matters' in the primary classroom: Pupils' and teachers' perspectives. *British Educational Research Journal*, 35(2), 187-204. https://doi.org/10.1080/01411920802041905

Torres-Torres, Y.-D., Roman-Gonzalez, M., & Perez-Gonzalez, J.-C. (2020). Unplugged teaching activities to promote computational thinking skills in primary and adults from a gender perspective. *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, 15(4), 208-217. https://doi.org/10.1109/RITA.2020.3008338

Varoy, E., Luxton-Reilly, A., Lee, K., & Giacaman, N. (2023). Understanding the gender gap in digital technologies education. *Proceedings of the ACM on Human-Computer Interaction*, 7(1), Article 179. https://doi.org/10.1145/3576123.3576131

Xu, T., & Yu, J. (2023). Examining gender-oriented design features in computational toys and kits for young children. *Proceedings of the ACM on Human-Computer Interaction*, 7(CSCW2), Article 138. https://doi.org/10.1145/3544548.3581035

Yang, Z., & Bers, M. U. (2023). Examining gender differences in the use of ScratchJr in a programming curriculum for first graders. *Computer Science Education*. https://doi.org/10.1080/08993408.2023.2224135

Zhang, S., & Wong, G. K. W. (2023). Exploring the underlying cognitive process of computational thinking in primary education. *Thinking Skills and Creativity*. https://doi.org/10.1016/j.tsc.2023.101314

TRENDS, ADVANTAGES, AND CHALLENGES: A SYSTEMATIC LITERATURE REVIEW OF ARTIFICIAL INTELLIGENCE IN DESIGN EDUCATION

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ABSTRACT
Artificial intelligence (AI) is reshaping modern education, and design education is no exception. Although there have been several reviews on AI in education, there are limited systematic literature reviews and analyses of AI in the field of design education. In order to facilitate the effective integration of AI in design education, this study reviews the current state of AI in design education. The study aims to identify the advantages and challenges of using AI in design education and to explore the potential opportunities that AI can bring to the future of design education. The review analyzed 37 studies on using AI in design education from 2019 to 2024. The findings indicated that the use of AI in design education is rapidly shifting from general AI to generative AI. In particular, image generation has become the most preferred AI technology among scholars. In addition, the integration of AI into design education can enhance the design process for students and increase their efficiency. Students could benefit from personalized design learning experiences and strengthen their comprehension and communication. Despite the significant advantages of using AI in design education, there are some challenges, such as ethical and legal issues, response errors and biases, pedagogical challenges, and technological anxiety and overreliance. This study emphasizes that the integration of AI in design education should be supplementary, aiming at enhancing rather than replacing traditional design teaching methods.

Keywords: Artificial Intelligence; AI; Design education; Systematic literature review.

INTRODUCTION

Artificial intelligence (AI) is reshaping modern education, and design education is no exception. A number of review studies that offer insights into the general AI in the education research field (Chen et al., 2024; Crompton & Burke, 2023; Wang et al., 2024; Zhai et al., 2021), as well as specific topics such as AI chatbots (Labadze et al., 2023), AI collaborative design tools (Hughes et al., 2021), and physical education (Zhou et al., 2023). However, there are still specific areas that have yet to be explored to understand the specific educational applications of AI, such as design education. In this area, there are limited systematic literature reviews (SLR) on AI. In order to facilitate the effective integration of AI into design education frameworks, this study reviews the existing research articles to understand the temporal distribution, technological applications, research contexts, and research topics related to the use of AI in design education. The study aims to identify the advantages and challenges of using AI in design education and thereby provide valuable insights into the academic discourse and professional practice of students, educators, and industry experts. By examining the existing literature, this study seeks to explore the potential opportunities that AI can bring to the future of design education.

METHODOLOGY

This study employed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis

(PRISMA) as a guide to search, identify and select articles (Page et al., 2021). The search was conducted in three databases: Scopus, Springer, and Web of Science, between 2 July 2024 and 10 July 2024. The boolean search terms included ("Artificial intelligence" OR "AI" OR "Midjourney" OR "DALL-E" OR "Stable Diffusion" OR "ChatGPT") AND ("Design education" OR "Design teaching" OR "Design learning"). Inclusion criteria limited the search to original, peer-reviewed research from the past five years in English, focusing on AI in design education at the higher education level. The review excluded conference papers, book chapters, editorials, letters, reviews, newspapers and articles in languages other than English. From the initial 2,416 articles, 37 articles were included in the final analysis after screening for relevance. Two researchers thoroughly checked the included articles to ensure coding consistency and reliability. Data extraction involved categorization and analysis by two researchers to ensure coding consistency. Initially, the researchers categorized and coded each article for research trends, technological applications, research contexts, and research topics. Subsequently, thematic analysis was selected to code the potential advantages and challenges of AI in design education in this study.

FINDINGS

First, the findings indicate that AI in design education is undergoing a rapid shift from general AI to generative AI. Second, the review observed a lack of attention to specific design majors such as animation design, fashion design, and visual communication design. Additionally, non-design disciplines were found to be underrepresented, potentially due to the challenges researchers face in interdisciplinary explorations between design and non-design fields. Third, the research topics show that researchers pay a lot of attention to enhancing students' design processes. Lastly, the review revealed a scarcity of studies focusing on image-to-image or text-to-text. Importantly, this study found that students and educators greatly benefit from AI-enhanced creation processes. The integration of AI in design education has the potential to revolutionize students' design learning paradigms. Depending on the design preferences, learning styles, and creative needs of different students, AI can output customized visual content and creative support (Gong, 2021). This personalized approach can stimulate students' creativity and assist them in rapidly iterating design concepts (Brown et al., 2024). Ultimately, this not only enhances student engagement but also strengthens their problem-solving abilities, which improves their design performance. Despite the advantages of using AI in design education, several challenges have been identified. The ethical and legal issues of AI in design education, such as copyright of work and academic integrity, have attracted strong attention from scholars. In addition, the content of AI responses may be inaccurate or biased. To reduce these biases, future AI applications should train datasets for specific cultures or design projects and improve the accuracy and transparency of their algorithms. Moreover, educators and policymakers need to timely and continually update curriculum content, as well as upgrade the technological infrastructure to accommodate software and hardware support for AI design tools. Meanwhile, the importance of training programs for both teachers and students cannot be overlooked. Furthermore, teachers should help students avoid over-reliance and anxiety about technology, as well as address issues such as homogenization of design content and communication barriers.

CONCLUSION

This study systematically reviews the current state of AI in design education and identify its advantages and challenges. The findings indicated that the use of AI in design education is rapidly shifting from general AI to generative AI. In particular, image generation has become the most preferred AI technology among scholars. The primary research topics of AI in design education encompass (1) design thinking and processes; (2) pedagogical strategies; (3) perspectives and implications; and (4) design evaluation. Within the research context, general design majors received considerable attention, whereas specific design majors such as animation design, fashion design, and visual communication design were less frequently studied. Additionally, non-design majors were rarely mentioned. The integration of AI into design education can enhance the design process for students and increase their efficiency. Students could benefit from personalized design learning experiences and strengthen their comprehension and communication. Despite the advantages of using AI in design education, several challenges have been identified. Ethical and legal issues are particularly prominent, including concerns related to intellectual property rights and academic integrity. In addition, the potential for response errors and biases in AI, as well as pedagogical challenges, should not be overlooked. Furthermore, technological anxiety and overreliance on AI are significant issues, with concerns about uncontrollability and potential misuse. This study emphasizes that the use of AI in design education should be supplementary, aiming at enhancing rather than replacing traditional design teaching methods. Educators and policymakers need to timely and continually update curriculum content, as well as upgrade the technological infrastructure to accommodate software and hardware support for design tools. Meanwhile, the importance of training programs for both teachers and students cannot be overlooked to support students' design learning in emerging technologies.

REFERENCES

Brown, A., Goldstein, M. H., Clay, J., Demirel, H. O., Li, X., & Sha, Z. (2024). A Study on Generative Design Reasoning and Students' Divergent and Convergent Thinking. *Journal of Mechanical Design, 146*(3). https://doi.org/10.1115/1.4064564

Chen, X., Hu, Z., & Wang, C. (2024). Empowering education development through AIGC: A systematic literature review. *Education and Information Technologies,* 1–53. https://doi.org/10.1007/s10639-024-12549-7

Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education*, *20*(1), 22. https://doi.org/10.1186/s41239-023-00392-8

Gong, Y. (2021). Application of virtual reality teaching method and artificial intelligence technology in digital media art creation. *Ecological Informatics, 63.* https://doi.org/10.1016/j.ecoinf.2021.101304

Hughes, R. T., Zhu, L., & Bednarz, T. (2021). Generative Adversarial Networks–Enabled Human–Artificial Intelligence Collaborative Applications for Creative and Design Industries: A Systematic Review of Current Approaches and Trends. *Frontiers in Artificial Intelligence*, *4*, 604234. https://doi.org/10.3389/frai.2021.604234

Labadze, L., Grigolia, M., & Machaidze, L. (2023). Role of AI chatbots in education: Systematic literature review. *International Journal of Educational Technology in Higher Education*, *20*(1), 56. https://doi.org/10.1186/s41239-023-00426-1

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*, *372*. https://doi.org/10.1136/bmj.n71

Wang, S., Wang, F., Zhu, Z., Wang, J., Tran, T., & Du, Z. (2024). Artificial intelligence in education: A systematic literature review. *Expert Systems with Applications*, *252*, 124167. https://doi.org/10.1016/j.eswa.2024.124167

Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., Liu, J.-B., Yuan, J., & Li, Y. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020. *Complexity*, *2021*(1), 8812542. https://doi.org/10.1155/2021/8812542

Zhou, T., Wu, X., Wang, Y., Wang, Y., & Zhang, S. (2023). Application of artificial intelligence in physical education: A systematic review. *Education and Information Technologies*, *29*(7), Article 7. https://doi.org/10.1007/s10639-023-12128-2

PROPOSAL FOR NEW MEDIA INSTALLATION ART LEARNING SYSTEM (NMIA) DESIGNING FOR CONTEMPORARY ART EDUCATION AMONGST TERTIARY STUDENTS IN CHINA

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ABSTRACT
The proposed research aims to design and develop a New Media Installation Art Learning System (NMIA) to enhance the teaching and learning of contemporary art in Chinese universities. The study addresses the increasing integration of new media technologies into various cultural and artistic domains, particularly in the realm of contemporary art, which has seen a significant shift from traditional forms to more immersive and technologically advanced mediums. New media art, characterized by the use of digital and emerging technologies, provides novel ways to engage students and audiences alike, transforming static learning experiences into dynamic, interactive encounters.

Keywords: New Media Installation Art; Contemporary Art Education; Immersive Interactive Learning

BACKGROUND OF THE STUDY

At the turn of the 20th century and the 21st century, various emerging technologies have gradually penetrated into all aspects of culture and art, adding new opportunities and experiences for artistic creation. New media, as the fourth media, has evolved into the leading role in the new century. New media art is a comprehensive term comprises artworks that are designed, produced, and transmitted by means of the digital technologies or make full use of the latest scientific and emerging technologies. Among the examples of such art are computer graphics , 2D and 3D computer animation, digital sound art, digital art, digital imaging, virtual reality, interactive art, Internet art, virtual art, video games, robotics, 3D printing, and cyborg art (Grau, 2016). In contrast to conventional visual art such as installation art, body art, earth art, and modern art, new media art is a new art discipline of which in broad sense, it copies traditional artworks using digital technologies. In a narrow sense, it refers to artworks created in the digital media environment (Ouali, Kerhervé, Lando·n, 2002; Spalter, 2020).

PROBLEM STATEMENT

One major problem in learning contemporary art nowadays is the difficulty of obtaining one new media learning system that is truly adapted to human's cognitive abilities. Most of the new media learning system nowadays are still overwhelmed by large amounts of contents that exceed the learners capacities (Barnes, 2010) . Another apparent problem visible in learning institutions is the absence of physical materials that properly fit into contemporary art learning environment (Parton & Hancock, 2008). The third problem is that in the world of art, contemporary art is a relatively new art form, and new media art is a common art form in contemporary art, which involves video, sound, computer technology .

RESEARCH OBJECTIVES

RO 1: Explore the design and development of a New Media Installation Art Learning System

(NMIA) in the context of contemporary art in China.

RO 2: Explore the correlation between NMIA and contemporary art learning.

RO3: Explore the interactive relationship between students and the new media installation art learning system.

RO4: Explore the application and development prospect of new media installation art in Chinese universities.

RESEARCH QUESTIONS

RQ 1: How is the New Media Installation Art Learning System (NMIA) applied and developed?

RQ 2: How to apply and promote the new media Installation Art learning system in Chinese universities?

RQ3: How to connect the new media art learning system to the actual work?

RQ4: What is the position and role of students in the learning system of new media installation art?

PROPOSED SYSTEM: NMIA

New Media Installation Art Learning System (NMIA) proposed in this proposal is rooted in contemporary art. There exists general new media installation art in the art industry. For this general new media installation art, the researcher considers it as a kind of "fuzzy art", which contains a nature of broad and fuzzy boundary of art. Due to this nature, general new media installation art is manifested in many types of forms, such as image installation art, mechanical installation art, video installation art, sound installation art, network installation art, interactive installation art, new material installation art, immersive virtual reality installation art, and biological mechanical installation. (Hua, M. 2021)Among them, the interactive installation art is an art category with great potential in new media installation art. In this respect, the researcher adopts and adapts this interactive installation art category as core idea for developing a new genre of system termed as New Media Installation Art Learning System (NMIA). NMIA signifies cross-development of new media and installation art, and the unification of art and technology. The cognitive level of the learners potentially reduced by using NMIA. The potential of NMIA is great because it not only extends the art form to learning in the infinite extension of immersive space, which contains time dimension that allows the learners to kindle a new perception experience, but also incorporate the reality of diversity and intense sensory overlay experience (Mengbing, 2020).

METHODOLOGY

This study aims at the College of Fine Arts in a university in Shandong province that have a total of 2,200 students. They are freshmen to seniors in the College of Fine Arts. Stratified sampling method will be conducted for different grades and majors. About 200 students with student ID numbers ending in 0, 2, 4, 6 and 8 will be selected as respondents for this research. This study will deploy two different research methods, namely qualitative and quantitative methods for collecting data. The combination of the two research methods is equivalent to a mixed research method. Quantitative research is mainly based on descriptive and inferential

statistics, and two sets of questionnaires will be deployed to collect data from the respondents sampled. The QR code will be firstly generated by the APP Wenxianxing for respondents to scan the code for the questionnaire. Then, a questionnaire will be displayed in the form of an online questionnaire. Data on experimental samples will be obtained directly from the respondents. The primary data acquisition channels include semi-structured interviews and questionnaires.

DATA ANALYSIS

The researcher will ensure the reliability of the data by conducting data cleaning, data sorting, filter out incomplete, missing, and repeated data. In the data cleaning steps, outliers, blank values, invalid values and duplicate values from the collected data will be excluded. After data cleaning, data sorting will be implemented, which will be completed by Excel according to grade, major. The software expected to be used in the quantitative study includes Excel2021 and SPSS2.

SIGNIFICANCE OF RESEARCH

Through the research, the public can have an in-depth understanding of the idea of a "new media installation artwork learning system", and understand how the artist uses new media technology to create. All these will provide a creative method for future work practice. Through this research, the public will be able to understand the status quo of new media installation art learning system in Chinese contemporary art as well.

CONCLUSION

From the ontological perspective of new media installation art, installation, enviro art. The environment not only refers to the physical space environment of the installation, but also includes the interactive behavioural environment, and also includes the psychological environment of the artist and the audience conveyed by the installation work, so as to obtain the expected effect. The creation of a prototype of New Media Installation Art System (NMIA) will offer rich expressions for learning Chinese contemporary art. It is expected that it will make use of immersive environment capable of enhancing cognition, imagination of artists through different perspectives.

REFERENCES

Barnes, S. K. (2010). Using Computer-Based Testing with Young Children. PhD. dissertation. The Graduate Faculty, James Madison University.

Deliyannis, I., & Kaimara, P. (2019). Developing smart learning environments using gamification techniques and video game technologies. In Didactics of smart pedagogy (pp. 285-307). Springer, Cham.

Dyson, F. (2009). Sounding New Media. In Sounding New Media. University of California Press.

Hosford, R. (2010). Screens: Viewing Media Installation Art/Rethinking Curating: Art After New Media. Afterimage, 38(3), 33.

Hua, M. (2021). Borderlessness: teamLab, Immersive Experience, and New Media Installation Art.

Lou, Y. (2022, December). Research on Space-time Construction and Perceptual Experience

of New Media Art Installation. In Proceedings of the International Conference on Art Design and Digital Technology, ADDT 2022, 16-18 September 2022, Nanjing, China.

Ma Xiaoxiang. (2013). New Media Installation Art, Nanjing Publishing House. [23]Millner, J., & Moore, C. (2021). Contemporary Art and Feminism. Routledge.

Piaget, J. (1972). The principles of genetic epistemology. New York: Basic Books.140-142

Potts, J. (2020). Displacement in contemporary art. In The handbook of displacement. Palgrave Macmillan, Cham.Press, USA. (687-700)

Sweller, J., Ayres, P., & Kalyuga, S. (2019). Cognitive Load Theory: Exploring the Interaction Between Information Structures and Cognitive Architecture. Educational Psychology Review, 31(2), 261-278.

Zhu, G., & Jin, S. (2022). Analysis on the Installation Art. In Wireless Technology, Intelligent Network Technologies, Smart Services and Applications (pp. 275-284). Springer, Singapore.

AI IN EDUCATION: ADDRESSING THE CHALLENGES OF DYSLEXIA, DYSCALCULIA, AND DYSGRAPHIA THROUGH TECHNOLOGY-ENHANCED LEARNING TOOLS

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INTRODUCTION

The rapid advancements in AI technology have created new opportunities to enhance the educational experiences of students with learning disabilities, such as dyslexia, dyscalculia, and dysgraphia. These specific learning disabilities encompass a range of complex neurological conditions that profoundly affect a student's ability to understand, retain, or process information and can significantly impact their academic performance, social interactions, emotional well-being, and overall quality of life. These challenges can lead to frustration, low self-esteem, and academic achievement, highlighting the critical need for innovative approaches to support these learners. However, integrating AI-powered technologies into the educational landscape offers promising solutions to address these issues and provide more personalized and effective learning environments. This research aims to explore the potential of AI-powered technologies in addressing the unique needs of students with dyslexia, dyscalculia, and dysgraphia and to examine the implementation of technology-enhanced learning tools that can improve their educational outcomes and overall quality of life.

METHODOLOGY

This research will use a mixed-methods approach, combining a comprehensive literature review with empirical data collection and analysis. As a result, AI-powered educational tools can assist students with dyslexia, dyscalculia, and dysgraphia, leading to improved academic performance, increased engagement, and enhanced self-confidence.

FINDINGS

It shows that this study emphasizes the effectiveness of personalized learning, teaching methods that involve multiple senses, and real-time feedback in helping students with learning disabilities overcome the challenges they often face in traditional schools.

CONCLUSION

In conclusion, this research highlights the positive impact of AI in education, especially in supporting students with learning disabilities.

INTEGRATING ARTIFICIAL INTELLIGENCE IN ISLAMIC EDUCATION: A REVIEW ON PEDAGOGICAL APPROACHES AND LEARNING OUTCOMES.

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INTRODUCTION
This study conducts a bibliometric and systematic review to explore the integration of Artificial Intelligence (AI) within Islamic education, focusing on trends, pedagogical approaches, and reported learning outcomes from 2003 to 2023. The study follows the PRISMA guidelines, analyzing data from the Scopus database.

FINDINGS
The review examines publication trends, subject area distributions, geographical contributions, leading institutions and authors, key terms, pedagogical approaches, and learning outcomes. The review identifies a peak in research activity in 2023, with consistent contributions across years. Computer Science is the dominant field, but interdisciplinary applications are evident. Leading contributions come from Saudi Arabia, Iran, and Egypt, with significant involvement from institutions in Malaysia and the UAE. Key terms reveal a focus on AI in Islamic finance and ethical considerations, with advanced AI applications emerging. Pedagogical approaches like personalized learning and gamification enhance engagement and comprehension, while reported learning outcomes include improved critical thinking and broader accessibility.

CONCLUSION
This study provides the first comprehensive overview of AI integration in Islamic education, offering insights into current trends, challenges, and opportunities for future research and practical applications

INDIGENOUS KNOWLEDGE IN EDUCATION FROM PARENT PERSPECTIVES TOWARDS INDIGENOUS STUDENTS' LEARNING MOTIVATION IN MALAYSIA

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ABSTRACT
Research on Indigenous Knowledge (IK) highlights a significant gap in how the Indigenous Community (IC) acquires knowledge, affecting Indigenous Education (IE). The aim is to create a knowledge-based society with high-quality education for all students, particularly Indigenous Students (IS). However, IS often face barriers to education due to language differences and teaching methods that reflect their communities' histories and traditional knowledge, contributing to higher dropout rates. This paper explores integrating IK into education by evaluating parents' perceptions through a qualitative focus group discussion with eight IC parents, analyzed thematically. Results show parents support incorporating IK in education, such as using native languages in the curriculum and increasing the number of Indigenous teachers. Integrating IK is expected to enhance student motivation, aligning with UNESCO's SDG 4 for Quality Education and the Malaysian Education Blueprint 2025.

Keywords: Indigenous Knowledge; Education; Motivation.

INTRODUCTION

Education is crucial for the indigenous community (IC) to sustain development and improve their quality of life, as highlighted by Mohd Tap (1990). Before 1995, Jabatan Kebajikan Orang Asli (JAKOA) managed educational programs aimed at integrating indigenous children into the national system. Since then, the government has launched comprehensive development programs to enhance sustainability competencies among IC members. Despite increased enrollment in primary and secondary schools, indigenous children face high dropout rates due to factors such as cultural mismatches, school location, poverty, and unsuitable pedagogical approaches (Mohd Noor, 2020). The prevalent use of Western educational models limits the inclusion of indigenous knowledge (IK), impacting sustainability. Differences between indigenous and Western education often result in curriculum irrelevance, leading to higher dropout rates (Demssie et al., 2020). The Malaysian Education Blueprint 2013-2025 emphasizes equal access but lacks specific strategies for indigenous learners, focusing broadly on educational improvement without addressing unique needs (Malaysia Education Blueprint, 2019). Although the Malaysian Constitution guarantees equal educational rights, the standard curriculum fails to integrate IK, which is essential for genuine inclusivity (Article 17, Act 134). The need for incorporating IK into education is critical to prevent the loss of indigenous knowledge and enhance relevance in curricula (Mato, 2015; Stavenhagen, 2015). UNESCO's SDG 4 advocates for inclusive, equitable education, and aligns with Malaysia's SDG Roadmap and national plans (UNESCO, 2019). However, the focus remains predominantly on education, often neglecting IK and its role in sustainable development (Pacis & VanWynsberghe, 2020). Despite efforts such as JAKOA's programs, challenges persist, including high dropout rates and socioeconomic barriers (Mohd Azizul Sulaiman et al., 2020). Addressing these issues

requires alternative education models and integration of indigenous perspectives into teaching approaches to improve educational outcomes and support sustainable development (Abdul Rahman et al., 2021; Elumalai, 2023).

METHODOLOGY

This study uses exploratory qualitative research approaches to answer the research questions. According to Saunders et al. (2018) exploratory study is a valuable means to find new insights, to clarify uncertainty of the precise nature of a problem, based on three principal ways: a search of the literature, interviewing experts in the subject and conducting focus group interviews. Therefore, a qualitative approach is the most appropriate strategy for this study, which is a valuable kind of sampling for special situations used in exploratory research for the judgement. Respondents were selected on the basis that they can provide the best information for answering the research questions. Data collection is based on a focus group discussion with 8 parents from the IC in Gerik, Perak and Temerloh, Pahang. The focus group sessions through interviews were carried out at selected schools in Gerik and Temerloh. The researchers prepared the semi-structured interview questions. The subject was regarding their lifestyle and the extent of transferring knowledge in relation to sustainable IK among the IC. The parents gave their perspectives on their role in educating their children. The questions also covered their obligations as parents to create awareness on the importance of education for sustainable development for their children and the young generation of the IC.

FINDINGS

Findings of this study discuss the demographics of the parents, and the qualitative findings of the research are divided according to themes. The respondents present during the interview session with the researcher consisted of the parents of indigenous students. Therefore, the respondents in this study include both males and females. During the interview session, there were 4 male respondents, and 4 female respondents to represent the parents of the Indigenous students. Based on the data obtained during the interview session, the ages of the respondents ranged from 25 years to 41 years and above. The majority percentage of respondents were aged between 31 to 35 years, accounting for 37.5%. There were 3 respondents aged between 31-35 years. Meanwhile, 2 respondents were aged between 36 to 40 years, making up 25%. Each 12.5% was represented by one respondent aged 41 and above, 25 and below, and 26 to 30 years. In the occupation section, most respondents were self-employed. Their occupations are as rubber tappers, farmer, and housewives. Based on the data obtained, six of the respondents had 2 children in school and the remaining have 4 children and one child in school. As for the qualitative findings, there are five (5) main themes that influence IK in education towards learning motivation among indigenous students, which are cultural, socio-demographic, environmental, motivational and policy.

CULTURAL FACTORS

IK among the indigenous community is heavily influenced by cultural factors that relate to specific knowledge of the indigenous. Three (3) parents agree that continued indigenous knowledge in schools should be emphasized through their native language. The parents also suggested that the school education system should integrate the learning of indigenous knowledge such as the learning of handicrafts as a means of ensuring that the children know about their culture and customs. The approach of learning about cultural and customary practices and handicraft brings to attention the need to create activities for the learning to take place. One method of cultural preservation is by encouraging the learning of IK among children

through sports activities such as archery, "sumpit," “sepak takraw,” swimming, and football. The parents highlighted the role of structured sports activities towards sustaining indigenous cultural knowledge, as all these activities are part of back-to-nature activities. Other activities that were suggested by parents were that every school must have a herb garden. This indirectly will let their children learn about the natural herbs that are available in the jungle that could benefit their daily lives.

SOCIO-DEMOGRAPHICS

The demographics of the Indigenous Communities (ICs) significantly influence how Indigenous Knowledge (IK) is retained, with factors such as family size, living conditions, and school proximity affecting education access. Parents express concerns about their children's ability to continue education, especially when primary and secondary schools are in different locations. Distance to school often leads families to place children in hostels to avoid transportation issues. Socio-economic challenges, including poverty and parents' occupations, further complicate school attendance. One parent noted the difficulty of sending children to school while needing their help to earn daily wages, which adds financial strain. Despite these hardships, parents recognize the importance of education for improving their children's prospects. However, demotivating factors like losing schoolbooks and stationery also impact both the children’s motivation and the family’s ability to afford replacements.

ENVIRONMENTAL FACTORS

The environmental factors within this research are inclusive of the weather, logistics and children’s mobility as well as challenging infrastructures such as the lack of roads. A few parents stated that they face challenges in sending the children to school especially during the rainy/monsoon season. The unpredictable weather makes it difficult for them to send the children. The situation remains challenging as there are limited transportation options that cause delays or prevent the children from attending school on time. In addition , poor road conditions and supporting structures in and around the village areas create additional challenges for parents and children alike.

MOTIVATIONAL FACTORS

The motivational and belief factors that influence indigenous parents and school going children alike goes back to the family dynamics. The parents face challenges in waking up the children for school so that they arrive on time, very much due to environmental challenges that make them tired or lazy. The situation remains challenging when children lose personal and school materials that disrupts the learning process, in which frequent loss of schoolbooks and stationery demotivates the students and influences the dropout rates. The parents play a major role in motivating and ensuring that the children attend school, often emphasizing the importance of education towards a brighter future. Parents added by giving rewards to the children will boost the motivation of students to go to school. The majority of the parents agreed that by having indigenous teachers from their community who can explain details about indigenous subjects that their children learn by using their native languages the indigenous children cannot understand indigenous terms and this causes language barriers within the community.

POLICY

There are several policies that are in place to support the IC towards gaining a better education and livelihood. This is inclusive of having organisations who can provide schools with better facilities as the existing schools are old and damaged. The engagement with agencies who can support these needs will lessen the burden faced by the indigenous people. The need for improved policies regarding the well-being of the community needs to be enhanced to allow for a balanced allocation of resources. Government support is crucial to the preservation of IK as parents indicate that there is a need for continuous engagement for the implementation of indigenous education in their school curriculum. And finally, the parents expressed their hope that the education system would provide opportunities and special attention towards the children's learning with emphasis on IK.

CONCLUSION

The research findings highlight parents' perceptions on integrating Indigenous Knowledge (IK) into education to motivate Indigenous Students (IS). While most parents agree that education is crucial for their children's future, they advocate for incorporating IK, particularly through the use of native languages. Studies emphasize that education in indigenous languages preserves cultural identity and fosters understanding (Jacob et al., 2019; Mendecka, 2023). Parents believe that using their native language in schools enhances learning motivation. Additionally, cultural activities such as handicrafts, sports, and herbal gardens are important in reflecting IK in education. These activities not only promote cultural heritage but also improve learning by connecting students to their roots and supporting sustainable development (Anantharam & Chittibabu, 2021). However, socio-demographic factors, including financial constraints and school location, affect access to education. Parents often place their children in hostels to avoid commuting issues but hope for cultural integration in these settings. Internal and external motivations, including family support and educational tools, are also essential for encouraging IS learning. Parents believe that involving more Indigenous teachers and addressing these factors through clear education policies can enhance Indigenous students' outcomes and contribute to the Malaysian Education Blueprint 2025.

REFERENCES

2019 Global Education Monitoring Report. 2019 GEM Report | Migration, displacement and education. (2023, January 23). https://gem-report-2019.unesco.org/

Abdullah, A., Huynh, I., Emery, C. R., & Jordan, L. P. (2022). Social norms and Family child labor: A systematic literature review. International Journal of Environmental Research and Public Health, 19(7), 4082. https://doi.org/10.3390/ijerph19074082

Affizal, A. 2008. Kepentingan pendidikan dalam pembentukan kualiti hidup sejahtera. Malaysian Education Dean's Council Journal. Malaysia. https://doi.org/10.1017/CBO9781107415324.004.

Asian Indigenous & Tribal Peoples Network (2008). The Department of Orang Asli Affairs, Malaysia—an agency for assimilation. New Delhi: Asian Indigenous & Tribal Peoples Network.

Barnhardt, R., & Oscar Kawagley, A. (2005). Indigenous Knowledge Systems and Alaska native ways of knowing. Anthropology & Education Quarterly, 36(1), 8–23. https://doi.org/10.1525/aeq.2005.36.1.008

Camilleri, & Unesco. (1970, January 1). Open educational resources. UNESCO.org. https://www.unesco.org/en/communication-information/open-solutions/open-educational-resources

Chantou, I. (2023). Towards inclusive education in Cambodia: Overcoming barriers and embracing diversity. Journal of Education Review Provision, 1(3), 48–52. https://doi.org/10.55885/jerp.v1i3.205

Demssie, Y. N., Biemans, H. J. A., Wesselink, R., & Mulder, M. (2020). Combining indigenous knowledge and modern education to foster sustainability competencies: Towards a set of learning design principles. Sustainability (Switzerland), 12(17). https://doi.org/10.3390/SU12176823

Doris Padmini Selvaratnam, Abdul Hamid Jaafar, Norlida Hanim Mohd Salleh, Redzuan Othman, Siti Hajar Idris (2012) Transformasi Modal Insan melalui Peningkatan Pendidikan: Kajian Kes Komuniti Orang Asli di Cameron Highlands, Pahang. Prosiding Perkem VII, Jilid 2, pp.1215 – 1224. ISSN: 2231 – 962X.

Elumalai, D. (2023). Empowering diverse learners: Tailored guidance and counseling in inclusive education. Shanlax International Journal of Arts, Science and Humanities, 11(S1i2-Nov), 58–61. https://doi.org/10.34293/sijash.v11is1i2-nov.7318

Golafshani, N. (2023). Teaching mathematics to all learners by tapping into Indigenous Legends: A pathway towards Inclusive Education. Journal of Global Education and Research, 7(2), 99–115. https://doi.org/10.5038/2577-509x.7.2.1224

Gumbo, M. (2023). Digitisation of Higher Education and research: Raising inclusivity and equity issues for Indigenous students. South African Computer Journal, 35(1). https://doi.org/10.18489/sacj.v35i1.1107

History of Jakoa - Laman web Rasmi Jabatan Kemajuan Orang Asli. (n.d.-b). https://www.jakoa.gov.my/public/history-of-jakoa/?lang=en

Kamarulzaman, K. & Osman, J. (2008). Educational policy and opportunities of Orang Asli: A study of indigenous people in Malaysia. The Journal of Human Resource and Adult Learning, 4(1), 86-97.

Letchamanan, H., Abdullah, N. S., & Fadzil, K. S. (2021). Language education for Orang Asli children in Malaysia. Pertanika Journal of Social Sciences and Humanities, 29(S3). https://doi.org/10.47836/pjssh.29.s3.23

Magni, G. (2017). Indigenous knowledge and implications for the Sustainable Development Agenda. European Journal of Education, 52(4), 437–447. https://doi.org/10.1111/ejed.12238

Malaysia-education-blueprint-2013-2025.PDF. (n.d.-c). https://www.pmo.gov.my/wp-content/uploads/2019/07/Malaysia-Education-Blueprint-2013-2025.pdf

Maszlee: Politics prevails over education. The Edge Malaysia. (n.d.). https://theedgemalaysia.com/article/edunation-maszlee-politics-prevails-over-education

Mato, D. (2015). Pueblos indígenas, estadosy educacion superior. Aprendizajes de experiencias en varios países de America Latina potencialmente utiles a los procesos en marcha en Argentina. Cuadernos de Antropología Social, 41, 5–23.

Ministry of Education Malaysia (2006). Pelan induk pembangunan pendidikan 2006-2010 [Education development master plan 2006-2010]. Putrajaya: Ministry of Education Malaysia.

Mohd Tap, S. (1990). Planning and administration of development programmes for tribal peoples (the Malaysian setting). Kuala Lumpur: Department of Orang Asli Affairs.

Muhajirah, M. (2020). Basic of learning theory. International Journal of Asian Education, 1(1), 37–42. https://doi.org/10.46966/ijae.v1i1.23

Ngulube, P. (2002). Managing and preserving indigenous knowledge in the knowledge management era: Challenges and opportunities for information professionals. Information Development, 18(2), 95–102. https://doi.org/10.1177/026666602400842486

NICHOLS, C. (2012). The Presidential Ranking Game: Critical Review and some new discoveries. Presidential Studies Quarterly, 42(2), 275–299. https://doi.org/10.1111/j.1741-5705.2012.03966.x

Nonaka, I. (1996). The knowledge-creating company: How Japanese companies create the dynamics of Innovation. Google Books. https://books.google.com/books/about/The_Knowledge_creating_Company.html?id=B-qxrPaU1-MC

Nst. (2020, November 6). Education Ministry gets largest allocation of RM50.4B in 2021 budget: New straits times. NST Online. https://www.nst.com.my/news/government-public-policy/2020/11/638830/education-ministry-gets-largest-allocation-rm504b-2021

Pacis, M., and VanWynsberghe, R. (2020). Key sustainability competencies for education for sustainability: creating a living, learning and adaptive tool for widespread use. Int. J. Sustain. High. Educ. 21, 575–592. doi: 10.1108/ijshe-12-2018-0234

Purvis, B., Mao, Y., & Robinson, D. (2019). Three pillars of sustainability: In Search of Conceptual Origins. Sustainability Science, 14(3), 681–695. https://doi.org/10.1007/s11625-018-0627-5

Rahman, M. N., DeWitt, D., Norlidah, A., & Idris, M. R. (2021). Home Based Education Programme for Orang Asli Children: an analysis of their educational needs. Perspectives of Science and Education, 49(1), 329–337. https://doi.org/10.32744/pse.2021.1.23

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2017). Saturation in qualitative research: Exploring its conceptualization and Operationalization. Quality & Quantity, 52(4), 1893–1907. https://doi.org/10.1007/s11135-017-0574-8

Stavenhagen, R. (2015). Indigenous peoples' rights to education. European Journal of Education, 50, 254–257.

Zainal Abidin, A. (2012). Pelan Tindakan Pembangunan Pendidikan Orang Asli 2000-2010: Satu Penilaian. Dalam Ramle Abdullah at.al.(Edit). Pendidikan dan Orang Asli Dalam Arus Perdana. Kuala Terengganu: Universiti Sult

IMPACT OF GAMIFICATION EDUCATION ON ENGAGEMENT, MOTIVATION, AND LEARNING OUTCOMES OF PRESCHOOL CHILDREN IN RURAL COMMUNITIES: A REVIEW

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ABSTRACT

The literature on the impact of gamified education on children's engagement, motivation and learning outcomes was synthesized through a review of the literature on gamified education for children in rural communities. Rural communities served as the regional context for this study to motivate and support preschoolers as subjects engaged in learning in rural communities. A variety of teaching and learning resources and rural community resources were integrated as a basis for cultural construction for preschoolers. By participating in social innovation methods, reflecting and exploring from different tracks such as pedagogy, sociology, psychology, etc., and making effective attempts on social innovation methods in rural communities, gamified education can participate in the process of social innovation in rural communities with a more tense structural form and social identity power. By combining gamification education with the regional cultural characteristics of rural communities, preschool children aged 3-6 years old can experience the fun of the countryside and increase their knowledge through gamification education, and evaluate the impact of gamification education on the participation, motivation and learning outcomes of children aged 36 years old in rural communities.

Keywords: gamified education; rural communities; engagement; motivation to learn; learning outcomes.

INTRODUCTION

The object of this study is preschool children in rural communities, where the distribution of educational resources between urban and rural areas is also unequal due to the unbalanced economic development of urban and rural areas. The development of most rural preschool children's education is realized through the education of kindergarten teachers, and there is also a situation of left-behind children due to the current realities such as rural-urban migration. The higher-quality teacher resources and student population in rural areas are moving further to the towns, and the gap between urban and rural areas still exists. This policy vision is centered on a focus on education modernization indicators, essentially using the city as a reference.

Rural culture, on the other hand, is a cultural resource that has been handed down over thousands of years, and it is important to vigorously develop countryside, which should not gradually shrink or disappear as technology develops and urbanization accelerates. According to the development of the world, developed countries have achieved very good results in the construction and development of rural communities. The more attention is paid to the cultural cause of the rural community, many design teams and scholars began to rely on the local characteristics of the culture as an entry point for research, which provides more ways to study the service culture system of the rural community. For the various complex social problems presented in the society nowadays, the construction of rural community can promote and help

the solution of these complex problems in a meaningful way from the perspective of social science. Moreover, the culture of the rural community has been continuously used by the groups in the community and has become an inseparable part of the community groups. It includes village customs, habits, dialects, architecture, festivals and so on.

Countryside and children's education has become a hot spot of great concern in the society, and there are more and more models of combining countryside and education. From the results of development, the development of rural communities and children's education is complementary and symbiotic. Practice cases based on social innovation show that the development of rural communities relies most on the bottom-up participation of community people. Strengthening of children's rural education is an important manifestation of the process of sustainable development of rural communities. The education of pre-school children is the underpinning foundation of educational development, providing children with the opportunity to learn about the culture of their hometown, indirectly influencing people around the community and forming a good sense of community identity.

BACKGROUND

Gamified education opens up a new spatio-temporal dimension, and its strong sense of immersion can increase the learner's sense of agency (Saleem, 2022). Gamification methods can greatly motivate learners by designing learning content into interlocking links and levels, and setting certain reward and punishment mechanisms in each link (Jacobs, 2016). Gamification education is a way of educating children that can stimulate their autonomy and increase their attention (Lamrani & Abdelwahed, 2020). Gamification education enables children to understand society, share experiences and increase knowledge effectively. Relevant surveys have shown that children who are exposed to media earlier and more frequently are more socialized, better adapted to the needs of social development, and have greater adaptability and resilience than children who live in closed environments (Bradley, 2020). Gamification is not only a technique but also a method used by some organizations to increase motivation (Dichev & Dicheva, 2017). Gamified education is the use of game logic components, mechanics and dynamics, and game aesthetics designed to promote and enhance learning through motivation (Caporarello et al., 2019). Gamification can be one of the new opportunities for innovation (Bálint Svella, 2021). Gamification education allows learners to learn while playing, reinforcing the understanding of knowledge and concepts in a fun and educational format. Therefore, game-based education is not only a recreational activity, but it also has an extremely important educational dimension. Gamification aims to increase engagement and motivation. The method has been much studied in urban communities. There are few studies on its application in rural communities (Sulistyo et al., 2019). Studies have found that applying gamification to education in rural communities can be effective in increasing learning interest and achievement (Deng & Zhou, 2020).

This can not only improve the overall educational level of local residents, but also cultivate more independent learning ability and innovative thinking, laying the foundation for future social development (Huh et al., 2016). Secondly, gamification can help protect and pass on traditional rural culture. Research has shown that many traditional games in villages contain rich cultural connotations and can cultivate children's positive character, moral sentiments and

social skills (Budi et al., 2022). By gamifying these traditional games, we can not only capture the interest of today's children, but also ensure that this valuable cultural heritage is passed on (Regiana et al., 2020). Gamification can also be an effective tool for rural community building. By designing games that are closely related to local life, it can enhance their sense of community identity and participation, thus contributing to the overall development of the community (Iswinarti et al., 2020).

METHODOLOGY

Literature analysis method: by reviewing numerous materials, combing the literature research content, and relevant cases to organize, for the reference of the theme part of the article, the guide to the future development of rural children's gamification education with a general grasp and correct expectations.

Field investigation method: through a series of investigation methods, a solid foundation of data and emotion is laid for the writing of the subsequent thesis, and the reliability of the thesis conclusions is also ensured. Find a certain number of children in the village, and naturally communicate the content of the profession with the children through the form of chatting, so as to get more direct feedback. Understand the children's activities of learning in the village and their subjective understanding of village culture, and get the research feedback of this research.

FINDINGS

Existing literature focuses on gamification education for urban community groups, and there is less literature on gamification education for children in rural communities. There are fewer educational resources in rural communities, and children's motivation to participate may affect the effectiveness of gamified education methods. The cultural heritage of rural communities is adapted and created by groups and individuals within each region. The potential of preschool children in the process of cultural creation cannot be ignored. Limitations of gamification education in rural communities include the level of technology, education, and economic factors that influence the curriculum of game elements containing regional culture to meet the cultural needs and play experiences of rural children.

The cultural understanding of rural preschool children is limited, and local cultural learning activities are set up to change children's cultural misconceptions, enhance cultural identity, and cultivate a sense of cultural heritage. To address these limitations, future research and interventions should focus on developing gamification methods that can be adapted to the unique needs and characteristics of children in rural communities. Incorporating traditional games and regional cultural practices into the design of gamified educational experiences, as well as exploring methods that can be effectively integrated into rural learning environments. In addition, a deeper understanding of the factors that influence rural children's motivation and learning outcomes in gamified environments can inform the development of more effective and equitable gamified education programs.

CONCLUSION

With the progress of scientific and technological power, more and more new things come into people's lives, and things with regional cultural characteristics are neglected and forgotten.

Rural community culture has its own uniqueness compared with other cultural resources, and it is a record of the development of national history and culture. The inheritance of regional culture and the explanation and teaching of education have become the top priority in revitalizing the culture of rural communities. More and more people are emphasizing the inheritance and innovation of local culture, and local teaching materials and school textbooks are constantly being innovated and developed, combining a variety of resources of regional culture to be presented in the classroom. As the youngest and most vital group in the community, preschool children are the future of community development and bear the responsibility of cultural inheritance. Preschool children can feel the culture of living in the rural community.

Social and cultural resources have an important influence on the formation of preschool children's cultural identity. There are several benefits of using gamified education for preschoolers, such as increasing their motivation, participation, and academic achievement. The development of the rural community and the development of preschoolers interact with each other, increasing children's participation and enhancing the participation of the rural community. Increased children's motivation and learning outcomes also contribute to the cultural heritage and development of rural communities, reflecting the practical implications of gamified education in rural community development.

REFERENCES

Bálint-Svella, É. (2021). Prospective Preschool and Primary School Teachers' Knowledge and Opinion about Gamification. Acta Didactica Napocensia, 14(1), 104-114.

Budi, S., Djati, S P., Nurbaeti, N., & Rahmanita, M. (2022, December 19). Analysis of The Influence of Image, Quality Perception, and Risk Perception on Decision To Play Traditional Games Through Value Perception As Intervening, 1(2), 211-216. *Proceeding of 2ndInternational Conference on Research and DeveIopment (ICORAD),* Indonesia, Nov. 05-06, 2022 doi: 211-216; https://doi.org/10.47841/icorad.v1i2.39

Caporarello, L., Manzoni, B., & Trabelsi, L. (2019). Adopt a Single Learning Model or Multiple Ones? Exploring Digital Ecosystems, *Organizational and Human Challenges*, 33, 179.

Content. *Global Vision Press*, 11(12), 101-114. https://doi.org/10.14257/ijmue.2016.11.12.10

Deng, C., & Zhou, C. (2020, May 29). Analysis of the Village Sports Public Services and Its Related Concepts. *Destech Publications*. https://doi.org/10.12783/dtssehs/icssm2020/34293

Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: a critical review. *International Journal of Educational Technology in Higher Education*, 14(1), 1-36.

Huh, J., Kim, H., & Seo, K. (2016, December 31). A Design of Smart-based Education Gamification Platform Using Mobile Devices for Digital

Iswinarti., Hasanati, N., Kartono, R., & Firdiyanti, R. (2020, January 1). BERLIAN (Bermain-ExpeRiential-LearnIng-ANak) Community to

Lamrani, R., & Abdelwahed, E. H. (2020). Game-based learning and gamification to improve skills in early years education. *Computer Science and Information Systems*, 17(1), 339-356.

Saleem, A. N., Noori, N. M., & Ozdamli, F. (2022). Gamification applications in E-learning: A literature review. *Technology, Knowledge and Learning*, 27(1), 139-159.

Sulistyo, E T., Vindy., Anwar, N., Warnars, D T S., Wibawa, S C., Brotosaputro, G., Kristiadi, D P., Warnars, H L H S., & Hashimoto, K. (2019, December 1). Implementation of Mobile game for Religion Learning. https://doi.org/10.1109/tale48000.2019.9225918
Support Character Education for Children. https://doi.org/10.2991/assehr.k.200120.069

EXPLORING THE IMPACT OF STUDENT BEHAVIOR PATTERNS ON LEARNING OUTCOMES IN IMMERSIVE VR ENVIRONMENTS

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ABSTRACT
In this investigation, we explored how distinct student behaviours within Virtual Reality (VR) learning environments correlate with various educational outcomes. The study leverages a mixed-methods approach to dissect behaviours such as exploration duration, task engagement, and collaborative learning, to evaluate their impacts on high school and university students' academic performance.

Keywords: Virtual Reality; Educational Outcomes; Student Behavior; Task Engagement; Collaborative Learning.

INTRODUCTION AND BACKGROUND

Virtual Reality (VR) is increasingly heralded as a transformative medium in education, enhancing student-centered learning by enabling immersive, interactive experiences. This study addresses a gap in current educational technology research by systematically analyzing how specific VR behaviors influence student learning outcomes. Prior studies, such as those by Radianti et al. (2020) and Makransky & Lilleholt (2018), provide foundational insights into VR's potential benefits but leave critical questions about behavior-specific impacts largely unanswered.

METHODOLOGY

This research utilizes a quasi-experimental design, employing advanced VR headsets to monitor and measure student engagement across various parameters. Participants, comprising both high school and university students, were divided into control and experimental groups to compare VR's impact against traditional learning methods. Behavioral data were rigorously collected through VR analytics, focusing on metrics such as task duration, frequency of interactions, and collaborative versus solitary learning contexts.

FINDINGS

Analysis reveals that VR significantly enhances engagement and learning outcomes, particularly when students engage in frequent exploratory and collaborative activities. The data indicate that students in VR settings spend more time on tasks and interact more intensively with educational content, leading to improved knowledge retention and higher post-test scores. These results align with the hypotheses and expand on existing literature by quantifying the educational benefits of specific VR behaviors.

CONCLUSION

The study confirms that immersive VR environments can substantially benefit educational processes, particularly through enhanced engagement and collaborative learning opportunities. However, it also highlights the need to balance VR exposure to mitigate potential cognitive

overload, suggesting optimal session lengths and activity types that maximize learning outcomes without causing fatigue or diminished returns.

RECOMMENDATIONS

1. **Broad Integration of VR in Education:** Schools and universities should consider integrating VR technologies across a variety of subjects to harness their full potential.
2. **Focused Professional Development:** Educators require targeted training to effectively implement VR in their teaching practices, ensuring they can facilitate VR sessions that maximize student engagement and learning.
3. **Strategic Session Management:** It is crucial to develop guidelines for VR session durations and activities to optimize educational benefits while avoiding cognitive overload.

REFERENCES

Freina, L., & Ott, M. (2015). A literature review on immersive virtual reality in education: State of the art and perspectives. *The International Scientific Conference eLearning and Software for Education*, 10(1), 133-141.

Jensen, L., & Konradsen, F. (2018). A review of the use of virtual reality head-mounted displays in education and training. *Education and Information Technologies*, 23(4), 1515-1529. https://doi.org/10.1007/s10639-017-9679-8

Makransky, G., & Lilleholt, L. (2018). A structural equation modeling approach to understanding the effects of immersive virtual reality in education. *Computers & Education*, 125, 248-257. https://doi.org/10.1016/j.compedu.2018.06.014

Makransky, G., & Petersen, G. B. (2019). Investigating the effects of a virtual reality simulation game on learning outcomes. *Journal of Computer Assisted Learning*, 35(6), 691-705. https://doi.org/10.1111/jcal.12372

Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney-Kennicutt, W., & Davis, T. J. (2014). Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis. *Computers & Education*, 70, 29-40. https://doi.org/10.1016/j.compedu.2013.07.033

Parong, J., & Mayer, R. E. (2018). Learning science in immersive virtual reality. *Journal of Educational Psychology*, 110(6), 785-797. https://doi.org/10.1037/edu0000241

Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers & Education*, 147, 103778. https://doi.org/10.1016/j.compedu.2019.103778

Yang, Y., Wang, Q., Wu, J., & Lai, C. (2023). Enhancing learning through interactive virtual reality: The role of cognitive engagement. *Interactive Learning Environments*, 31(1), 15-32. https://doi.org/10.1080/10494820.2020.1867795

HARNESSING ARTIFICIAL INTELLIGENCE AND AUTOMATION: ALTERNATIVE CURRICULUM DEVELOPMENT FOR THE ALPHA GENERATION IN EMERGING TECHNOLOGY

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ABSTRACT
As the field of educational technology undergoes rapid change, the role of Artificial Intelligence (AI) and automation, in particular, presents significant potential for generative transformations of curriculum development suited to the Alpha Generation. This literature review provides a summary and synthesis of current literature on the use of AI and automation in educational contexts to advance a new model of curriculum development. Specifically, the review synthesizes a diverse range of research findings to illustrate that AI-informed tools have the potential to provide personalized learning opportunities, increase student engagement, and improve learning outcomes. The dimensions of the review emphasize various aspects of AI and automation including adaptive learning systems, automated assessments, and the use of emergent technologies within pedagogical processes. The literature review indicates that AI and automation have substantial potential to support a transformative and dynamic student-centered approach to curriculum development that is built on the needs and learning styles of the Alpha Generation. Nonetheless, challenges including equity, data privacy, and teacher training also emerged. This literature review establishes a timely examination of the current state of the field, addresses a structured way to integrate AI and automation in curriculum development, and aims to provide a text for educators and policy makers to consider when integrating AI and automation for future uses in education.

Keywords: Artificial Intelligence; Automation; Curriculum Development; Alpha Generation; Emerging Technologies.

INTRODUCTION

The Alpha Generation, who have been exposed to technology since being born, both brings practical difficulties as well as opportunities. If curriculum and educational programs do not adapt as artificial intelligence (AI) and automation technologies continue to develop, they may quickly become unsatisfactory. This paper considers what alternative curriculum programs may be necessary to leverage artificial intelligence and automation while preparing the Alpha Generation to meet future challenges and opportunities. Recent developments in artificial intelligence and automation have created disruption in most sectors. A recent report from McKinsey & Company (2023) found that potentially 50% of tasks performed in the workplace can be automated with today's technologies. AI-based systems are ready to take on these tasks whether they be natural language processing or autonomous driving (Deloitte, 2023). In recent years education has also begun to implement artificial intelligence tools to enhance curriculum and education programs. An Education Commission (2022) report indicates that 67% of educators believe AI tools in their classrooms improved learning outcomes for students, however only 30% of schools have full utilization of these education AI technologies in curriculum.

METHODS

This research undertakes a systematic literature review (SLR) methodology to investigate the nexus of artificial intelligence (AI), automation, and curriculum development for the Alpha Generation. Systematic literature review (SLR) provides the backbone to reach this aim, and is a structured and exhaustive way to collectively find, evaluate, and analyze and synthesize prior studies. The goal of the research is to assist in ensuring that the resultant curriculum

development process, is based on evidence and best practice through contemporary developments in education technology, integrated with basic phenomenological perspectives of possibly undertaking curriculum framework alternatives to the needs of the Alpha Generation.

The literature review is aimed at addressing the following questions: 1) What are the current uses of AI and automation in education? 2) Are these technologies having any influence on curriculum development for today's learners it's prioritized focus being the Alpha Generation)? 3) What are the trends and best practice of current AI and automation into educational curricula? An aggregate search strategy was developed. The following steps were completed. Academic databases such as PubMed, IEEE Xplore, ERIC, Google Scholar and Scopus, were methodically searched to ensure that the search covered the largest area of relevant literature possible. Search terms included combinations and or variations of keywords of "artificial intelligence," "automation," "curriculum development," "Alpha Generation," and "educational technology." Included studies published in peer reviewed journals, dissertation and conference publications of the past 10 years. Research related to AI and automation in education that specifically relates to curriculum development for emerging generations.

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he process of selection comprised several key stages of analysis: 1) Initial screening: The titles and abstracts of articles were reviewed to find studies potentially relevant to the present research. This task consisted of filtering out irrelevant articles according to inclusion and exclusion criteria developed beforehand. 2) Full-text review: The identified articles were subjected to full-text review to determine their relevance to the articles at hand. Studies that met the inclusion criteria were retained for analysis and summary. 3) Data extraction: Information that was seen as relevant to the research was extracted from the articles. Information extracted included study aims, methodologies, findings, and relevance to Artificial Intelligence (AI) and automation in curriculum development. The synthesis of the literature employed thematic analysis. Once studies were identified they were classified according to themes that emerged during the data extraction process, such as theoretically or practically interested in AI in education, software and automation in curriculum, and generalized pedagogical approaches for the Alpha Generation. Thematic insights were synthesized to elaborate a cohesive overview on how AI and automation were shaping curriculum, and qualified this understanding with existing lacuna in the literature.

FINDINGS

The incorporation of artificial intelligence (AI) and automation into educational curriculum presents a considerable opportunity to address the changing needs of the Alpha Generation, learners born in 2010 or later. This literature review of existing studies discusses a variety of important findings and implications for educational practice. AI and automation are transforming educational practices that facilitate truly personalized learning and reduce teachers' administrative load. Research shows that AI systems can quickly analyze student data to produce educational content with tailored content and pacing and subsequently improve students' engagement and learning outcomes (Baker et al., 2021). Adaptive learning platforms and intelligent tutoring systems, for instance, have been effective at addressing students' individual learning needs and enhancing students' mathematics performance (Zhang & Liu, 2023). In addition, automation supports teachers by reducing some of the administrative load, allowing them to spend more time focusing on direct instruction and student learning (Johnson, 2022). The Alpha Generation is particularly suited to educational curriculums that integrate accepted practices with emerging technologies because they are characterized with their proficiency in technology and they prefer learning through interaction. For example, research indicates AI-driven simulations and virtual reality (VR) fit student needs for engaging, practical

learning experiences (Smith & Brown, 2023; Lee et al., 2022). Specifically, 85% of Alpha Generation students preferred interactive, technology-based learning experiences. Additional studies indicated VR-based science education proved to make complex ideas more accessible and enhanced student engagement by a success rate of 25%, (Lee et al., 2022). AI-driven simulations have also indicated to improve students' problem-solving skills by 20% compared to traditional educational tools (Lee et al., 2022). Despite the strong potential benefits associated with the integration of AI and automation into curriculum, there are a number of challenges associated with establishing such technologies. Leading the challenges related to the ethical and practical considerations associated with AI, such as data privacy and bias toward algorithmic practices. Research indicates we must, and be prepared to, weigh such ethical considerations (Wang & Chen, 2021). In addition, teacher education is vital for the successful use of these technologies in the classroom. Teachers need to develop both technical skills and pedagogical techniques to properly utilize AI and automation (Garcia & Martinez, 2022).

Although AI and automation can provide substantial benefits, they involve challenges. For example, Wang & Chen (2021) note there are concerns regarding data privacy, as 40% of educators are concerned about data security around student data in AI systems. Only 30% of teachers reported having received adequate training to utilize the AI technologies successfully into the classroom (Garcia & Martinez, 2022). These issues must be resolved in order for AI to be considered a success in education. Success stories of AI and automation provide insight into effective strategies. Zhang & Liu (2023) found that intelligent tutoring systems demonstrated improvements in student performance in mathematics of 20% over a course of the school year. Likewise, VR-ed based learning environments have reported increasing student engagement levels of 35% while providing a better understanding of complex subject matter (Lee et al., 2022). These numbers demonstrate the benefit of using these technologies when applied with intention.

Further research is necessary to understand how much AI and automation will effect educational outcomes and equity in the long term. Evidence provided through academic research suggests future work should focus on learning how AI and automation will affect student learning across diverse student populations and to ensure that they promote equitable educational opportunities (Patel et al., 2023; Turner & White, 2024). New and innovative applications of AI and automation will continue to help respond to emerging educational needs and challenges, to ensure relevancy and effectiveness of these technologies.

CONCLUSION

In conclusion, there is a transformative opportunity for the future of education as artificial intelligence and automation are integrated into curriculum development. This process is significant for the Alpha Generation who will grow up in an increasingly fast-paced world influenced by technology. This exploration demonstrates how the benefits that result from advanced technologies will promote personalized, active, and adaptive instructional opportunities for students. With AI-generated data and knowledge in curriculum development and implementation, refinement of content specific to a child's needs will promote greater engagement using active and immersive learning strategies as well as less time-consuming administrative tasks to support pedagogical development.

Yet, this journey does not come without careful consideration of challenges. Data privacy, the need for professional learning for educators, and access to tools and technology need to be considered to maximize educational experiences, learning and engagement for the Alpha Generation. Educational research needs to continue to evaluate the implications of AI and

automation as it relates to learning outcomes for the Alpha Generation and equity across the educational systems to ensure the innovation does not widen gaps.

As we embrace AI and automation technologies into curriculum development and implementation, we are not only responding to the needs of the Alpha Generation, but the expectations of changing educational technology contexts. If the introduction is done consciously and inclusively, we can prepare students for a world filled with complexity and opportunity within a digital age.

REFERENCES

Baker, R. S., et al. (2021). *The role of artificial intelligence in personalized learning: Current research and future directions*. *Educational Technology Research and Development, 69*(4), 1237-1265.

Brown, A., & Green, T. (2023). *The impact of AI on student learning outcomes*. *Learning & Technology Journal*.

Center for Digital Education. (2023). *The role of automation in education administration*. *Center for Digital Education*.

Deloitte. (2023). *AI in the workplace: Transforming business operations*. *Deloitte Insights*.

EdTech Magazine. (2023). *AI-driven personalized learning: Case studies and success stories*. *EdTech Magazine*.

Education Commission. (2022). *The impact of AI on education: A global perspective*. *Education Commission*.

Garcia, M., & Martinez, J. (2022). *Teacher training for AI integration: Current practices and future needs*. *Teaching and Teacher Education, 104*, 103408.

Johnson, L. (2022). *The impact of automation on administrative tasks in education*. *International Journal of Educational Management, 36*(5), 792-807.

Johnson, L., & Adams, S. (2022). *Automation in education: Opportunities and risks*. *Educational Technology Review*.

Lee, J., Patel, R., & Martinez, S. (2022). *Virtual reality and interactive learning environments: A study of their effectiveness in education*. *Educational Technology & Society, 25*(1), 58-73.

Lee, R., & Chen, Y. (2023). *Integrating emerging technologies into school curricula*. *Educational Innovations Journal*.

Martin, J., & Lee, K. (2024). *AI and automation: Changing the face of education*. *Innovations in Learning*.

McKinsey & Company. (2023). *The future of work: How technology is transforming employment*. *McKinsey & Company*.

National Center for Education Statistics. (2024). *Technology adoption in schools: Annual report*. *NCES*.

Nguyen, T., & Patel, S. (2023). *Personalized learning and AI: A review of recent advances*. *Journal of AI in Education*.

Patel, R., Turner, D., & White, A. (2023). *Long-term impacts of AI and automation on educational equity: A research agenda*. *Educational Policy Review, 45*(2), 159-176.

Pew Research Center. (2023). *Technology use among children and teens*. *Pew Research Center*.

Privacy International. (2023). *Data privacy in the age of AI: Challenges and solutions*. *Privacy International*.

Sharma, R., & Clarke, T. (2023). *Educational AI: Enhancing learning through technology*. *Journal of Educational Technology*.

Smith, A., & Brown, T. (2023). *Engaging the Alpha Generation: AI-driven simulations and virtual reality in education*. *Computers & Education, 184*, 104708.

TechEd Journal. (2023). *Personalized learning: Case study analysis*. *TechEd Journal*.

Thompson, P., & Garcia, M. (2023). *The Alpha Generation: Preparing students for a tech-driven future*. *Journal of Contemporary Education*.

Turner, D., & White, A. (2024). *Innovative applications of AI in education: Addressing emerging needs and challenges*. *Journal of Educational Innovation, 38*(1), 101-118.

UNESCO. (2023). *Equity in education: Bridging the digital divide*. *UNESCO Reports*.

Wang, L., & Chen, H. (2021). *Ethical and practical challenges of AI in education: Data privacy and algorithmic bias*. *Journal of Educational Technology, 48*(3), 202-215.

Williams, H., & Sanders, M. (2023). *Adapting curricula for the future: Trends and insights*. *Future Education Quarterly*.

World Economic Forum. (2022). *The future of learning: Preferences of the new generation*. *World Economic Forum*.

World Economic Forum. (2024). *Emerging technologies and future job markets*. *World Economic Forum*.

Zhang, X., & Liu, Y. (2023). *Effectiveness of intelligent tutoring systems in improving mathematics performance: A meta-analysis*. *Journal of Educational Computing Research, 60*(2), 345-368.

THE EFFECT OF "*DALL·E*" GENERATIVE AI MULTIMEDIA APPLICATIONS ON POSTGRADUATE ARTS AND DESIGN STUDENTS IN MALAYSIA

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ABSTRACT
This research investigates the effect of "DALL·E", an Artificial Intelligence (AI) generative multimedia application, on postgraduate arts and design students in Malaysia. As generative AI applications become increasingly integrated into educational practices, understanding their effect on student learning outcomes, particularly arts and design students is imperative. This research adopted a pre-experimental design, involving 35 postgraduate students from a reputable university in northern region of Malaysia. The research targets to gauge the effect of one of the most influential AI multimedia applications, namely "DALL·E" on students' academic performance and cognitive load. Raw data were collected through pre- and post-tests, followed by cognitive load questionnaire named Paas's Cognitive Load Scale. The results indicate that the use of "DALL·E" significantly enhances students' academic performance. The findings also reveal a moderate increase in cognitive load, suggesting the need for careful integration of such application into educational settings. This research contributes to the growing body of literature on AI in education.

Keywords: AI generative applications; postgraduate education; academic performance; cognitive load; Technology.

INTRODUCTION AND BACKGROUND

The integration of artificial intelligence (AI) into education has sparked significant interest among education practitioners and policymakers. One domain of particular interest is the application of AI generative multimedia applications in institution of higher learning. "*DALL·E*", developed by OpenAI, is one such tool that has gained overwhelming attention for its capability to generate realistic and detailed images from textual descriptions for learning purposes. Its capabilities open a new avenue for visual learning. In Malaysia, although the higher institution of learning has already recognized the usefulness of incorporating digital applications into the curriculum so that the students can perform well in academia while they can learn the applications without incurring much the cognitive load. However, the adoption of generative AI applications like "*DALL·E*" in these two educational contexts is still in its nascent stages. In view of this situation, a relevant research work was conducted with aims to examine the effects of "*DALL·E*" on Malaysian postgraduate Art and Design students' academic performance and cognitive load.

PROBLEM STATEMENT

One main problem in Malaysian students lies in the potential cognitive load associated with using generative AI applications. Cognitive load refers to the mental effort required to process information and excessive cognitive load can hinder learning. As a novel application in Malaysia, it is unclear how *"DALL·E"*, affects their learning outcomes. *"DALL·E"* also comes

with vast advanced capabilities, and how these capabilities in turn impacts the cognitive load of postgraduate students remains under-researched. A research work that attempts to address all these gaps offer valuable insights for educators to decide whether to use this application for students in Malaysia. Understanding students' learning outcomes help to ensure successful integration of generative AI applications into educational practices.

RESEARCH OBJECTIVES

The main objectives of this research are as follows:

RO1: To determine whether the use of *"DALL·E"* as an educational application can enhance students' understanding and application of complex concepts, thereby improving their academic learning results.

RO2: To evaluate the level of cognitive load associated with using *"DALL·E"* in an academic setting. Understanding the cognitive demands placed on students by generative AI applications is essential for designing effective educational interventions.

RESEARCH QUESTIONS

To guide the investigation, the following research questions have been formulated:

RQ1: How does the use of *"DALL·E"* affect the academic performance of postgraduate students in Art and Design in Malaysia?

RQ2: How does the use of *"DALL·E"* influence the cognitive load experienced by postgraduate students in Art and Design?

THEORETICAL FRAMEWORK

This research is grounded in one major theoretical framework, namely Cognitive Load Theory (CLT). CLT posits that the human cognitive system has a limited capacity for processing information. An effective instructional material should minimize unnecessary cognitive load during learning. Therefore, in the context of this research, CLT will be used to examine the level of cognitive load that may be incurred during the use of *"DALL·E"* among the postgraduate students.

The implications of examining CLT for instructional materials, and in this research, generative AI applications, are profound. Educators are encouraged to create an AI learning environments that minimize extraneous load while managing intrinsic load effectively. Among the strategies that can be used are segmentation by breaking up information, using multiple formats such as visual and auditory, and redundancy to avoid unnecessary repetition. These strategies are the areas that the researcher focus in investigating the *"DALL·E"* generative AI application.

Overall, CLT provides a valuable lens through which to understand the complexities of learning generative AI application. By acknowledging the limitations of cognitive processing and strategically designing suitable learning environment based on CLT, educators can be informed of the best practices in education, thereby contributing to more effective teaching and learning strategies.

RESEARCH METHODOLOGY

This research employs a pre-experimental research design, specifically a one-group pretest-post-test design, to investigate the effect of *"DALL·E"* on postgraduate students in Malaysia.

The research involves a single group of participants who will be assessed before and after the intervention, allowing for the measurement of changes in academic performance and cognitive load.

Participants

A total of 35 postgraduate students from a university in Northern region of Malaysia were recruited for this research. Participants were selected based on their familiarity with digital applications but without prior experience using *"DALL·E"* generative AI applications. This ensures that the research focuses on the impact of *"DALL·E"* rather than the participants' pre-existing digital skills.

Data Collection

Data was collected using a combination of quantitative pre-test, post-test, and cognitive load questionnaire described as follows:

1. Pre-test and Post-Test: Participants were required to complete a pre-test before being introduced to *"DALL·E"*, which assessed their baseline academic performance. After using *"DALL·E",* participants will complete a post-test to measure any changes in these understanding.
2. Paas's Cognitive Load Scale (PCLS): To measure cognitive load, participants were requested to complete the PCLS after using *"DALL·E"*. This widely used assessment tool measures perceived cognitive load during learning activities.

Data Analysis

The collected data will be analyzed using both descriptive and inferential statistics. Descriptive statistics such as means, standard deviations, and frequencies, were used to summarize the participants' demographic information and their responses to the PCLS. For Inferential Statistics, Paired sample *t*-tests were conducted to compare pre- and post-test scores, allowing for the assessment of changes in academic performance after using *"DALL·E"*.

FINDINGS

The findings of this study are based on the analysis of data collected through pre-tests, post-tests, and the Paas's cognitive load assessment. Descriptive statistics revealed that upon completion of the post-test, a statistically significant improvement in academic performance was observed, as determined by paired sample t-tests. These results suggest that the use of *"DALL·E"* generative AI applications had a positive impact on students' academic outcomes, highlighting its potential as an educational tool for enhancing learning in postgraduate arts and design programs. PCLS results indicated that participants reported an increase in perceived mental demand and effort after using "*DALL·E*," overall workload was deemed manageable. These findings imply that "*DALL·E*" generative AI applications can be integrated into educational contexts without overwhelming students.

CONCLUSION

The integration of generative AI applications like *"DALL·E"* in education holds great promise for enhancing learning experiences and outcomes. This research that aims to investigate the

effect of *"DALL·E"* on postgraduate students in Malaysia would confirm the circumstance. By examining its impact on academic performance and cognitive load, this research provides valuable insights into the role of generative AI multimedia applications in general, and *"DALL·E"* in particular in higher education in Malaysia. The findings imply the way the educators should design the educational materials that leverage AI technology. This ensures that such AI applications will be used in ways that optimize learning and minimize cognitive load.

REFERENCES

Brown, A., & Lee, J. (2022). Cognitive Load and User Experience in AI-Powered Educational Tools. *International Journal of Educational Technology in Higher Education*, 19(4), 102-118.

Chen, X., Liu, Y., & Wang, Q. (2022). The Impact of AI Tools on Student Engagement and Learning Outcomes: A Meta-Analysis. *Journal of Educational Technology Research and Development*, 70(2), 85-101.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340.

Sweller, J., Ayres, P., & Kalyuga, S. (2019). Cognitive Load Theory: Exploring the Interaction Between Information Structures and Cognitive Architecture. *Educational Psychology Review*, 31(2), 261-278.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2020). Unified Theory of Acceptance and Use of Technology: A Synthesis and the Road Ahead. *Journal of the Association for Information Systems*, 21(6), 328-376.

Zhang, L., & Wu, H. (2023). Exploring the Role of AI Generative Tools in Creative Arts Education. *Journal of Creative Arts and Technology*, 15(1), 67-82.

FRAMING FUNDAMENTAL TAXONOMY OF GENERATIVE AI APPLICATIONS IN EDUCATIONAL SETTINGS FOR SCHOOL STUDENTS

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ABSTRACT
Generative Artificial Intelligence (GenAI) technologies have transformed creative processes by merging human ingenuity with advanced machine learning. Despite their potential, GenAI outputs often fail to align perfectly with educational usability and curricular needs, necessitating continuous refinements. This study extends Strobel et al.'s (2024) taxonomy by introducing three key dimensions—Usability, Coherence, and Interactivity—grounded in creative cognition, human-computer interaction (HCI), and constructivist learning theories. Using a qualitative approach that combines expert interviews and case studies, this research develops a comprehensive framework for optimizing GenAI in varied educational settings, enhancing creativity and cognitive development. Findings highlight that integrating these dimensions improves contextual relevance, adaptability, and user engagement, providing practical insights for developers, educators, and policymakers. This study enriches the broader discourse on AI's educational role, emphasizing structured, ethical, and culturally sensitive implementation.

Keywords: Artificial Intelligence; Creative Cognition; Generative AI; Educational Technology; Cognitive Development; Usability; Coherence; Interactivity; Ethical AI; Cultural Considerations.

INTRODUCTION

GenAI, exemplified by technologies like DALL·E and Suno AI Music Generator, democratizes content creation, enabling users with minimal expertise to create multimedia. This capability is particularly promising in education, where it can foster creativity and engagement (Ramesh et al., 2021). However, outputs often require iterative prompt refinements to align with educators' and students' specific needs, complicating seamless integration. Existing taxonomies, such as Strobel et al.'s (2024), categorize GenAI applications but overlook practical dimensions essential for educational use, including Usability, Coherence, and Interactivity.

Grounded in creative cognition theory, which frames creativity as the interplay of generative and evaluative processes (Finke, Ward, & Smith, 1992), HCI emphasizing user-centric design (Nielsen, 1994), and constructivist learning theory advocating for active, personalized engagement (Piaget, 1950), this study seeks to extend current frameworks. Addressing usability ensures intuitive GenAI tool use; coherence aligns content with educational goals; and interactivity supports dynamic learning, making tools adaptable to diverse educational contexts.

METHODOLOGY

This research utilized a qualitative design, integrating expert interviews and case studies to construct an extended taxonomy for GenAI applications. Twenty experts, selected via purposive sampling, contributed to this study: five AI developers, five cognitive psychologists,

five educational technologists, and five cultural studies scholars. Semi-structured interviews, conducted online, probed insights into Usability, Coherence, and Interactivity, challenges with curricular alignment, and cultural influences on GenAI effectiveness. The questions were designed to explore practical integration strategies and the critical dimensions influencing tool effectiveness.

The study incorporated case studies from five diverse educational institutions—two primary schools, two secondary schools, and one university—selected for their active integration of GenAI. Observations, interviews with educators and students, and analyses of GenAI outputs provided empirical evidence of how these dimensions impacted real-world applications. Thematic analysis using NVivo 12 was conducted, coding interview transcripts and observational data to identify recurring themes.

FINDINGS

The findings underscore the significant potential of GenAI to enhance creative processes and learning when tools are evaluated through Usability, Coherence, and Interactivity. GenAI tools, such as DALL·E, facilitated diverse creative outputs, aligning with creative cognition theory by supporting generative and evaluative thinking. The iterative refinement process promoted deeper student engagement and metacognitive awareness. Educators observed that GenAI's interactive nature kept students engaged through real-time feedback and personalized learning, aligning with constructivist principles (Vygotsky, 1978).

Usability was pivotal for tool adoption, as user-friendly interfaces and seamless integration into lesson plans facilitated broader educational use. High usability allowed educators and students to focus on creativity rather than learning the technology itself (Nielsen, 1994). Coherent outputs ensured alignment with curricular goals, supporting learning objectives and enhancing understanding. However, instances of incoherent content highlighted the need for prompt refinement and adjustments in AI algorithms to improve cultural and contextual relevance. Interactivity provided personalized learning paths and adaptive feedback, promoting sustained motivation and cognitive growth (Johnson et al., 2016).

Cultural considerations were crucial for effective adoption. GenAI tools that aligned with local policies and adapted to cultural contexts enhanced inclusivity and equity. Conversely, culturally insensitive content reduced engagement and highlighted the necessity for region-specific adaptations. Ethical issues, including authorship and data privacy, were prevalent, emphasizing the need for clear guidelines and algorithmic transparency (European Commission, 2020).

DISCUSSION

Integrating Usability, Coherence, and Interactivity into the taxonomy aligns with established theories emphasizing user-friendly design, cognitive engagement, and active learning. These dimensions are essential for fostering creativity that balances idea generation and critical evaluation (Finke, Ward, & Smith, 1992). Practical implications include designing GenAI tools that are accessible, culturally relevant, and supportive of adaptive learning. Usability facilitates

seamless classroom integration; coherence ensures meaningful content that aligns with educational objectives; and interactivity supports personalized, active learning experiences (Piaget, 1950; Vygotsky, 1978).

Ethical and societal considerations are paramount. Addressing authorship and intellectual property is crucial for maintaining academic integrity. Developers should prioritize transparency to foster trust among users. While GenAI enhances creativity and learning, over-reliance may hinder independent thinking, highlighting the need for a balanced approach that uses AI as a supportive, rather than substitutive, tool.

CONCLUSION

This study concludes that GenAI tools hold significant potential to enhance educational creativity and cognitive development through Usability, Coherence, and Interactivity. By extending the taxonomy, this research provides a framework that helps developers and educators optimize GenAI tools for practical, meaningful use. The findings emphasize a balanced approach where AI complements human cognitive processes, fostering creative exploration, critical thinking, and personalized learning. Future research should refine these dimensions to address evolving challenges and ensure ethical, culturally sensitive AI integration in education.

REFERENCES

Borenstein, J., Herkert, J. R., & Miller, K. W. (2020). The ethics of autonomous systems: A case study of the Artificial Intelligence development lifecycle. *Science and Engineering Ethics, 26*(3), 1313-1333. https://doi.org/10.1007/s11948-019-00119-x

European Commission. (2020). *White paper on artificial intelligence: A European approach to excellence and trust*. https://ec.europa.eu/info/sites/default/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf

Goodfellow, I., Bengio, Y., & Courville, A. (2014). *Deep learning*. MIT Press.

Johnson, L., Becker, S. A., Estrada, V., & Freeman, A. (2016). *NMC Horizon Report: 2016 Higher Education Edition*. The New Media Consortium.

Luckin, R. (2018). *Machine learning and human intelligence: The future of education for the 21st century*. UCL IOE Press.

Luckin, R. (2022). Enhancing education with artificial intelligence: Teaching and learning in the age of AI. *Educational Review, 74*(5), 678-693. https://doi.org/10.1080/00131911.2021.1875205

Mazzone, M., & Elgammal, A. (2019). Art, creativity, and the potential of artificial intelligence. *Arts, 8*(1), 26. https://doi.org/10.3390/arts8010026

O'Neil, C. (2016). *Weapons of math destruction: How big data increases inequality and threatens democracy*. Crown Publishing Group.

Ramesh, A., Pavlov, M., Goh, G., Gray, S., Voss, C., Radford, A., … & Sutskever, I. (2021). Zero-shot text-to-image generation. *arXiv preprint arXiv:2102.12092*. https://arxiv.org/abs/2102.12092

Strobel, C., Smith, J., & Lee, D. (2024). Taxonomy of generative AI applications. *Journal of Educational Technology*, 37(2), 145-159.

EXPLORING THE LEARNING EXPERIENCE OF GENERATIVE AI MULTIMEDIA TOOLS IN LEARNING

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ABSTRACT

This study explores the learning experiences of postgraduate students using Luma Dream Machine, a generative AI multimedia tool, in their academic pursuits. Using a qualitative approach and grounded theory analysis, data were collected through focus group interviews with five postgraduate students from a reputable university in northern part of Malaysia. The findings revealed several emergent themes, namely ease of use, creativity enhancement, and the challenges of technological dependency. This study contributes to the understanding of how generative AI multimedia tools can be integrated into educational settings to enhance learning experiences.

Keywords: AI generative applications; learning experiences; Constructivist Theory.

INTRODUCTION

Driven by the promise of personalized learning and enhanced educational outcomes, the integration of Artificial Intelligence (AI) in education has been gaining momentum in recent years. However, the impact of these tools on students' learning experiences remains underexplored, particularly in the context of higher education. This research aims to explore the learning experiences of postgraduate students using Luma Dream Machine, shedding light on the potential benefits and challenges associated with its use in learning.

PROBLEM STATEMENT

The major problem of postgraduate students in learning today is that they overreliance on learning materials provided by their lecturers and thus facing the potential diminishment of their critical thinking skills and creative problem-solving skills.

The second problem is the challenges they face in balancing technology and traditional learning approaches.

The third problem is that there is insufficiency of postgraduate student preparedness for AI-Enhanced Learning Environments.

The fourth problem is there is limited empirical evidence on how the generative AI multimedia tools actually influence postgraduate students' learning experiences, engagement and motivation.

RESEARCH OBJECTIVES

The objectives of this study are as follows:

RO1: To explore the learning experiences of postgraduate students using *Luma Dream Machine* generative AI multimedia tools.

RO2: To identify the benefits and challenges of using *Luma Dream Machine* in academic learning.

RO3: To develop a grounded theory that explains the role of *Luma Dream Machine* in enhancing or hindering the learning process.

RESEARCH QUESTIONS

The study aims to answer the following research questions:

RQ1: What are the learning experiences of postgraduate students using *Luma Dream Machine* AI tool?

RQ2: How do students perceive the benefits and challenges of using *Luma Dream Machine* AI tool in their academic work?

RQ3: What are the emergent themes that explain the role of *Luma Dream Machine* AI tool in the learning process?

THEORETICAL FRAMEWORK

This study is grounded in the constructivist learning theory, which posits that learners construct knowledge through their experiences and interactions with the world (Piaget, 1954). In the context of generative AI tools, constructivist theory suggests that students' engagement with generative AI technologies can facilitate deeper learning by allowing them to create and manipulate content actively. With reference on this theory, this study utilizes grounded theory as a methodological framework to collect relevant data from students' experiences with *Luma Dream Machine*.

LITERATURE REVIEW

Although the application of generative AI tools in education has been explored in various contexts, past research mostly focus on their potential to enhance creativity and personalized learning (Johnson et al., 2020). Previous studies have highlighted the potential of AI to enhance learning by providing personalized feedback and adaptive learning paths (Chen et al., 2019). Generative AI tools are also found to have great influence on all these aspects in both positive and negative ways.

RESEARCH METHODOLOGY

This study adopts a qualitative research design to investigate the lived experience of the participants. Grounded theory is used to explore the learning experiences of postgraduate students with Luma Dream Machine because firstly, grounded theory is particularly suited for exploring new or under-researched complex phenomena where existing theories may not fully capture the nuances of the experience (Glaser & Strauss, 1967). Secondly, grounded theory has been widely used in educational research to develop theories based on empirical data (Charmaz, 2006).

PARTICIPANTS

The participants consisted of five postgraduate students from diverse academic disciplines in a northern part of Malaysia, all of whom had experience using Luma Dream Machine in their studies. The selection criteria ensured that participants could provide rich insights into the use of the AI tool, which is Luma Dream Machine in different academic contexts.

DATA COLLECTION

Data were collected through focus group interviews using unstructured open-ended questionnaire, where participants were encouraged to discuss their experiences, challenges, and perceptions of using Luma Dream Machine. Secondly, it allowed the researcher to explore various aspects of the learning experience in depth. The interviews were audio-recorded with permission and transcribed for analysis. The interviews were conducted until data saturation was reached. This ensures that there will be no new themes emerged.

DATA ANALYSIS

The data were analyzed using grounded theory methods, involving open coding, axial coding, and selective coding (Strauss & Corbin, 1998). During open coding, the transcripts were examined line by line to identify significant statements and codes. Axial coding involved organizing these codes into categories based on their relationships, while selective coding focused on identifying the core category that emerged from the data.

FINDINGS

The analysis of the data revealed three emergent themes related to the learning experiences of postgraduate students using *Luma Dream Machine*, namely ease of use, creativity enhancement, and challenges of technological dependency. The findings are presented below with supporting quotations from the participants.

- **Ease Of Use**

Participants consistently highlighted the user-friendly nature of Luma Dream Machine, noting that it allowed them to create content with minimal effort. One participant remarked, “The interface is very intuitive, and I was able to start creating images almost immediately without needing much instruction.”

- **Creativity Enhancement**

Another significant theme that emerged was the tool’s ability to enhance creativity. Participants expressed that Luma Dream Machine enabled them to experiment with ideas and create content that they might not have been able to produce on their own. “I was able to generate ideas and visuals that I would never have thought of without the tool,” one participant stated.

- **Challenges Of Technological Dependency**

Despite the positive feedback, participants also expressed concerns about becoming too reliant on the AI tool. “I worry that I’m losing some of my own creativity because I’m relying on the tool to generate ideas for me,” one participant noted.

SIGNIFICANCE OF THE STUDY

This study contributes to the understanding of how generative AI multimedia tools in general, and Luma Dream Machine in specific influence the learning experiences of postgraduate students. By using grounded theory, the study provides a nuanced understanding of the benefits and challenges associated with these tools. The findings of this study can inform the design

and implementation of AI tools in educational settings, which ensures that they enhance rather than hinder the learning process.

IMPLICATIONS

The findings of this study have two implications for the integration of AI tools in general, and Luma Dream Machine in specific in educational settings. First, the ease of use and creativity enhancement provided by Luma Dream Machine suggests that generative AI tools can be valuable in promoting student engagement and facilitating creative expressions. Secondly, educators should seriously consider incorporating generative AI multimedia tools into the curriculum in a way that it encourages critical thinking and self-reflection. This ensures postgraduate students to develop a well-rounded skill set.

CONCLUSION

This study explored the learning experiences of postgraduate students using Luma Dream Machine, a generative AI tool. The findings reveal that while the tool offers significant benefits in terms of ease of use and creativity enhancement. These insights contribute to the broader discourse on the role of AI in education, subsequently highlighting the need for thoughtful integration of technology in the learning process.

REFERENCES

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. Sage.

Chen, X., Zou, D., Xie, H., & Wang, F. L. (2019). Application and theory gaps during the rise of artificial intelligence in education. *Computers and Education: Artificial Intelligence*, 1, 100002.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Aldine Publishing.

Johnson, R., & Lee, C. (2020). The impact of generative AI on creativity and learning: A theoretical perspective. *Journal of Educational Technology, 45*(2), 123-135.

Piaget, J. (1954). *The construction of reality in the child.* Basic Books.

Selwyn, N. (2016). *Is technology good for education?* John Wiley & Sons.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory (2nd ed.).* Sage.

LEVERAGING SOCIAL MEDIA FOR CYBER SECURITY AWARENESS: A CASE STUDY

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INTRODUCTION

This study explores how the Royal Malaysia Police (PDRM) Cyber Crime Alert Facebook page enhances cyber security awareness through social media. The platform aims to educate the public on cybercrime prevention, using various communication styles, including general information, warnings, lessons, and awareness campaigns. Content analysis and thematic analysis of posts by the PDRM Facebook reveal that the page consistently informs the public about cybercrime trends, prevention methods, and law enforcement activities.

METHODOLOGY

The study identifies four key themes: general cyber security information, warnings, lessons on cybercrime prevention, and awareness-building. Additionally, the presence of teaching, cognitive, and social elements within the Community of Inquiry (CoI) framework is evident, suggesting that Facebook can serve as an informal learning platform.

FINDINGS

The findings underscore the PDRM's effective use of social media to engage and educate the public about cyber security, helping to curb the spread of cybercrime.

CONCLUSION

This study contributes to understanding how law enforcement agencies can leverage social media to promote security awareness in a digital age.

THE IMPACT OF GAME-BASED TEACHING WITH INTERACTIVE WHITEBOARDS ON KINDERGARTEN EDUCATION IN CHINA: A CASE STUDY IN MATHEMATICS LEARNING

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INTRODUCTION

In the field of preschool education in China, there is strong advocacy for implementing "game-based teaching" in kindergartens teaching that embodies the spirit and philosophy of play. In the design and implementation of game-based teaching, teachers are encouraged to utilize various media and information technologies, adopting teaching methods and strategies that integrate education with entertainment.

METHODOLOGY

This approach aims to place children in a "play state" where they can "spur themselves on without the need for a whip," allowing them to experience the spirit of freedom, autonomy, joy, and creativity. With the rapid development of information technology, interactive whiteboards (IWB) have emerged as a new teaching tool and are gradually being widely applied in kindergarten curricula and instruction in China, especially in mathematics subjects.

FINDINGS

This study implements an experimental design comprised of 60 kindergarten students in the Providence, of China.

CONCLUSION

The study revealed that using game-based teaching with interactive electronic whiteboards offers several benefits, including real-time interaction, active participation, immediate feedback, and flexibility in teaching. These advantages positively impact children’s learning by boosting their engagement, enhancing their knowledge and skills, encouraging deeper thinking and reflection, and improving their emotions, attitudes, and social interactions, ultimately leading to better overall performance.

SECTION 2

Science, Engineering, Computing & Emerging Disciplines

CONSUMERS RELATIONSHIP PRONENESS, BENEFITS AND SATISFACTION ON SELECT CASUAL DINING RESTAURANTS IN MALABON CITY

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ABSTRACT

Food and beverage establishments are greatly patronized by people all over the world. It results in highly recognized and huge competition, which seems to limit the intentions of the newly entered restaurant business. Based on previous studies, this study suggests that strategic management may lead to creating loyalty among customers. Also, confidence, social, and special treatment benefits were suggested for developing relationships with their customers. A SmartPLS4.0 software program was utilized to structure a quantitative correlation model based on 301 customers dining at restaurants in Malabon City, Philippines. The findings suggest that customer trust is crucial for organizations in the food industry as it cultivates loyalty towards the services provided. The correlation between consumer relationship proneness and social benefits, special treatment benefits, and personalized attention is statistically significant in this study. The findings of this study may be essential to market share and can be seen as lucrative and mutually advantageous strategic management. Conclusively, the suggested model can be adopted by different stakeholders in food businesses by equipping them with the necessary information to develop resilient casual dining enterprises. Future studies may replicate the suggested model in a different location or in another developing country. Future studies may also consider mixed studies and statistical software such as WarpPLS 8.0 may be considered for analysis.

Keywords: Consumer Relationship Proneness; Confidence Benefits; Social Benefits; Special Treatment Benefits; Satisfaction.

INTRODUCTION

In the competitive casual dining market, effective building and marketing strategies are essential for success, with exceptional customer service being crucial. Quality service fosters customer loyalty, emphasizing the importance of strong customer relationships through benefits and brand experiences. Understanding consumer relationship proneness is crucial for customer relationship management and high satisfaction levels. Future research should focus on the effects of CRP on customer satisfaction, particularly in terms of social interaction, special treatment, and confidence. Prioritizing customer relationships, confidence building, social engagement, and special treatment are key for success in the food and beverage industry (Fader, 2020). Relationship-oriented consumers are valuable for restaurants, as they show greater loyalty, positive word-of-mouth, and higher satisfaction levels (Ing et al., 2019; Wu et al., 2019). Confidence in a restaurant, developed through effective staff interaction, significantly enhances satisfaction (Hong et al., 2020).

Feng et al. (2015) propose that strong business bonds increase consumer confidence, leading to the hypothesis that consumer relationship proneness (CRP) positively impacts confidence benefits (H1). Frequent dining interactions can deepen relationships with staff, enhancing satisfaction and loyalty. Research suggests that highly relational consumers perceive greater social benefits from these interactions (Lo et al., 2018), supporting the hypothesis that CRP

positively affects perceived social benefits (H2). Special treatment benefits, such as personalized service, may further strengthen customer relationships (Hong et al., 2020; Wu et al., 2019), forming the hypothesis that CRP can be influenced by special treatment benefits (H3). Individuals with high CRP are likely more satisfied with brands due to confidence, personalization, and special treatment (Risitano et al., 2017), which supports the hypothesis that CRP impacts satisfaction levels (H4). Confidence benefits, which reduce risks, are expected to enhance satisfaction (H5). Social benefits, like a sense of belonging, may also enhance satisfaction (Fatikhaturrohmah et al., 2020), supporting the hypothesis that social benefits impact satisfaction (H6). Special treatment benefits, including personalized recommendations, likely increase satisfaction by enhancing perceived value (Hong et al., 2020; Kim & Ok, 2009), leading to the hypothesis that special treatment benefits influence satisfaction (H7). Finally, CRP-related benefits—confidence, social, and special treatment—may indirectly enhance satisfaction in casual dining, suggesting an indirect effect of CRP on satisfaction through these benefits (H8a-c).

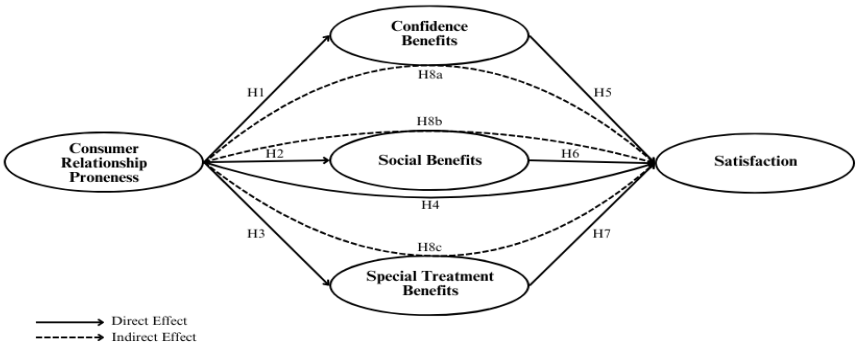

Figure 1: *Hypothetical Framework Suggested for the Study*

METHODOLOGY

Research Design and Data Analysis

The study aims to investigate the relationship between consumer relationship proneness and satisfaction through confidence, social, and special treatment benefits. It gathers data from guests based on demographics such as age, gender, civil status, and monthly income. The research uses a 5-point Likert scale questionnaire to measure consumer relationship proneness and its impact on satisfaction (Solomon et al., 2024). Original Research Article Influence of travel experience on travel intentions and tourist behavior. Journal of Autonomous Intelligence, 7(5).). Data collection is conducted online with customers from seven restaurants in Malabon City, Philippines, using a purposive and convenience sampling technique. A pilot study with 20 restaurant customers in Manila was conducted before full data collection. The study follows strong research methodologies and ensures data privacy and professional language in the questionnaire. Analysis is done using SmartPLS4. 0 software to determine both direct and indirect effects of consumer relationship proneness on satisfaction. Reliability and validity are maintained through Cronbach's alpha, composite reliability, and average variance extracted. The study upholds a minimum threshold of 0. 7 for credibility in the results.

RESULTS AND DISCUSSION

The demographic analysis of 301 respondents highlights that the majority are young adults aged 18-30 (62.1%), with a significant portion being women (62.46%). This demographic tends to prefer casual dining due to the emphasis on physical environment, food, and service quality. Notably, the single demographic (73.09%) is prominent, underscoring the trend of solo dining. Employed individuals (54.82%) dominate the patronage, likely because of their financial capability to dine out. Restaurant G is the most popular choice (30.23%), indicating the importance of location in dining decisions. This study confirms a strong link between consumer relationship proneness (CRP), perceived benefits, and satisfaction in casual dining, supported by high reliability (Cronbach's alpha > 0.7). Confidence benefits (average rating of 4.02) show a strong positive correlation with CRP ($r = 0.682$), while special treatment benefits are less influential (average rating of 3.08).

Confidence benefits emerge as the strongest predictor of satisfaction ($r = 0.793$), emphasizing the importance of trust and reliability in dining experiences. Customers with high CRP perceive greater confidence, social, and special treatment benefits ($p < 0.01$ for each), with confidence ($p < 0.01$) and social benefits ($p = .002$) significantly predicting satisfaction levels. The study reveals significant indirect effects of CRP on satisfaction, mediated by confidence benefits (95% CI: .289, .497) and social benefits (95% CI: .022, .211). These findings highlight the need for businesses to build genuine customer relationships and offer valuable benefits to enhance satisfaction, providing insights for those looking to enter the food industry.

CONCLUSION AND RECOMMENDATION

The study revealed that Consumer Relationship Proneness (CRP) predicts Confidence Benefit (CB), Social Benefit (SB), and Special Treatment Benefit (STB), which consequently, predict Satisfaction on guests eating in Casual dining restaurants in Malabon City. All the hypotheses included in this study were supported by Consumer Relationship Proneness to Satisfaction. Restaurant establishments show the importance of brand loyalty to service providers, especially that the service they offer is almost always intangible (Wirtz & Lovelock, 2018). Thus, a study examined how restaurant image and customer orientation, which is a special treatment benefit, affect the relative importance of both procedure and outcome service quality in customer satisfaction.

REFERENCES

Fader, P. (2020). Customer Centricity: Focus on the Right Customers for Strategic Advantage. University of Pennsylvania Press.

Fatikhaturrohmah, F., Suharyono, S. and Kusumawati, A. (2020), "Pengaruh relational benefits terhadap satisfaction, trust, dan advocacy", Profit: Journal Administrasi Bisnis, pp. 93-103.

Feng, X., Zhang, M., & Ye, J. (2015). Empirical Study of the Influence of Consumer Relationship Proneness on Customer Loyalty in Service Context. International Journal of u- and e-Service, Science and Technology, 8(4), 195-206.

Hong, J., Kim, B., & Oh, S. (2020, July 12). The Relationship Benefits of Auto Maintenance and Repair Service: A Case Study of Korea. Multidisciplinary Digital Publishing Institute, 10(7), 115-115.

Kim, W., & Ok, C. (2009). The Effects of Relational Benefits on Customers' Perception of Favorable Inequity, Affective Commitment, and Repurchase Intention in Full-Service Restaurants. SAGE Publishing, 33(2), 227-244.

Risitano, M., Sorrentino, A., & Quintano, M. (2017, November 8). Critical Success Factors in Strategic Brand Management in Luxury Fashion Markets: The Case of Isaia.

Solomon, A. O., Yao, A. J., Ferrer, R. L., & Cusipag, M. N. (2024). Original Research Article Influence of travel experience on travel intentions and tourist behavior. Journal of Autonomous Intelligence, 7(5).

Soumutul, M., Sagala, R., Dianti, F., Yusran, H., & Masnita, Y. (2022). Customer Relationship Proneness: Is It Important for Customer Loyalty?

Wirtz, J., & Lovelock, C. (2022). Services Marketing: People, Technology, Strategy, 9th edition. 10.1142/y0024.

INVESTIGATING THE IMPACT OF ARTIFICIAL INTELLIGENCE ON HUMAN RESOURCE FUNCTIONS IN THE HEALTH SECTOR OF THE PHILIPPINES

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ABSTRACT

Artificial intelligence (AI) is a new technology which has spread fast in many institutions in the Philippines and has been used in many aspects of human resource functions. Thus, this study investigated how artificial intelligence had been perceived by human resource practitioners working in healthcare institutions in the Philippines. Two hundred one electronic survey questionnaires via Google form were distributed discreetly in hospitals and clinic centers. The researchers examined the effects of perceived risks and technological awareness among the participants. Their objective was to find out if there is a significant relationship between human resource functions and artificial intelligence. PLS-SEM or partial least squares structural equation modeling and bootstrapping were used for the quantitative research design. The findings showed that artificial intelligence is significantly correlated with personal innovativeness and that human resource functions have significant relationship with personal innovativeness and technological awareness. However, the relationship between human resource persons and artificial intelligence was not positively supported. Practitioners were not yet ready to fully implement artificial intelligence in their workplace and reap its full benefits. Lastly, perceived risks notably affected the connection between human resource functions and technological awareness. The results of the study heavily suggest that more health professionals in the Philippines will eventually adapt artificial intelligence technology in the future to streamline the process of use, eliminate possible flaws committed by health practitioners, and improve the performance of their organization.

Keywords: Human resource functions; artificial intelligence; technological awareness; personal innovativeness; perceived risk

INTRODUCTION

Main text/Content font: Century. Font size: Section (12 pt), subsection (11 pt), Sub-subsection (10 pt), Main text (9 pt). For the main text (contents) and references, two column formatting is required.

In geformatted with 1-inch side margins, 1.5-inch top margin anneral, papers will have sections for the introduction, methodology, results and discussions, acknowledgements and conclusions. However, authors may exercise some flexibility in organizing the content of their papers. The paper should be d 1-inch bottom margin in standard letter size (8.5” x 11”). The whole paper should be single-spaced and justified. Indent paragraphs by 0.5-inch.

Artificial intelligence (AI) functions in a variety of ways. It simulates tasks requiring human intellect, such as reasoning, sensory comprehension, adaptation, and deep learning. It analyzes data to identify patterns, aiding in recruitment, employee retention, and talent management (Tagliaferri,et al.,2020). This study aims to understand how AI can be used to improve efficiency, decision-making, and overall performance in HR management within the context

of the Philippines, focusing on the relationships between AI, HR functions, personal innovativeness, technological awareness, and perceived risk

Related Literature on Human Resource

Human Resources (HR) is a critical department responsible for managing people-related functions within organizations. This includes tasks such as recruitment, on boarding, performance management, training, and organizational development. Effective HR management is essential for organizational success, ensuring that the right people are in the right roles and that they are motivated and engaged (Munir et al, 2020).)

AI And Human Resource Functions

In HR, AI can be used for tasks like screening resumes, scheduling interviews, and providing personalized training. AI can also analyze large data sets to identify patterns and trends, helping HR professionals make more informed decisions about recruitment, retention, and talent management (Bhardwaj et al., 2020). The study explores the impact of AI on HR functions, recognizing its ability to automate repetitive tasks, improve decision-making, and enhance efficiency. The author highlights the potential of AI in HR for tasks such as screening resumes, scheduling interviews, and providing personalized training (Davenport et al., 2020). It was also suggested that AI is capable to analyze large data sets to identify patterns and trends, enabling HR professionals to make more informed decisions regarding recruitment, retention, and talent management

Anchored Model: TAM

The Technology Acceptance Model (TAM), developed by Davis, has been proven effective in promoting technology adoption. TAM considers how perceived utility (PU) and perceived ease of use (PEOU) influence technology acceptance. *PU* refers to the belief that using technology enhances performance, while *PEOU* measures the perceived effortlessness of technology use (Bankins, 2021).

Hypotheses Development

The researchers aim to explore the influence of personal innovativeness, technological awareness, and perceived risk on the adoption and utilization of AI in HR functions within the Philippine healthcare sector. Studies argue that AI can enhance efficiency and accuracy in HR functions, while personal innovativeness can influence how readily HR professionals embrace and utilize AI (Bhardwaj et al., 2020).

This particular study proposes six hypotheses to investigate the relationships between key variables: *H1: human resource function on artificial intelligence (AI); H2: human resource function on personal innovativeness; H3: Human Resource and Technological Awareness; H4: Personal Innovativeness and Artificial Intelligence; - H5: Perceived Risk on Technological Awareness and - H6: Perceived Risk on Artificial Intelligence.*

Figure 1 presents a hypothetical framework for the study, illustrating the relationships between the key variables: human resource functions, AI, personal innovativeness, technological awareness, and perceived risk.

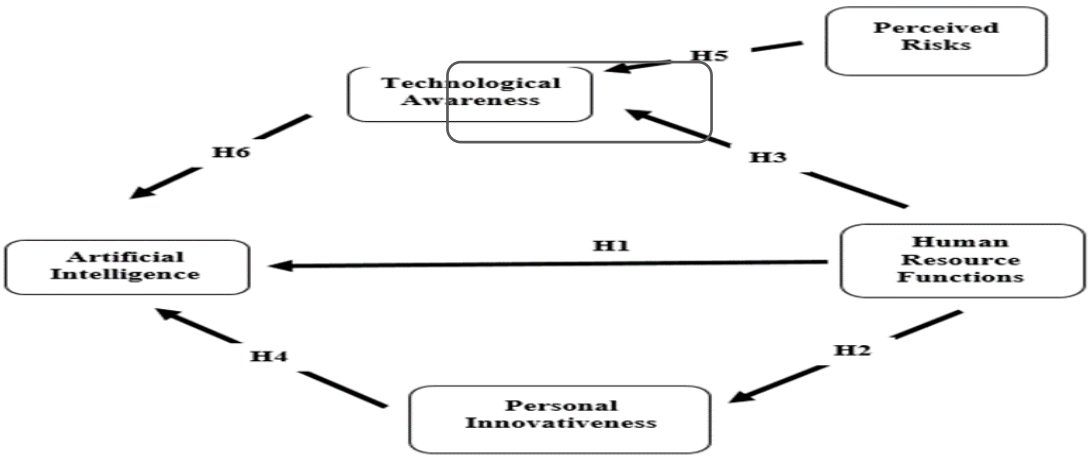

Figure 1: *Hypothetical Framework Suggested for the Study*

METHODOLOGY

Research Design

The study employs a quantitative research design, relying on numerical data and statistical analysis to investigate causal relationships between variables. The questionnaire consists of six sections: demographics, artificial intelligence, technological awareness, personal innovativeness, perceived risks, and human resource functions and it is a 5-point Likert scale questionnaire for responses.

This study utilized a combination of purposive and convenience sampling techniques to select participants *(Aldhein,2020)*. The utilized 201 samples came from the HR professionals in the Philippine healthcare sector.

Data Analysis

The study considered SmartPLS (4.1.0.1) for data analysis, a software package specifically designed for partial least squares structural equation modeling (PLS-SEM). The researchers assess reliability and validity of the measurement instruments using *Cronbach's alpha, composite reliability, and average variance extracted (AVE).*

Discriminant validity is assessed using the Heterotrait-Monotrait (HTMT) ratio and indicator cross-loading. However, the study reports the results of the data analysis, focusing on the reliability and validity of the measurement instruments, the path coefficients, and the impact of AI on HR functions. *Construct Reliability and Validity;* construct reliability and validity such as average variance extracted (AVE), rho-A, and Cronbach's alpha achieved (Hair et al..,2019, Ayodele et al,.2018).

RESULTS AND DISCUSSION

The construct reliability and validity quality criteria (composite reliability (CR), average variance extracted (AVE) 0f 0.5, rho-A, and Cronbach's alpha, factor loadings and composite reliability of 0.7) that were applied are summarized in ***Table 1***

Table 1: Retained Items

CODES-CONSTRUCT'S VALIDITY AND RELIABILITY: RETAINED ITEMS	FA>0.7
Artificial Intelligence (AI) : Alpha (0.803); Rho (0.839); Comp (0.869); Ave (0.624)	***FA***
AI 2: The implementation of Artificial Intelligence in hospitals is capable of improving clinical decision-making.	0.849
AI 3: Applying Artificial Intelligence in hospitals could progress the delivery of direct easygoing care	0.842
AI 5: An ethical principle is in place for the application of Artificial Intelligence in the healthcare sector	0.716
AI 6: Artificial Intelligence will reduce healthcare waiting times	0.743
Technological Awareness (TA): Alpha (0.910); Rho (0.919); Comp (0.933); Ave (0.735)	***FA***
TA 1: I place great importance on being the first to purchase new technology	0.841
TA 2: I enjoy making high-tech purchases before most other people are aware of them	0.872
TA 3: Being the first to procure a high-tech item gives me a rush	0.912
TA 4: I wish to be the owner of cutting-edge technology goods	0.847
TA 5: I frequently purchase new technology when I see it on the market because it is new	0.812
Personal Innovativeness (PINN): Alpha (0.830); Rho (0.841); Comp (0.886); Ave (0.660)	***FA***
PINN 1: I am excited about the idea of using new technology	0.747
PINN 2: Using new technology is an acceptable solution to my current work	0.853
PINN 4: I plan to use the latest technology in the near future	0.852
PINN 5: I would love that my current company to adapt the latest technologies in the near future	0.793
Perceived Risk (PR): Alpha (0.916); Rho (0.969); Comp (0.936); Ave (0.744)	***FA***
PR 1: When Artificial Intelligence is used, my personal data cannot be kept private	0.801
PR 2: When using Artificial Intelligence, I fear that my personal information may be stolen by others	0.875
PR 3: Learning to use Artificial Intelligence in the healthcare institutions will spend too much time	0.870
PR 4: Integrating (AI) in the healthcare sector makes me feel nervous because it might have errors	0.874
PR 5: I am worried to use AI because other people may be able to access my information	0.891
Human Resource Functions (HRF): Alpha (0.887); Rho (0.936); Comp (0.929); Ave (0.813)	***FA***
HRF 3: AI technology helps HR managers to conduct online training and development sessions for employees	0.877
HRF 4: Artificial Intelligence technology provides user-friendly mediums to monitor employees' performance	0.927
HRF 5: Tracking employees' activity through artificial intelligence technology is more efficient and time-saving	0.900

Note(s): FA = Factor loadings (FA)

Bootstrap Report: Path Coefficients

The values of the Path Coefficients are demonstrated in Table 2.

Table 2: ***Path Coefficients Achieved***

Hypothetical Path	T Statistics	P Values
H1: Human resource functions has correlation with artificial intelligence.	0.608	0.543
H2: Human resource functions has been influenced by Personal Innovativeness.	2.876	0.004
H3: Human resource functions has been influenced by Technological Awareness	3.221	0.001
H4: Personal Innovativeness affected by Artificial Intelligence	2.767	0.006
H5: Technological Awareness has some implication of perceived risk.	0.604	0.546
H6: Artificial Intelligence has an Influence in Technological Awareness	0.265	0.791

Findings and Discussion Based on Bootstrap Report

This study used SmartPLS 4 for path analysis to test nine hypotheses, three of which were significant ($p<0.05$). Table 4 indicated that out of the six hypotheses tested, three (H2, H3, and H4) showed significance ($p < 0.05$), indicating that personal innovativeness and technological awareness have a positive impact on human resource functions, and that personal innovativeness is influenced by artificial intelligence. On the other hand, three hypotheses (H1, H5, and H6) did not show significance, suggesting that artificial intelligence does not directly

affect human resource functions, perceived risk does not significantly impact technological awareness, and artificial intelligence does not significantly influence technological awareness.

CONCLUSION AND RECOMMENDATION

The study's findings suggest that while HR professionals recognize the potential benefits of AI, they may not be fully ready to incorporate it into their roles. The results underscore the importance of nurturing personal innovativeness and technological awareness to facilitate the adoption of AI in HR operations. The study also highlights the need for further research to explore the relationships among AI, perceived risk, and technological awareness in the Philippine health sector.

REFERENCES

Aldhein, M. (2020). Interview versus questionnaire from the perspective of CBE members. *International Journal of Education, Learning and Development, 8*(2): 21-41 https://www.eajournals.org/wpcontent/uploads/Interview-versus-Questionnaire-from-the-Perspective-of-CBEMembers.pdf

Ayodele, S., Endozo, A, & Ogbari, M.E. (2018). A study on factors hindering online learning acceptance in developing countries. In *Proceedings of the the 10th International Conference on Education Technology and Computers*, pp. 254-258, 2018.

Bankins, S. (2021). The ethical use of artificial intelligence in human resource management: A decision-making framework. *Ethics Information Technology, 23* (4) 841–854, https://doi.org/10.1007/s10676-021-09619-6.

Bhardwaj, G., Singh, S. V., & Kumar, V. (2020, January). An empirical study of artificial intelligence and its impact on human resource functions. In *2020 International Conference on Computation, Automation and Knowledge Management (ICCAKM)* (pp. 47-51). IEEE.

Davenport, T., Guha, A., Grewal, D., Bressgott, T., 2020. How artificial intelligence will change the future of marketing. *J. Acad. Market. Sci. 48* (1), 24–42.

Hair, J. (2019). Definition of SmartPLS 3. [Online]. https://www.smartpls.com

Munir, M., Amaliyah, A., & Pandin, M.G.R. (2020). , Human Resource Information System and Work Stress during COVID-19 Pandemic,

Tagliaferri SD, Angelova M, Zhao X, Owen PJ, Miller CT, Wilkin T, Belavy DL. Artifcial intelligence to improve back pain outcomes and lessons learnt from clinical classifcation approaches: three systematic reviewsNPJ Digit Med. 2020 Jul 9;3:93. doi: 10.1038/s41746-020-0303-x. PMID: 32665978; PMCID: PMC7347608.

CORPORATE SOCIAL RESPONSIBILITY AND CUSTOMER SATISFACTION TOWARDS CORPORATE REPUTATION OF THE BANKING INDUSTRY

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ABSTRACT
Corporate social responsibility is vital for organizations to achieve sustainability and success, particularly in the banking industry. Banks, as major financial intermediaries, have faced impulsive actions due to the global financial crisis. Engaging in CSR initiatives can have a significant impact on society and the bank's reputation, fostering strong relationships with customers and understanding their needs. However, banks still face reputational risks and customer criticism, as their existence is crucial for society. Researchers conducted a study on leading universal banks to measure the effects of CSR and customer satisfaction on corporate reputation among adults aged 20-64 in the National Capital Region. The correlation coefficient results show that corporate social responsibility and customer satisfaction have a moderate to strong relationship with corporate reputation. The study found that both factors have significant direct or indirect effects on the corporate reputation of the banking industry. Regression analysis revealed an adjusted R squared value of 0.449 and beta values of 0.294 for CSR and 0.472 for customer satisfaction. Engaging in CSR initiatives can lead to customer satisfaction, which in turn boosts the bank's reputation and loyalty. Corporate social responsibility is crucial for banks to enhance their image and retain customers in the industry.

Keywords: Corporate Social Responsibility; Customer Satisfaction; Corporate Reputation.

INTRODUCTION

Corporate social responsibility improves business performance and consumer value by addressing social and environmental issues (Raza et al., 2020). The financial industry increasingly values corporate social responsibility (CSR), recognizing stakeholder needs as vital for business success and reputation. The banking industry's societal impact arises from its financial intermediary role, necessitating a focus on corporate social responsibility. CSR is defined as fair customer treatment, employee well-being, and community and environmental contributions. Additionally, Organizations should engage in community activities like providing aid, supporting programs, and reducing waste and emissions. Thereby, CSR efforts boost customer satisfaction and enhance a company's reputation for social responsibility.

Customer satisfaction is about experience, not just meeting expectations of goods and services, it is something that consumers and customers tend to expect from the products or services before buying and using them (Shamsudin et al., 2018). The value of customer relationships is crucial for business success and long-term loyalty. Thus, service quality affects customer satisfaction by fostering a positive representation of a company in the customer's mind. Hence, companies must be responsible corporate citizens, as their actions in response to societal demands can impact customer satisfaction. Companies use customer satisfaction as a competitive advantage in the market. Participating in CSR activities boosts customer satisfaction, commitment, and loyalty to a company, giving it a competitive edge in the market.

Likewise, customers view corporate social responsibility initiatives positively in banks, which can enhance bank-customer relationships and increase consumer satisfaction.

Corporate reputation is vital for organizations, enhancing client loyalty, and competitive advantage, and demonstrating a strong link to customer satisfaction. Customer perception is shaped by a company's reputation and corporate social responsibility initiatives (Ali et al., 2021). While Public trust in finance has decreased post-recession, harming businesses; corporate social responsibility can help restore.

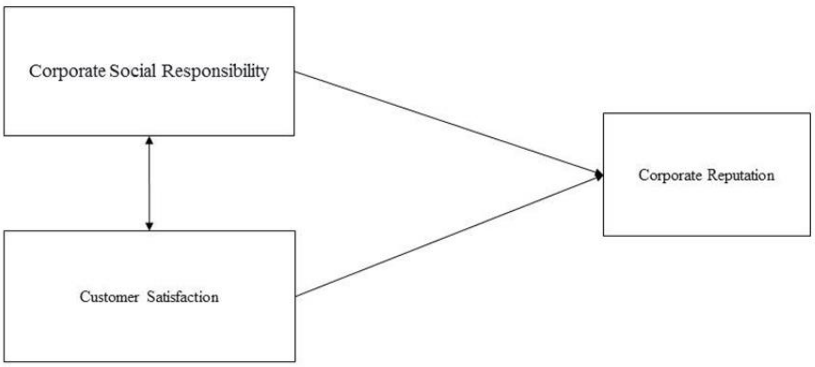

Figure 1. Conceptual framework of the study

METHODOLOGY

Research Design

The correlational research design was used in the study to integrate the different aspects of the emerging issues in the study. Correlational design is a research design that analyses connections of two or more variables in a single group, which might occur at multiple scales. It represents the extent and/or direction of the association which it can be either positive or negative (Devi, Lepcha, & Basnet, 2023).

Correspondingly, the researchers used a correlational research design to study the relationship between CSR initiatives and customer satisfaction in the banking industry. They detailed the research process for addressing industry reputation concerns.

Instrument Development

This research paper used a 14-question survey with a 4-Likert Scale, examining corporate social responsibility, corporate reputation, and customer satisfaction, including demographic information and assessing the impact of socially responsible practices which has a Cronbach's alpha of 0.868. The third section, the customer satisfaction ($\alpha = 0.767$) variable measures the level of satisfaction with the company's products and services. The final section includes four questions assessing corporate reputation, focusing on customer knowledge and identity, influencing organizational attractiveness. The variable's Cronbach's alpha value is 0.746. The Likert scale identifies perceptions of corporate social responsibility and reputation and customer satisfaction: 3.28-4.00 signifies Strongly Agree/Very Satisfied, 2.52-3.27 as Agree/Satisfied, and lower ranges indicate dissatisfaction (Balonias et al., 2022).

RESULTS AND DISCUSSION

Participants Demographics

The data for the study was gathered through a survey answered by 302 bank users in the CAMANAVA area. Demographic information such as age, gender, occupation, and bank used was included in the analysis. The majority of respondents were female (58.9%) and aged between 20-30 years old. Most respondents were unemployed and lived in Caloocan City. Bank no. 1 was the most commonly used bank among the participants (31.5%).

Measurement Model Assessment

The study assesses discriminant validity and reliability through Structural Equation Modeling (SEM) using WarpPLS 7.0, an advanced software for analyzing variable associations and determining data reliability via Cronbach's alpha. Consequently, suggested coefficient Cronbach's Alpha should be greater than or equal to 0.7 (Kock, 2021). In addition, to test the reliability and validity, WarpPLS application was use to perform PLS-SEM for this study.

Codes: Construct reliability and validity

Retained Items	Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Corporate Social Responsibility				
CSR1	0.732			
CSR2	0.803			
CSR3	0.828	0.840	0.887	0.611
CSR4	0.722			
CSR5	0.818			
Customer Satisfaction				
CS1	0.848			
CS2	0.815			
CS3	0.787	0.894	0.922	0.703
CS4	0.886			
CS5	0.854			
Corporate Reputation				
CR1	0.848			
CR2	0.815	0.833	0.889	0.667
CR3	0.787			
CR4	0.886			

Table 1. Measurement items retained

	CSR	CS
CSR	-	-
CS	0.262	-
CR	0.161	0.304

Table 2. Ratio of correlation

Structural Equation Modeling Report

Figure 2 illustrates that corporate social responsibility positively predicts customer satisfaction and corporate reputation, with beta values of 0.51 and 0.30, and p-values below .01. Additionally, customer satisfaction predicts corporate reputation with a beta of 0.48 and a p-value under .1.

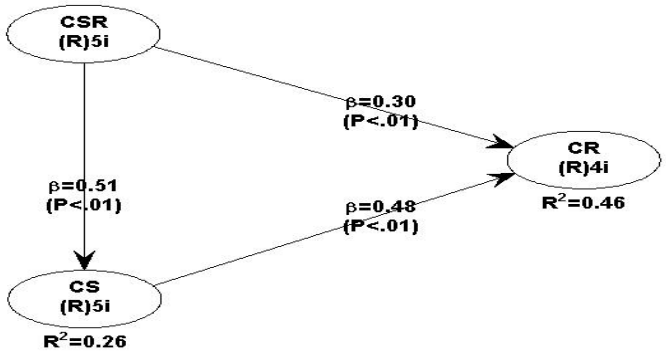

Figure 2. The Structural Model with Beta Coefficients

Hypothesis	β	p	SE	f^2	Supported (Yes/No)
H1. CSR=CR	0.30	<.01	0.055	0.161	Yes
H2. CS=CR	0.48	<.01	0.053	0.304	Yes
H3. CSR=CS	0.51	<.01	0.053	0.262	Yes

Table 3. Direct Effects of Each Hypothesis.

RESULTS AND DISCUSSION

In all hypotheses, it is shown that all of the mentioned variables have a direct or indirect effect on one another, (a) corporate social responsibility; (b) customer satisfaction; (c) corporate reputation. In addition, the result shows corporate social responsibility and customer satisfaction are correlated to each other.

CONCLUSIONS

The study explores customers' perceptions of corporate social responsibility initiatives, revealing that when banks prioritize societal welfare, customer satisfaction with services, products, prices, and overall experiences significantly increases, reflecting a growing recognition of CSR's value of banks in CAMANAVA. The study reveals that bank customers prioritize corporate reputation, focusing on reliability and leadership. It highlights a significant link between corporate social responsibility, customer satisfaction, and reputation. Banks in the Philippines should invest in CSR to enhance customer satisfaction and strengthen their industry reputation.

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REFERENCES

Ali, W., Danni, Y., Latif, B., Kouser, R., & Baqader, S. (2021). Corporate Social Responsibility and Customer Loyalty in Food Chains—Mediating Role of Customer Satisfaction and Corporate Reputation. Sustainability, 13(16), 8681. https://doi.org/10.3390/su13168681

Balonias, K., Polinar, M. A., & Delantar, A.F. (2022). Organizational Commitment and Effectiveness of a Holding Company for a Conglomerate in Cebu City. JPAIR Multidisciplinary Research. 48. 71-87. 10.7719/jpair.v48i1.404.

Devi, B., Lepcha, M. N. & Basnet, S. (2023). Application of Correlational Research Design in Nursing And Medical Research. Xi'an Shiyou Daxue Xuebao (Ziran Kexue Ban)/Journal of Xi'an Shiyou University. 65. 60-69. 10.17605/OSF.IO/YRZ68.

Kock, N. (2021). WarpPLS user manual: Version 7.0. Laredo, TX: ScriptWarp Systems.

Raza, A., Rather, R. A., Iqbal, M. K., & Bhutta, U. S. (2020). An assessment of corporate social responsibility on customer company identification and loyalty in banking industry: a PLS-SEM analysis. Management Research Review, 43(11), 1337-1370.

Shamsudin, M. F., Nurana, N., Aesya, A., & Nabi, M. A. (2018). Role of university reputation towards student choice to private universities. Opcion, 34(Special Issue 16), 285–294.

ARTIFICIAL INTELLIGENCE (AI) COMPETENCIES FOR ORGANIZATIONAL PERFORMANCE: A B2B MARKETING CAPABILITIES PERSPECTIVE

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ABSTRACT

The increasing adoption of AI has become prominent in different sectors, with a particular focus on business-to-business (B2B) marketing. Most of the previous studies emphasize the potential advantages of AI in B2B marketing, including its capacity to offer crucial insights into consumer behavior, uncover essential market intelligence, and improve operational efficiency Thus, this study aims to find out if there is relationship between effective AI competencies for B2B marketing and by what means they affect organizational performance. It is anchored on recent related existing literature and uses a redirected theoretical framework to examine the influence of AI competencies on B2B marketing capabilities and, in turn, on organizational performance. The study considered a total of 151 survey responses from different company employees of Region 3 of the Philippines valid for the structural modeling of the B2B marketing model using SmartPLS 4 software. According to the findings, 2B marketing information management, planning, and implementation capabilities have a positive relationship with AI competencies but are not confirmed in the organization performance assumption. It is therefore recommended that companies adopt the positive and significant parts of this study to develop an effective B2B marketing strategy and improve their organization's performance. A future study may also revalidate the study's outcome in a different location.

Keywords: Artificial Intelligence (AI); business to business marketing capabilities; marketing implementation; marketing information management; organizational performance.

INTRODUCTION

Data processing power due to digital devices has made Artificial Intelligence (AI) more popular. According to Chatterjee and Bhattacharjee (2020), the multifaceted nature of AI lacks a universally accepted definition but commonly refers to a machine's capacity to perform humanlike tasks for business transaction, learning, adaptation, and task execution which propelled AI from a primitive concept to a complex, flexible system capable of achieving diverse goals and addressing complex challenges, as emphasized (Haenlein & Kaplan, 2019). AI can automate manual processes, reducing B2B bottlenecks and improving efficiency (Paschen, et al., 2020). Meanwhile, Shin & Kang (2022) suggested that the majority of business executives surveyed perceive AI to be a majorly adopted technology soon. Due to a few related arguments toward a proposed operational framework and hypothesis development, the researchers focused on a more related studies that had been previously conducted.

MATERIALS

AI competencies and B2B implementation capabilities

AI competencies have a connection to B2B implementation capabilities. Once different

marketing solution strategies are ranked by AI-based systems, the expertise of the marketer can be used in making the final decisions, which in turn do not require any input from their leaders but rather are backed up by AI-driven decisions and strategies to improve the company's execution competencies (Wamba et al., 2020). In addition, a company can help them make decisions faster, leading to higher productivity levels and overall performance too. AI technologies may produce new knowledge, hence leading to various ideas for an organization (Martin, 2020).

Meanwhile, other researchers suggested that utilizing artificial intelligence technologies would enable an organization to enhance decision-making efficiency and speed, resulting in a competitive advantage and improved overall performance (Wamba, et al., 2020). Organizations can also use feedback from marketing activities to reevaluate and potentially revise their current business models. Thus, it is hypothesized that business-to-business planning capabilities may have an impact on organizational performance. Figure 1 demonstrated the study's framework.

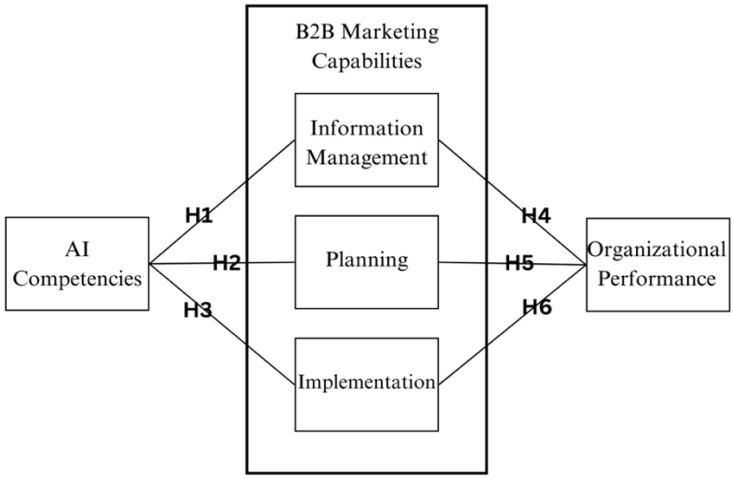

Figure 1. Operational hypothetical framework of the study.

METHODS

Research Design

To characterize and investigate the associations between variables, numerical data were systematically collected and analyzed using a descriptive-correlational approach. The quantitative data were acquired through a survey questionnaire containing Likert scale, in which respondents were allowed to answer numerous questions about the study. The survey questionnaires were administered online, and some respondents requested a physical meeting to answer the survey with the guidance of the researchers.

Participants and Sampling Technique

This study utilized the convenience sampling technique. The respondents were those who were currently working in companies around Region 3 of the Philippines. A sample size of one hundred and fifty-one (151) among selected top- middle- and lower-level management employees participated.

Analysis of Data

The collected data underwent quantitative analysis using SmartPLS (see Table1). This analytical tool was chosen to assess the relationships among the variables and determine if any correlation existed. In ensuring the credibility of the findings, SmartPLS employed a rigorous criterion whereby only variables exhibiting an outer loading of 0.7 or higher were considered valid.

Table 1. Measurement items retained

Codes: construct reliability and validity				
Retained Items	FA	@	CR	AVE
AI Competencies		*0.896*	*0.923*	*0.706*
IN1: Data handling solution and frameworks for AI.	0.915			
IN2: Communication services for networking and cloud computing.	0.812			
BS3: Incorporating strategic business planning with artificial intelligence-based planning.	0.839			
BS4: AI contributes to business value.	0.841			
PS5: We consistently stay updated on emerging AI advancements.	0.788			
Marketing Information Management		***0.934***	***0.950***	***0.792***
MIM1: Collecting data from clients and competitors.	0.865			
MIM2: Utilizing market research expertise to create impactful marketing initiatives.	0.926			
MIM3: Observing customer wants and needs.	0.881			
MIM4: Fully utilizing marketing research data.	0.868			
MIM5: Synthesizing our market information.	0.907			
Marketing Planning		***0.922***	***0.942***	***0.763***
MP1: Marketing planning skills.	0.884			
MP2: The capacity to efficiently divide and focus on specific market segments.	0.891			
MP3: Time allotment for varied marketing processes and procedures	0.904			
MP4: Preparing creative strategies for marketing	0.872			
MP5: Planning for effective ways to do marketing jobs.	0.816			
Marketing Implementation		***0.923***	***0.942***	***0.765***
MI1: Distributing marketing resources effectively.	0.875			
MI2: Delivering marketing programs following appropriate procedures effectively.	0.886			
MI3: Translating marketing strategies into action.	0.823			
MI4: Monitoring marketing performance.	0.869			
MI5: Implementing marketing strategies quickly.	0.918			
Organizational Performance		***0.954***	***0.965***	***0.846***
OP1: Our organization outperforms our main competitors.	0.916			
OP2: Our organization holds a larger share of the market different from our key competitors.	0.903			
OP3: Our organization is experiencing faster growth unlike our main competitors.	0.933			
OP4: Our company generates great profits almost every day	0.905			
OP5: Our organization demonstrates greater innovation than in previous years.	0.942			

Note: *AI Competencies* (Alpha), *Marketing Information Management* (MIM), *Marketing Planning* (MP), *Marketing Implementation (*MI) *Organizational Performance* (OP). Cronbach's Alpha (@), Composite Reliability (CR); Average Variance Extracted (AVE); Factor Loading (FA)

Table 2. Ratio of correlation.

	Alpha	MI	MIM	MP	OP
Alpha	NA				
MI	0.693	NA			
MIM	0.673	0.788	NA		
MP	0.733	0.812	0.807	NA	
OP	0.763	0.782	0.781	0.776	NA

Structural Equation Modeling Report

In the second phase of SmartPLS 4.0, the bootstrapping and the algorithm of SmartPLS were utilized on variable paths of the suggested framework to assess and predict the significance of the stated hypotheses and to confirm the variance explained by each construct according to the regression assumed. The structural equation modeling with Beta Coefficients and suggested R-squares were demonstrated in Table 2 of this study.

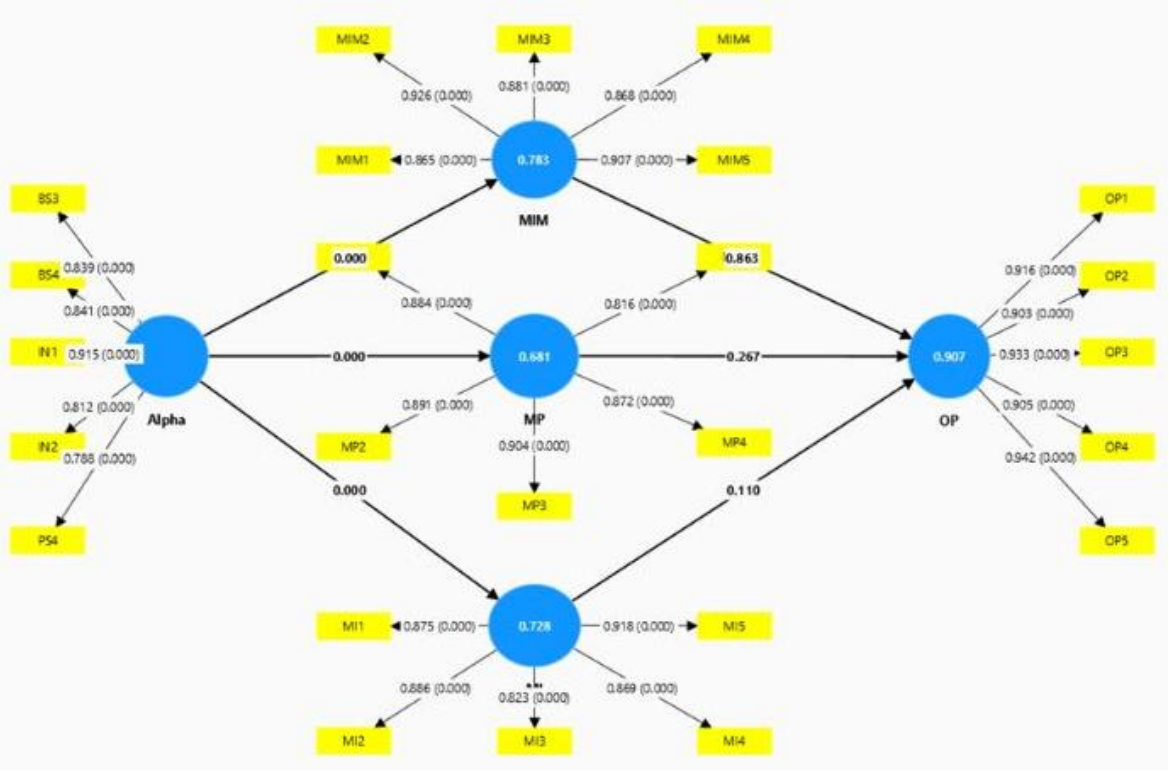

Figure 2. Bootstrapping Results

Table 3. Paths Coefficient estimates.

Hypotheses Tested	**Value (P<.05); Supported**	
AI competencies has relationship with B2B information management capabilities (H1).	0.000	YES
AI competencies can be linked to B2B planning capabilities (H2)	0.00	YES
AI competencies may be related to B2B implementation capabilities(H3).	0.00	YES
B2B information management capabilities may have an impact on organizational performance(H4).	0.11	NO
B2B planning capabilities may have an impact on organizational performance (H5).	0.863	NO
B2B implementation capabilities may have an impact on organizational performance (H6).	0.267	NO

RESULTS AND DISCUSSIONS

In this study, out of the six hypotheses tested, only three (3) were proven to be significant. Specifically, it was revealed that there are positive links among AI competencies and (a) B2B information management capabilities (b) B2B planning capabilities and (c) B2B implementation capabilities (H1, H2, and H3). Based on the statistical results, the following have been revealed:

***Hypothesis 1*:** AI competencies have relationship with B2B information management capabilities. Table 3 shows that AI competencies are positively related with B2B information management capabilities ($p < 0.05$).

Hypothesis 2: AI competencies are significantly related to business planning capabilities. Table 3 shows that significant relationship exists between AI competencies and business planning capabilities ($p < 0.05$) where the p-value is less than.05 level of significance. This transformation involves coordination between and among enterprises, processes, and marketing staff working alongside analytical experts.

Hypothesis 3: AI competencies may be related to B2B implementation capabilities. Table 3 shows that AI competencies are related to B2B implementation capabilities ($p < 0.05$). The implementation of marketing capabilities is linked to AI talents, and marketers use their expertise to make final decisions.

Implications, current results have confirmed that AI has great potential for competitive marketing leverage in terms of strategic implementation, efficiency, and improved decision-making processes. The potential of AI in informing marketing capabilities (traditionally a positive factor on organizational effectiveness) is indeed plausible towards effectiveness, although there may be further processes that need to be considered.

CONCLUSION

This study would shed light on the complex connection between competencies of artificial intelligence (AI) and organizational performance. The results indicate that although being skilled in certain AI abilities can help in managing B2B processes well, it does not automatically lead to better overall performance for companies. This underscores the need to consider other factors besides just AI skills when evaluating how successful an organization is.

REFERENCES

Bag, S., Gupta, S., Kumar, A., & Sivarajah, U. (2021). An integrated artificial intelligence framework for knowledge creation and B2B marketing rational decision making for improving firm performance. Industrial Marketing Management, 92, 178–189

Chatterjee, S., Bhattacharjee, K.K. (2020). Adoption of artificial intelligence in higher education: A quantitative analysis using structural equation modelling. Educ Inf Technol 25, 3443–3463 (2020).

Haenlein, M., & Kaplan, A. (2019). A brief history of artificial intelligence: On the past, present, and future of artificial intelligence. California Management Review, 61(4), 5-14. https://doi.org/10.1007/s10639-020-10159-7

Jeong, L. S., Bautista Jr, R., Guillen Jr, N. B., & Oluyinka, S. (2024). Do generations matter? The moderating role of media in adherence to COVID-19 quarantine protocol. DLSU Business & Economics Review, 33(2), 35-46

Martin, S. L., Javalgi, R. R. G., & Ciravegna, L. (2020). Marketing capabilities and international new venture performance: The mediation role of marketing communication and the moderation effect of technological turbulence. Journal of Business Research, 107, 25-37

Mikalef, P., & Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. Information & Management, Online. https://doi.org/ https://doi.org/10.1016/j.im.2021.103434

Oluyinka, S., Endozo, A. N., & Cusipag, M. N. (2021). Integrating trialability and compatibility with UTAUT to assess canvas usage during COVID-19 quarantine period. Asia-Pacific Social Science Review, 21(2), 4.

Shin, S., & Kang, J. (2022). Structural features and diffusion patterns of Gartner Hype Cycle for Artificial Intelligence using Social Network analysis. Journal of Intelligence and Information Systems, 28(1), 107–129.

Wamba-Taguimdje, S.-L., Wamba, S. F., Kamdjoug, J. R. K., & Wanko, C. E. T. (2020). Influence of artificial intelligence (AI) on firm performance: The business value of AI-based transformation projects. Business Process Management Journal, 26(7), 1893–1924.

INFLUENCE OF PERCEIVED ADVERTISING VALUE ON THE ATTITUDE OF USERS TOWARD TIKTOK ADVERTISEMENTS

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ABSTRACT

Advertising promotes commodities, services, ideas, and images. Many advertising organizations utilize tiktok to sell their goods. Business owners believe that tiktok offers a lucrative way to reach many clients. The goal of this research is to evaluate the perceived elements that impact Tiktok users' perceptions regarding random ads. The survey included 432 CAMANAVA Region millennials and Gen Z. This area includes Caloocan, Malabon, Navotas, and Valenzuela. Participants were provided Google forms to answer data questions. Independent factors included credibility, lack of annoyance, informativeness, amusement, and customization, whereas dependent variables included attitude toward tiktok ads. Quantitative analysis employed SmartPLS and a five-point Likert scale.Credibility and informativeness did not affect TikTok ad consumers' perceptions, according to the research. The investigation shows that absence of annoyance, enjoyment, and customisation affect user perceptions about Tiktok ads. Future researchers should repeat the study to confirm the results. Other countries that employ tiktok may be used.

Keywords: Attitudes toward tiktok; credibility; lack of irritation informativeness; entertainment; personalization.

INTRODUCTION

Advertising promotes products, ideas, and images. It's visible and addresses the situation. In metropolitan and semiurban locations, users see many ads daily in newspapers, magazines, TV, the internet, and radio. Our social, cultural, and economic environment includes advertising, which is seen as a symbol of civilization's progress and perfection. Due to public and target audience scrutiny, it is one of the most scrutinized corporate entities.

Today, social media is vital. Due to its statistics, numbers, and information, it is inescapable. Social media is helping companies promote their goods and services as technology advances. Advertising promotes products and services, like motivating people, as the internet grows. TikTok's features attract users, capturing their attention, attitude, and need, which helps advertisers. Successful user reactions to ads may arise from marketers using networking sites as a baseline. User views and behaviors are quickly changing, especially regarding ethics and legality, as technology improves.

One of the fastest-growing social media networks is TikTok. Unique and engaging material has made it popular among younger users. Active and dedicated TikTok users make up its community. Its viral challenges and short films are famous. This allows advertising to reach a vast audience profitably.

According to Hilliard, J. (2019) [1], obsessive social media use may harm personal life.

Problems arise when people use social media to deal with stress, loneliness, or unhappiness. Because they constantly reward themselves these individuals tend to do more and use more. Exposure makes us like things more.We were unknowingly exposed to social media ads and material that fit our preferences.Random exposure to social media information may lead to long-term problems, including addiction.

Social networking is more than simply entertainment and is becoming the most popular techn ology.Users experience interactive situations, which highlights the implications for marketers wanting to better online advertising and shows that several factors must be considered.The re search examines how perceived value affects TikTok ad perception.Knowing how TikTok us ers assess ads may help marketers create more engaging campaigns.

As social media advertisers compete for consumers' attention, they must understand what driv es their thoughts.Entertainment, informativeness, credibility, and non-
annoyance impact TikTok users' perceptions of ads.

These characteristics may help marketers tailor their advertising to their target demographic. This study fills a research vacuum by examining user attitudes regarding TikTok ads. By examining how perceived value affects users' opinions, marketers may enhance their marketing activities and make TikTok fun. As a primary indication of brand attitudes, advertising affects, advertising effectiveness.

Emotionally focused transformational advertising has a greater impact on customer attitudes (Lee, S., and Heere, B., 2018).[2]. According to Otamendi, FJ and Martin, DL (2020) . [3], an individual's advertising attitude is influenced by their unconscious emotional reaction, making it challenging to express genuine sentiments.

Such emotions use excellent or terrible advertising knowledge.This may happen after seeing an ad. Social media influencers may boost internet enterprises (Santora, J., 2024) [4]. The idea that social media influencers strongly impact online marketers' purchases. According to influencer marketing statistics, approximately half of firms have raised their spe nding for social media influencers to advocate their goods (Santora, J., 2024).[4].Mukherjee, K., and Banerjee, N. (2019) [5] found that brand ads on social media improve user attitudes a nd buy intent.According to Geng, S., Yang, P., Gao, Y., Tan, Y., and Yang, C. (2021), indivi duals are more likely to prefer advertising if they think it is relevant, entertaining, or useful.[6]. Thus, to understand TikTok commercial responses, one needs understand perceived worth and attitude development. User attitudes affect social media advertising effectiveness (Geng, S., Yang, P., Gao, Y., Tan, Y., and Yang, C., 2021; Pellet, JE., and Ettis, SA., 2022).[6; 7]. The creation of attitudes is complicated by several factors, including perceived worth. It significantly affects people's views on affects people's views on commercials (Geng, S., Yang, P., Gao, Y., Tan, Y., and Yang, C., 2021). [6].

Marketers that want to use TikTok effectively must understand user perceptions regarding ad s.TikTok is a global hit (Pelet, JE., and Ettis, SA., 2022) [7].Digital ads, including those on so cial media platforms like TikTok, are judged by their perceived worth (Dwivedi, YK., Ismagi lova, E., Hughes, DL., Carlson, J., Filieri, R., Jacobson, J., et al., 2021) [8].Thus, to improve TikTok advertising, marketers should examine how perceived value affects viewers' attitudes toward ads (Geng, S., Yang, P., Gao, Y., Tan, Y., and Yang, C., 2021), (Pelet, JE., and Ettis, SA., 2022), and (Dwivedi, YK., Ismagilova, E.), [6-7-8]. Understanding how perceived value influences customers' and users' views about ads might help marketers comprehend TikTok behaviour (Agdigos, MAH., and Etpison, MCR., 2022) [9].

METHODOLOGY

Research Design

The researchers utilize descriptive as their prime research method to determine the influence of perceived value on users attitude towards tiktok advertisement in CAMANAVA.

Research Instrument

The study structured its questionnaire by modifying and adopting its anchored instrument to collect data from Generation Z and Millennials of CAMANAVA. The measures and items that were assessed were gathered from comparable literatures and were measured using the Likert scale, which consists of five points.

RESULTS

Demographics

The CAMANAVA (Caloocan, Malabon, Navotas, and Valenzuela) region's millennial and Gen Z respondents (Philippines) were questioned about their sociodemographic profile, which includes their age, gender, employment position, use of a mobile phone, social media platform, and time alotted for social media. At least 72.5% of the respondents, or most of them, were between the ages of 18 and 23. This may be inferred from the researchers' target respondents, who made it clear that millennials and Gen Z are the primary participants because they are the ones most accustomed to social media platforms, particularly TikTok (Rashika, U. Maiya, 2019) [28].

Majority of the youth has been identified as the driving force behind online shopping. Furthermore, a significant portion of the respondents—54.6% of all respondents—are female, a fact that has no bearing on the study's conclusions. Furthermore, a significant proportion of the respondents reside in Caloocan, accounting for 42.4% of all the respondents. With 61.1% of the respondents being unemployed, it is likely that majority of the respondents are students who are not yet employed.

Moreover, a sizable portion of the respondents— 52.8%—use Android smartphones, indicating that the majority of the smartphones they use are from reasonably priced manufacturers. Finally, majority of — 55.1%—use TikTok as their preferred social media network. This suggests that TikTok is the most often utilized platform among the respondents because of its accessibility and popularity, which maintains their contentment.

Measurement Assessment Model

A general survey was carried out by the researchers to verify the validity and reliability of the research questionnaire and the collected data. For structural equation modelling based on the partial least squares' method, WarpPLS 7.0 has been utilized (Singh, R., Singh, C. D., & Singh, T., 2024) [33].It was also employed by the researchers to analyze the pilot study with 14 survey samples. Composite reliability values reveal that the construct indicators have a value greater than 0.70 [31]. as shown in Table 1 with credibility (CR=0.902), lack of irritation (CR=0.883), informativeness (CR=0.926), entertainment (CR=0.941), personalization (CR=0.929), and attitude towards TikTok advertisement (CR=0.936). As a result, the variables met the composite dependability value.

Mean, SD, and Correlation Coefficients

All scales exhibit good internal consistency and are positively connected. User attitudes toward TikTok ads had the highest mean of 3.96, indicating good attitudes. Informativeness has a 3.63 mean, indicating that respondents value the material's information. Lack of annoyance, with a mean score of 3.73, indicates that respondents liked the topic. Entertainment and personalization scored 3.75, suggesting that respondents choose Tiktok material focused on entertainment and personality. However, trustworthiness has the lowest mean, suggesting that Camanava Region millennials and Gen Z are more inclined to trust Tiktok ads. According to Van Der Miesen, MM., Van Der Lande, GJM., Hoogeveen, S., Schjoedt, U., and Van Elk, M. (2022) [10], people who had a positive attitude toward the advocated position were more susceptible to a less credible source, while those who had a negative attitude were more susceptible to a credible source.

Agreement, credibility, lack of aggravation, informativeness, amusement, and personalization of user attitude toward Tiktok Advertisement are also strongly correlated. Since all research variables were amenable to further study, an SPSS regression was used to examine their influence on user attitude toward TikTok ads. Youth drive most internet buying. Female respondents make up 54.6% of the study's sample, however this does not affect its findings. As many as 42.4% of respondents live in Caloocan. Since 61.1% of responders are jobless, most are presumably students. Android smartphones are used by 52.8% of respondents, showing that most of their cellphones are affordable. Finally, 55.1% favor TikTok. This shows that TikTok is the most popular and accessible site among respondents, which keeps them happy.

Measurement Assessment Model

To validate the study questionnaire and results, the researchers conducted a general survey.W arpPLS 7.0 is used for partial least squares structural equation modeling (Singh, R., Singh, C. D., & Singh, T., 2024) [33]. Researchers used it to examine 14 prototype survey samples. Composite reliability ratings for construct indicators exceed 0.70 [31].Thus, variables met co mposite dependability.

Mean, SD, Correlation.

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REFERENCES

Agdigos, MAH., and Etpison, MCR. (2022). The Impact Of Brand Image And Perceived Value On Consumers' Purchasing Behavior Of Clothing Lines. Research Gate.

Arora, T., & Agarwal, B. (2019). Empirical Study On Perceived Value And Attitude Of Millennials Towards Social Media Advertising: A Structural Equation Modelling Approach.

Arora, T., & Agarwal, B. (2020). Impact Of Social Media Advertising On Millennials Buying Behaviour. Research Gate.

Ata, S., Arslan, H., Baydaş, A., & Pazvant, E. (2022). The Effect Of Social Media Influencers' Credibility On Consumer's Purchase Intentions Through Attitude Toward Advertisement. Esic Market, 53(1), E280.

Aydın, G. (2018). Role Of Personalization In Shaping Attitudes Towards Social Media Ads. International Journal Of E-Business Research, 14(3), 54–76.

Barysevich, A. (2020). How Social Media Influence 71% Consumer Buying Decisions. Search Engine Watch.

Başaran, D., & Ventura, K. (2022). Exploring Digital Marketing In Entertainment Industry: A Case Of A Digital Music Platform. Journal Of Business, Economics And Finance.

Berryman, C., Ferguson, C., & Negy, C. (2018). Social Media Use And Mental Health Among Young Adults. Pubmed.

Cesaroni, F., Demartini, P., & Paoloni, P. (2017). Women In Business And Social Media: Implications For Female Entrepreneurship In Emerging Countries. Research Gate.

Chandra, S., Verma, S., Lim, W. M., Kumar, S., & Donthu, N. (2022). Personalization In Personalized Marketing: Trends And Ways Forward. Psychology & Marketing.

Dwinanda, B., Syaripuddin, F. A., & Hendriana, E. (2022). Examining The Extended Advertising Value Model: A Case Of Tiktok Short Video Ads. Mediterranean Journal Of Social & Behavioral Research, 6(2), 35-44

Dwivedi, YK., Ismagilova, E., Hughes, DL., Carlson, J., Filieri, R., Jacobson, J., et. al., (2021). Setting The Future Of Digital And Social Media Marketing Research: Perspectives And Research Propositions.

Erobathriek, A., Pangaribuan, C. H., & Princes, E. (2023). Social Media Marketing Activities To Tie-In Brand Commitment. A Brand Experience Mediation.

Gaber, H., Wright L. & Kooli K. (2019) Consumer Attitudes Towards Instagram Advertisements In Egypt: The Role Of The Perceived Advertising Value And Personalization.

Geng, S., Yang, P., Gao, Y., Tan, Y., Yang, C., (2021). The Effects Of Ad Social And Personal Relevance On Consumer Ad Engagement On Social Media: The Moderating Role Of Platform Trust. Sciencedirect.

Hair Jr, J., Hult, GT., Ringle, C., Sarstedt, M., Danks, N., & Ray, S. (2022). Evaluation Of Reflective Measurement Models. Springer Link.

Hilliard, Jena (2019, July 15). Social Media Addiction. Addiction Center.

Jeong, L. S., Bautista Jr, R., Guillen Jr, N. B., & Oluyinka, S. (2024). Do Generations Matter? The Moderating Role of Media in Adherence to COVID-19 Quarantine Protocol. DLSU Business & Economics Review, 33(2), 35-46.

Jung, A. (2017, May). The Influence Of Perceived Ad Relevance On Social Media Advertising: An Empirical Examination Of A Mediating Role Of Privacy Concern. Research Gate.

Lee, S., & Heere, B. (2018, June 1). Exploring The Relative Effectiveness Of Emotional, Rational And Combination Advertising Appeals On Sport Consumer Behavior. - Document - Gale Academic Onefile. Exploring The Relative Effectiveness Of Emotional, Rational, And Combination Advertising Appeals On Sport Consumer Behavior. - Document - Gale Academic Onefile.

Mukherjee, K., & Banerjee, N. (2019). Social Networking Sites And Customers' Attitude Towards Advertisements. Journal Of Research In Interactive Marketing, 13(4), 477–491.

Myllyoja, HL., Bejo Ceh, N., and Said, Y. (2020). The Effects Of Humorous And Irritating Advertising On Brand Perception In The Food Industry.

Oluyinka S. (2021). Mediating role of trust in internet banking acceptance. International Journal of Business Information Systems, 38(3), 299-323.

Otamendi, FJ. & Martín, DL. (2020, September 4). The Emotional Effectiveness Of Advertisement. Frontier.

Pelet, JE., Ettis, SA. (2022). Social Media Advertising Effectiveness: The Role Of Perceived Originality, Liking, Credibility, Irritation, Intrusiveness And Ad Destination. Research Gate.

Rashika, U. Maiya (2019). Youth's Perception Towards Digital Marketing.

Santora, J. (2024, February 6). 17 Key Influencer Marketing Statistics To Fuel Your Strategy. Influencer Marketing Hub.

Sharma, A., Dwivedi, R., Mariani, M., & Islam, T. (2022). Investigating The Effect Of Advertising Irritation On Digital Advertising Effectiveness: A Moderated Mediation Model.

Sheth, S. & Kim, J. (2017). Social Media Marketing: The Effect Of Information Sharing, Entertainment, Emotional Connection And Peer Pressure On The Attitude And Purchase Intentions. Gstf Journal On Business Review

Singh, R., & Banerjee, N. (2018). Exploring The Influence Of Celebrity Credibility On Brand Attitude, Advertisement Attitude And Purchase Intention. Global Business Review, 19(6), 1622–1639.

Singh, R., Singh, C. D., & Singh, T. (2024). Structural Equation Modelling Of Core Functional Competencies Based On Partial Least Square Method Using Warppls 7.0. International Journal Of Process Management And Benchmarking, 16(2), 215–230. Https://Doi.Org/10.1504/Ijpmb.2024.135759

Solomon, O. (2021). Exploring the Facets of e-learning acceptance in developing country. Kasetsart Journal of Social Sciences, 42(4), 854-861.

Tomše, D., Snoj, B., & Milfelner, B. (2022). Beliefs, Attitudes, And Behaviour Towards Marketing Communication On Social Networks: A Comparative Study Of The Two CEE Countries Journal Article | IGI Global. Beliefs, Attitudes, And Behaviour Towards Marketing Communication On Social Networks: A Comparative Study Of The Two CEE Countries Journal Article | IGI Global..

Van Der Miesen, MM., Van Der Lande, GJM., Hoogeveen, S., Schjoedt, U., and Van Elk, M. (2022). The Effect Of Source Credibility On The Evaluation Of Statements In A Spiritual And Scientific Context: A Registered Report Study. Research Gate.

Wei, X., Ko, I., & Pearce, A. (2021). Does Perceived Advertising Value Alleviate Advertising Avoidance In Mobile Social Media? Exploring Its Moderated Mediation Effects. Sustainability, 14(1), 253.

Wijayaa, O. Y. A., Sulistiyanib, S., Pudjowatic, J., Kartikawatid, T. S., Kurniasih, N., & Purwanto, A. (2021). The Role Of Social Media Marketing, Entertainment, Customization, Trendiness, Interaction And Word-Of-Mouth On Purchase Intention: An Empirical Study From Indonesian Smartphone Consumers. International Journal Of Data And Network Science, 231–238.

Winter, S., Masłowska, E., & Vos, A. L. (2021). The Effects Of Trait-Based Personalization In Social Media Advertising. Computers In Human Behavior, 114, 106525.

THE ROLES OF HOMEPAGE DESIGN ON HOMEPAGE AUTHENTICITY AND PECULIARITY IN ONLINE SHOPPING PLATFORMS

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ABSTRACT
The purpose of this study is to investigate the roles of homepage design on homepage authenticity and peculiarity towards instructors' intention to continue the usage of online shopping in the Philippines. An online questionnaire survey was designed, drawing on validated prior studies focused on homepage design, homepage authenticity, and instructors' continual usage. The findings of the study revealed significant relationships between and among the variables under investigation. Specifically, homepage design was found to positively influence homepage authenticity and reliability. Additionally, peculiarity is positively associated with the instructor's intention to continue using the online shopping homepage. The researchers recommend that a review of the findings be conducted and a deeper analysis and investigation of the variables be performed by future researchers. Online shopping platforms should prioritise homepage design that promotes authenticity and peculiarity to enhance the instructor's intention to continue using the platform. Some potential areas of future investigation include, firstly, examining the roles of other factors, such as website usability, customer support, or social interaction, an instructor's intention to continue using online shopping homepages; and secondly, investigating the impact of homepage design on different user segments (e.g., novice instructors, experienced instructors) to understand potential variations in their preferences and needs.

Keywords: Authenticity; electronic service satisfaction; homepage design; instructors' continual usage; peculiarity.

INTRODUCTİON AND BACKGROUND

The design of a homepage can determine the success or failure of an online shopping platform (Khalid & Helaluddin, 2020). Instructors who use these platforms regularly may have a unique perspective on the importance of homepage design regarding authenticity and peculiarity (Arilaha et al., 2021). Authenticity relates to an object's uniqueness, sincerity, genuineness, actuality, or hones (Kao et al., 2020). Hence, peculiarity adds value to the website. One study found that the negative impact of productive ambiguity can be mitigated by the peculiarity of the website design, which, in effect, makes a lasting impact on online shoppers (Pappas et al., 2014). Many academics have proposed various standards and metrics to evaluate the value of e-services. Homepage design, homepage authenticity, page responsiveness, instructors' continual usage, page reliability, and peculiarity were found to be the six most important qualities of high-quality e-services in an early study on online shopping homepage quality (Ali, 2019). The study examined how the homepage design of the quality of online shopping homepage is formed. Homepage design has given attention to online shopping homepage quality, particularly among those who shop online. It is thought that online shopping homepage quality significantly affects instructors' continual usage when it comes to online shopping. This

study looks at how homepage design is impacted by the quality of an online service (Tandiono et. al., 2020).

METHODOLOGY

This study used a descriptive-quantitative methodology. In this study, a descriptive-quantitative approach was utilized to gather and evaluate college students' perceptions of the quality of e-services when shopping online. Since surveys may capture each student's attitude toward and perception of using e-services, they were employed to collect data. The purpose of the study was to identify the variables influencing college students' perceptions of the quality of online services. As a result, the researchers made the choice that the college students who live close to Baliuag would be their target respondents. They were picked as respondents because they suited the study's goals the best.

Using a Google Forms survey to collect information from 278 instructors from public universities and colleges in Region III of the Philippines, convenience sampling was used to select the respondents, and a Likert scale was used to assess responses. The study chose an online survey through Smart Partial Least Squares statistical software version 4 is used to examine the relationship between variables, both latent and manifest.

FINDINGS

Objectives achieved on the relationship between Homepage Design and Peculiarity when shopping online: The objective is not achieved on the relationship between Homepage Design on Peculiarity when shopping online: The findings of the study effectively evaluated the relationship between Homepage Design on customers' perception among college students in different Schools in Baliwag and were determined to be insignificant.

The relationship between Homepage Design and Homepage Authenticity when shopping online: The objective is achieved on the relationship between Homepage Design on Homepage Authenticity when shopping online: The findings of the study effectively evaluated the relationship between Homepage Design on Homepage Authenticity among college students in different Schools in Baliwag and other locations, were determined to be significant.

The relationship between Homepage Design and Page Reliability when shopping online: The objective is achieved on the relationship between Homepage Design on Homepage Design when shopping online: The findings of the study effectively evaluated the relationship between Homepage Design on Page Reliability among college students in different Schools in Baliwag and other locations and were determined to be significant.

The relationship between Homepage Authenticity and Peculiarity when shopping online: The objective is not achieved on the relationship between Homepage Authenticity and Peculiarity when shopping online: The findings of the study effectively evaluated the relationship between Homepage Authenticity and Peculiarity among college students in different Schools in Baliwag and other locations, were determined to be insignificant.

The relationship between Homepage Authenticity and Page Reliability when shopping online: The objective is achieved on the relationship between Homepage Authenticity and Page Reliability when shopping online: The findings of the study effectively evaluated the

relationship between responsiveness on customers' perception among college students in different Schools in Baliwag and were determined to be significant.

The relationship between Page Reliability and Peculiarity when shopping online: The objective is not achieved on the relationship between homepage design on reliability of e-service quality when shopping online: The findings of the study effectively evaluated the relationship between responsiveness on customers' perception among college students in different Schools in Baliwag and were determined to be significant.

The relationship between Peculiarity and Instructors' Continual Usage of Online Shopping Homepage: The objective is achieved on the relationship between Peculiarity and Instructors' Continual Usage of Online Shopping Homepage The findings of the study effectively evaluated the relationship between Peculiarity and Instructors' Continual Usage of Online Shopping Homepage among college students in different Schools in Baliwag and were determined to be significant.

CONCLUSION

The results of the concluded investigation show that Peculiarity has a relationship with Instructors' Continual Usage of Online Shopping Homepage, Page Reliability has a relationship with Peculiarity in student perception when shopping online, Homepage Design has a relationship with Homepage Authenticity in student perception when shopping online, Homepage Design has a relationship with Reliability in student perception when shopping online and Homepage Authenticity has a relationship with Reliability when shopping online. This means all the factors mentioned relate to the Instructors' Continual Usage of the Online Shopping Homepage. The result shows that all the factors mentioned are significant, showing Homepage Design is the highest. In conclusion, students who shop online their perception is a homepage design because for them it is more effective. Towards this end, it is imperative to state that the issue of online purchase difficulties such as technological problems, wrong shipping addresses, payment mistakes, and fraud, can negatively impact consumers' trust and continued usage of online shopping websites.

REFERENCES

Agboola, O. P. (2021). The significance and users' perceptual evaluation of traditional market spaces in Nigeria. SN Social Sciences, 1(5), 106.

Agboola, O. P., Zango, M. S., & Zakka, S. M. (2015). Towards Sustainability of Open Space's Planning and Management in Nigeria: Roles of Science and Technology". Jurnal Teknologi, 27(14), 51-56.

Buamonabot I. et al,. (2021) Journal of Asian Finance, Economics and Business Vol 8 No 6 (2021) 0287–0295.

Fahri, J. et al,. (2021).). Instructors' Continual Usage of E-service Quality: An Empirical Study of Indonesia Journal of Asian Finance, Economics and Business Vol 8 No 6 (2021) 0287–0295.

Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2022). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)., 3rd Ed., Thousand Oakes, CA: Sage.

Khalid, H., & Helaluddin, A. B. M. (2020). Homepage design: A review of theories, principles, and guidelines. Journal of Theoretical and Applied Information Technology, 98(21), 3582-3593.

Marliana, R.R., 2020. Partial least square-structural equation 16(2), pp.174-186.
Mazur, V.A., Pantsyreva, H.V., Mazur, K.V. and Monarkh, V.V., 2019. Ecological and biological evaluation of varietal resources Paeonia L. in Ukraine. Acta Biologica Sibirica, 5(1), pp.141-146.
Oluyinka, S., & Cusipag, M. (2021). Trialability and purposefulness: Their role towards Google classroom acceptance following educational policy. *Acta Informatica Pragensia*, *10*(2), 172-191.

THE IMPACT OF SINO-MALAYSIAN BILATERAL TRADE ON ECONOMIC GROWTH: AN EMPIRICAL ANALYSIS FROM 1992 TO 2023

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ABSTRACT

In the process of global economic integration, international trade has become a crucial engine for economic growth, not only enhancing the efficiency of resource allocation but also driving technological progress and economic structural optimization. The development of technological innovation and emerging technologies has further strengthened this impact. As a vital component of regional economic cooperation, Sino-Malaysian bilateral trade has seen significant growth. However, the increased uncertainty in the global economic environment in recent years has posed new challenges to Sino-Malaysian trade, making the impact of bilateral trade on the economic growth of both countries uncertain. Based on export and import trade data between China and Malaysia from 1992 to 2023, as well as the GDP data of both countries, this paper conducts an empirical analysis using the VAR model, cointegration analysis, and Granger causality test. The results indicate that Sino-Malaysian bilateral trade has a significant positive impact on the economic growth of both countries. Specifically, a 1% increase in China's exports to Malaysia leads to a 0.266% increase in China's economic growth and a 0.4168% increase in Malaysia's economic growth; a 1% increase in China's imports from Malaysia results in a 0.1899% increase in China's economic growth. The Granger causality test results show that when considering the combined impact of China's exports to and imports from Malaysia, there is a significant causal relationship affecting the GDP of both countries. Therefore, China and Malaysia can achieve higher levels of economic growth by strengthening bilateral trade cooperation, promoting regional economic development, actively participating in global economic integration, and leveraging technological innovation to enhance trade efficiency.

AI-DRIVEN STRATEGIES FOR ENHANCING CAMPUS SUSTAINABILITY: A REVIEW

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ABSTRACT
The proliferation of complex activities and operations in universities, which involve teaching and learning, research, technological development, and various societal-based activities, have eventually led to the occurrence of environmental degradation on campus, which has caused growing concerns among the campus community. As the pace of the Fourth Industrial Revolution quickens with promising opportunities to improve environmental sustainability, artificial intelligence (AI) is highly expected to tackle these challenges where researchers around the world are beginning to harness AI techniques that provide improved understanding of complex, changing environmental patterns in universities. Thus, this paper seeks to shed light on AI's role in addressing environmental challenges and advancing campus sustainability. This study could be an initial attempt at assessing the extensiveness of AI application in campus sustainability benchmarks and rating systems.

Keywords: Environmental degradation; AI; campus sustainability; campus community; sustainable university.

INTRODUCTION

Academics, governments, and companies have recognized the necessity of sustainable development (SD) in recent years to address global environmental issues and prevent future degradation. Higher Education Institutions (HEIs) can promote sustainable development by improving campus sustainability in every university. The Stockholm Declaration of 1972 introduced sustainability in higher education and proposed ways to achieve environmental sustainability. The vast responsibility universities have for campus sustainability is evident. Sustainable universities are "a higher educational institution, as a whole or in part, that addresses, involves, and promotes, on a regional or global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of its resources to fulfill its functions of teaching, research, outreach and partnership, and stewardship in ways to help society make the transition."

This definition showcases universities' leadership in promoting and implementing sustainable development in their daily operations. Without an effective method for campus sustainability, universities alone cannot minimize environmental issues, so one of the emerging tools in this technological era that can help a university become more sustainable is AI. AI may be a massive technological boost to campus sustainability. Although these AI applications for campus sustainability are still in development, they may unlock opportunities for major environmental sustainability activities by improving university sustainable programmes. Universities can use AI to solve environmental problems.

This work addresses a literature gap by offering key concepts and understandings of AI-based environmental protection, which is said to solve the difficulties of conventional methods and lessen university environmental consequences. AI can represent mechanisms without sophisticated mathematical formulas and input-output linkages without losing precision. New strategy aims to improve results and reduce environmental issues. This study also illuminates campus sustainability and its need. AI has rarely been applied to achieve campus or university sustainability, therefore this study may be the first.

LEVERAGING AI FOR ENVIRONMENTAL SOLUTIONS

AI has revolutionized environmental science by handling and analyzing massive datasets essential for sustainability. Unlike conventional methods, which often struggle with the volume and complexity of environmental data, AI leverages advanced algorithms and machine learning techniques to uncover patterns, predict trends, and provide actionable insights with remarkable accuracy and speed. AI can connect multiple data sources and perform real-time analysis to improve natural resource management. AI can improve transportation, water, and energy sustainability. Water management uses AI to forecast usage trends, detect leaks, and monitor water quality to ensure safe and sustainable water supplies. Transportation uses AI to optimize routes and reduce emissions. AI improves grid efficiency and incorporates renewable sources to conserve energy, indicating its significant impact in these key industries.

AI IN TRANSPORTATION

Transportation management, especially on large campuses, can greatly benefit from AI. For instance, Majumdar et al. (2021) explored machine learning models like long short-term memory (LSTM) networks to forecast traffic congestion in smart cities—a method applicable to campus settings where traffic flow and emissions are major concerns. Additionally, AI-based energy prediction models, like those proposed by Basso et al. (2021), are crucial for optimizing electric vehicle routes, enhancing sustainability by reducing energy demand uncertainties (Majumdar et al., 2021; Basso et al., 2021).

AI IN WATER BODIES

AI also enhances water management through accurate forecasting and monitoring. Bui et al. (2020) developed hybrid machine-learning models to predict water quality indices, supporting efficient water management on campuses. Additionally, Baek et al. (2020) combined CNN and LSTM models to monitor water levels and quality in real-time, allowing universities to implement sustainable water usage policies (Bui et al., 2020; Baek et al., 2020).

AI IN ENERGY USE

Energy consumption on campuses is a significant sustainability issue that AI can address. For example, Pham et al. (2020) used a Random Forest (RF) model to analyze energy usage across buildings, identifying ways to improve efficiency. Similarly, Nam et al. (2020) applied deep learning for renewable energy forecasting, facilitating better energy planning and reducing reliance on non-renewable sources (Pham et al., 2020; Nam et al., 2020).

AI FOR CAMPUS SUSTAINABILITY

The connection between the environment and campus underscores a comprehensive approach to tackling environmental challenges. The report "Smarter Sustainable Campus Communities: A Guide for Campuses Embarking on the Green-Campus Programme" highlights that many people care deeply about environmental issues and wish to contribute positively. Consequently, universities worldwide have established green campuses that offer structured ways to address environmental issues through innovation and research by academic experts. These initiatives aim to foster environmental awareness among students, academic, and non-academic staff, who, as representatives of society, can carry this knowledge and commitment to environmental protection beyond the campus. Thus, campus sustainability and broader environmental protection can be achieved, starting with universities themselves. Environmental protection is one of the main pillars of sustainability. For that, there are some examples of universities across the world which embrace the use of AI in promoting campus sustainability.

AI IN CAMPUS SUSTAINABILITY BENCHMARKS AND RATING SYSTEM

Although some declarations or frameworks have been implemented on fostering campus sustainability, the use of technologies in conducting campus sustainable initiatives in every university may vary according to the advancement of the country. This is based on the basis of campus sustainable goals and the concept of campus sustainability of the university (Alshuwaikhat & Abubakar, 2008). Some universities may regard campus sustainability by owning some action plans, technological development, or having environmental management systems (EMS). Since these domains may differ in every HEIs, some benchmarks are thus imposed to assess the performance of environmental activities using technologies in universities. The indicators of performance were proposed as a broader tool to assess the performance of sustainability.

One of the significant performance indicators used by universities in evaluating the ecological performance of the universities is the Sustainability Tracking Assessment and Rating System (STARS). It is a voluntary and self-reporting system that assesses the performance of universities and ranks them based on several categories such as engagement, innovation, operations, and planning and administration (Matson, 2008). This ‘STARS’ rating system has two aspects in evaluating and assessing the sustainability in university campus, namely, strategy and performance credits. Strategy credit focuses on documented processes and approaches, such as the adoption of AI in promoting campus sustainability, while the performance credit is a numerical measurement of sustainability performance, for instance, the percentage of AI models that have been used in carrying out campus sustainability initiatives (Matson, 2008).

CONCLUSION

The overall study depicts that AI could be a powerful tool in enhancing campus sustainability as the AI approach can reduce the severity of increasing environmental impacts which were caused by anthropogenic factors. AI can tackle the complexities and uncertainties found in previous conventional methods that are unable to yield better results at reducing pollution.

Hopefully, this study will help to create awareness of the importance of AI in university sustainability in this technological era so that our university would be a leading research university along with other top research universities around the world in utilizing the AI approach to minimize environmental degradation.

REFERENCES

Baek, S. S., et al. (2020). Prediction of water level and water quality using a CNN-LSTM combined deep learning approach. Water.

Basso, R., et al. (2021). Electric vehicle routing problem with machine learning for energy prediction. Transportation Research Part B: Methodological.

Bui, D. T., et al. (2020). Improving prediction of water quality indices using novel hybrid machine-learning algorithms. Science of the Total Environment.

Majumdar, S., et al. (2021). Congestion prediction for smart sustainable cities using IoT and machine learning approaches. Sustainable Cities and Society.

Matson, L. (2008). Sustainability Tracking, Assessment & Rating System (STARS): A Tool for Evaluating Campus Sustainability.

Nam, K., et al. (2020). A deep learning-based forecasting model for renewable energy scenarios to guide sustainable energy policy. Renewable and Sustainable Energy Reviews.

Pham, A. D., et al. (2020). Predicting energy consumption in multiple buildings using machine learning for improving energy efficiency and sustainability. Journal of Cleaner Production.

DESIGN AND DEVELOPMENT OF AUGMENTED REALITY PHYSICAL ACTIVITY FOR ADOLESCENTS: ANALYSIS OF THE LEVEL OF SATISFACTION

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ABSTRACT

Many adolescents fail to meet daily physical activity recommendations, increasing their risk of future health issues. This study introduces an Android-based Augmented Reality (AR) application that uses 3D animations to enhance adolescents' understanding of physical activity. The research aimed to develop the AR application and compare its effectiveness with PowerPoint materials. Sixty respondents were divided into two groups: one used the AR application, and the other used PowerPoint. Developed using the ADDIE model, the AR application significantly improved user satisfaction compared to PowerPoint. The findings demonstrate that AR effectively enhances adolescents' understanding and motivation by integrating modern technology with physical activity.

INTRODUCTION

All age groups, especially modern adults usually lead unhealthy lifestyles. For example, fast food consumption, indiscriminate snacking, and lack of physical activity are all factors that clearly impact the health of these adults. This happens because adults do not realize the importance of maintaining a healthy lifestyle by implementing a healthy lifestyle to the fullest (1). Health is defined as an ideal biological, psychological, and social condition so that a person can carry out optimal physical activity (16).

Physical activity and exercise have different meanings. Physical activity is body movement caused by muscle and skeletal contractions, which causes the body to require more calories or spend more calories than it needs at rest (16). To achieve good health, physical activity must be balanced with a healthy lifestyle and a healthy environment. Physical activity can be done according to age, gender, and type of activity, indoors or outdoors, in the morning, afternoon, or evening, with consistency and attention to equipment, and always warm up before physical activity (2).

Society is indirectly affected by current technological developments, especially the development of learning technology which has become more effective and interesting. Learning technology becomes varied due to the innovations created that are applied to society (3). Uninteresting learning media will lead to passive learning (4), so more interesting learning media is needed. Augmented Reality (AR) is one of the rapidly growing technologies in the world of learning and is expected to create innovative and interesting learning for the community.

Augmented Reality (AR) technology is a technology that combines virtual objects such as video, sound, text, photos, 3D models, and other things in the real world view (reality) (5).

Augmented Reality (AR) technology is one of the most likely technologies to be used for the wider community to access educational materials attractively because it can display a combination of the real world with virtual objects and is known to increase knowledge and achievement (6). AR technology in providing education about physical activity is expected to provide a satisfying new learning experience for the community and increase knowledge about the importance of physical activity.

LITERATURE REVIEW

Physical activity

Body movements made by skeletal muscles and requiring energy are called physical activity. Regular and appropriate physical activity is essential for physical, mental health, and quality of life (7). According to World Health Organization (WHO) (2020) If you regularly engage in physical activity, such as walking, cycling, playing sports, or participating in active recreational activities, you will see significant improvements in your health. Engaging in physical activity is also good for your mental health and lowers the risk of depression, cognitive decline, and dementia. While there are many advantages to physical activity, it would be a shame if people continued to sleep all day (8). Vigorous physical activity is physical activity performed for ≥3 days per week and MET minutes per week ≥1500. Moderate physical activity is a moderate physical activity performed for ≥5 days per week with an average duration of ≥150 minutes per week (or >30 minutes per day).

Augmented Reality (AR)

Augmented Reality (AR) is a technology that can project or combine two-dimensional or three-dimensional virtual objects into a real environment and then project or display these virtual objects in real time (9). Augmented Reality can help visualize abstract concepts to better understand how and how an object model is structured (10). This media uses the Android operating system to make it easier to use and can be accessed at any time. To make the introduction of this technology easier for users, the marker will be in the form of a poster. This poster will be displayed as a three-dimensional (3D) animated object through an android device. Augmented Reality has 3 characteristics, namely (1) combining the real and virtual worlds, (2) interactive in real time, (3) allowing it to be displayed in 3D (11).

Augmented Reality has benefits that can be used in various activities, such as presentations, estimating an object, performance stimulating equipment, simulating a tool performance, and others. Another benefit obtained is a more advanced learning media by utilizing current technological developments. According to (12) there are three principles underlying Augmented Reality. The first is that Augmented Reality is real and virtual, the second is that it operates interactively in real time, and the third is that there is a three-dimensional fusion between virtual objects and the real world. In simple terms, Augmented Reality can be defined as a real environment added to virtual objects. Using appropriate display technology, real and virtual objects can be combined and interacted through specific input devices(13).

APLICATION DESIGN

Augmented Reality Physical Activity

The development of physical activity AR in this study uses the ADDIE development model. The ADDIE model uses 5 stages of development namely Analysis, Design, Development, Implementation, and Evaluation. The ADDIE development model is a popular model used for the design and development of interactive learning models. Physical activity educational media using augmented reality technology contains material related to the definition of physical activity, types of physical activity activities that can be done starting from light physical activity, moderate physical activity and heavy physical activity, the amount of calorie burning done from each type of physical activity, and information on examples of activities of various types of physical activity available in 3D.

Hardware and software

We use an android with a 6.6 inc HD+ IPS LCD screen specification of 1612 x 720 pixels per eye and a refresh rate of 90 hertz. In this study we use the assemblr application as an application to implement AR on the android used.

Physical Activity Augmented Reality Display

The initial display of AR Physical activity is shown in Figure 1. which is the beginning of the entire section and users can press 'start' to go to the next section. The entire section consists of material about physical activity. The display consists of 2 choices of display angles, namely vertical or horizontal and can be selected by the user as shown in Figure 2. Figure 3 shows there are 3 physical activities ranging from light, moderate, and vigorous activities. Figure 4 shows light physical activity and its explanation. Figure 5 shows moderate physical activity and its explanation and Figure 6 shows vigorous physical activity and its explanation.

Fig. 1 AR initial display

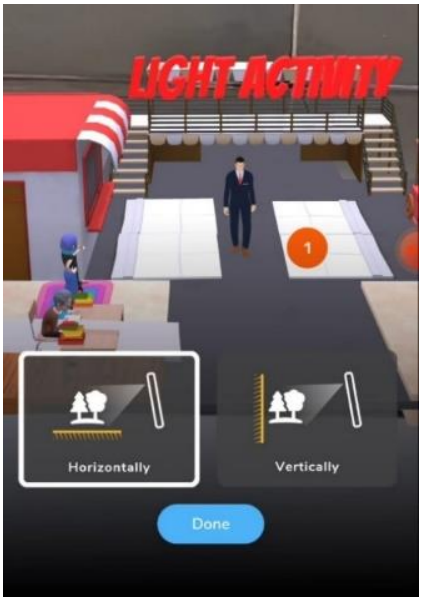

Fig 2. Display angle selection menu

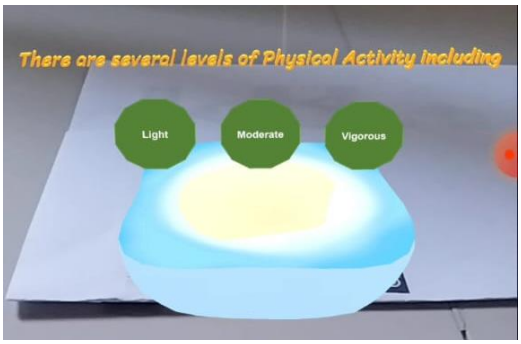

Fig. 3 General view of AR physical activity

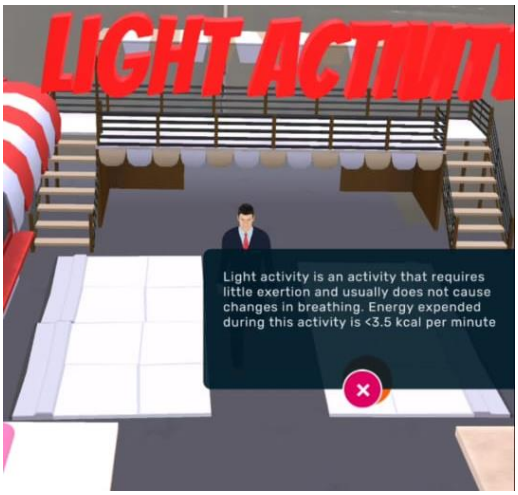

Fig. 4 Light Activity

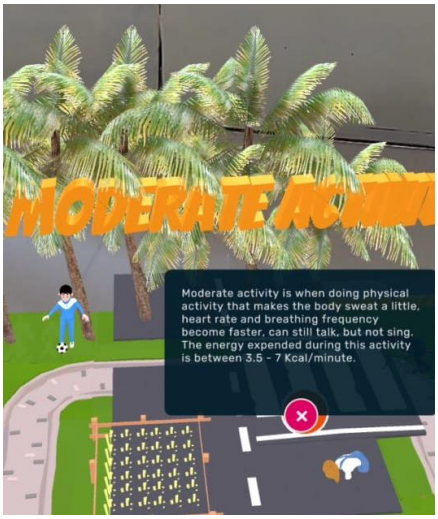

Fig. 5 Moderate Activity

Fig 6. Vigorous activity

RESEARCH METHODOLOGY

Research Design

This study uses a descriptive quantitative methodology to address the research topic. As a research instrument, an online questionnaire was used, namely the Google form platform to obtain students' voluntary participation in this study.

Population and Sampling

In this study, we evaluated the participants' level of satisfaction in using AR physical activities and their experience in using AR. This study was conducted by dividing participants into 2 groups consisting of 60 students. Group 1 is 30 students who will use AR on physical activities, while group 2 is 30 students who will use powerpoint media on physical activities.

Instrument

The instrument used to collect data for this study was an online questionnaire. The questionnaire consists of 3 parts, part A collects respondents' personal data, part B collects data on their experience of using AR/Powerpoint and part C collects suggestions from participants with open-ended questions. Participants will be asked to answer on a Likert scale that ranges from strongly disagree to strongly agree.

CONTENT OF RESULT AND DISCUSSION

Content of Result

The hypothesis of this study is H0: There is no significant difference between Group 1 (AR) and Group 2 (Powerpoint) in mean scores. Non-parametric tests are conducted for data that are not normally distributed. Based on the normality test, it was found that Group 1 and Group 2 were not normally distributed with the significance values shown in Table 1. Therefore, a Mann-Whitney U Test was conducted to determine if there was a significant difference in experience satisfaction between Group 1 (AR) and Group 2 (Powerpoint). The distribution of value scores was statistically significantly different between Group 1 and Group 2 with p = 0.000. The median score of Group 1 was higher (4.4545) than that of Group 2 (2.1364). Therefore, the decision according to Table 2 on Summary of hypothesis testing is to reject the null hypothesis. Table 3 shows the summary of the Independent Samples Mann-Whitney U Test, while Figure 7 shows the distribution of the two groups. Table 4 shows the mean, standard deviation, and median values. Group 1 (AR) outperformed group 2 (PPT) in mean and median values. Group 2 had a larger standard deviation than Group 1, indicating more variation in the scores.

Table I: Test of Normality

TEST OF NORMALITY Kolmogorov-Smirnov[a]				
Score	Group	Statistic	df	Sig.
	Group 1	0.204	30	0.003
	Group 2	0.162	30	0.044

Table II: Hypothesis Test Summary

Null Hypothesis	Test	Sig.	Decision
The distribution of Scor is the same across categories of Groups.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Table III: Independent-Samples Mann-Whitney U Test Summary

Independent-Samples Mann-Whitney U Test Summary	
Total N	60
Mann-Whitney U	79.500
Wilcoxon W	544.500
Test Statistic	79.500
Standard Error	67.611
Standardized Test Statistic	-5.480
Asymptotic Sig.(2-sided test)	.000

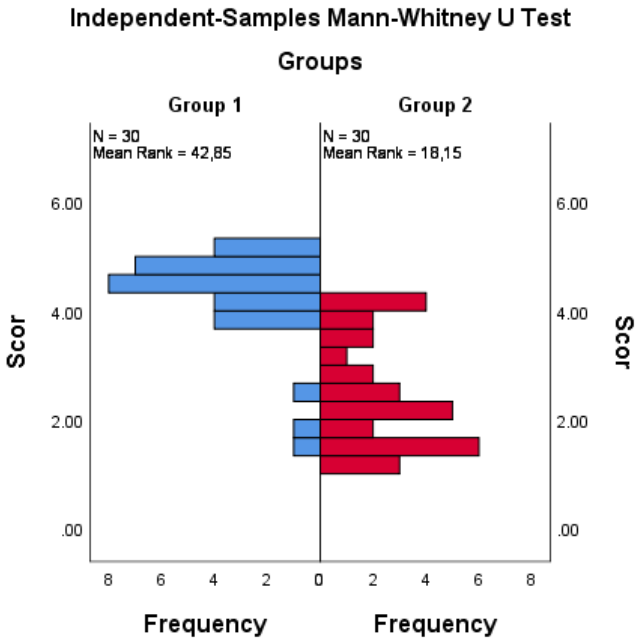

Fig 7. Distributions of the two group—Independent-Samples Mann-Whitney U Test.

Table IV: The Mean, Std, and Median Report

Group		Mean	N	Std. Deviation	Median
1		4.2696	30	0.88223	4.4545
2		2.4767	30	1.03784	2.1364

DISCUSSION

Based on the results of the study, we can conclude that the group using AR physical activities has higher satisfaction and experience than the group using PPT. Overall, the results obtained support the statement of (14) that learning using AR produces better experience value and can improve achievement compared to learning using media that does not display reality. This is also supported by (9) which states that the development of AR can help in absorbing information/education faster so as to create a good experience for users. Finally, the goal of this research is that the use of AR that has been developed can affect the level of satisfaction and experience of the community in education about physical activity.

CONCLUSION

This study was conducted to determine the effectiveness of AR media as a physical activity educational media. We measured the level of satisfaction of the user experience of AR physical activity media with the comparison media, namely powerpoint. The results showed that there was a significant difference between the two groups. For future research, we suggest including cognitive load as another variable to be tested with AR learning tools. The continuous development of education is undeniable, and technology plays an important role in bringing about positive changes that offer opportunities and strategies in creating innovative and engaging learning for students in the current era (15).

REFERENCES

Adigüzel I, Onmuş IRD, Mandiracioğlu A, Öcek ZA. Adaptation of the global physical activity questionnaire (GPAQ) into Turkish: A validation and reliability study. Turkish J Phys Med Rehabil. 2021;67(2):175–86.

Aini Zahra, Putri Rahayu Sya'baniah, Khoiriyah Isni, Ayu Saidah. Pengembangan Media Permainan TESABEN (Tebak Salah Benar) Sebagai Media Promosi Kesehatan Peningkatan Kesadaran Aktivitas Fisik. SEHATMAS J Ilm Kesehat Masy. 2023;2(4):816–26.

Ali MA, Kamraju M. Importance of health and fitness in life. Asian J Phys Educ Comput Sci Sport. 2020;441(December 2017):41–5.

Calabuig-Moreno F, González-Serrano MH, Fombona J, García-Tascón M. The emergence of technology in physical education: A general bibliometric analysis with a focus on virtual and augmented reality. Sustain. 2020;12(7):1–23.

Chen Y, Wang Q, Chen H, Song X, Tang H, Tian M. An overview of augmented reality technology. J Phys Conf Ser. 2019;1237(2).

Fitria TN. Augmented Reality (AR) and Virtual Reality (VR) technology in education: Media of teaching and learning: A review. Int J Comput Inf Syst Peer Rev J [Internet]. 2023;4(1):14–25. Available from: https://ijcis.net/index.php/ijcis/indexJournalIJCIShomepage-https://ijcis.net/index.php/ijcis/index

Garrett BM, Anthony J, Jackson C. Using mobile augmented reality to enhance health professional practice education. Current Issues in Emerging ELearning, 4 (1), 10. Interact Learn Environ. 2018;4820(1):1–21.

Mokmin NAM, Rassy RP. Review of the trends in the use of augmented reality technology for students with disabilities when learning physical education. Educ Inf Technol. 2024;29(2):1251–77.

Moreno-Guerrero AJ, García SA, Navas-Parejo MR, Campos-Soto MN, García GG. Augmented reality as a resource for improving learning in the physical education classroom. Int J Environ Res Public Health. 2020;17(10).

Olim SC, Nisi V, Olim SC, Nisi V, Reality A, Facilitating T, et al. Concepts Learning To cite this version : HAL Id : hal-03686009 concepts learning. 2022;0–17.

Saidin NF, Halim NDA, Yahaya N. A review of research on augmented reality in education: Advantages and applications. Int Educ Stud. 2015;(13):1–8.

Scherer R, Siddiq F, Tondeur J. The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. Comput Educ [Internet]. 2019;128(0317):13–35. Available from: https://doi.org/10.1016/j.compedu.2018.09.009

Setiawan AH, Dani H. Studi Terhadap Media Augmented Reality (AR) Dalam Meningkatkan Hasil Belajar Peserta Didik Pada KD Memahami Jenis-Jenis Alat Berat. J Kaji Pendidik Tek Bangunan. 2021;7(1):1–5.

Subekti N, Mulyadi HA, Mulyana D, Priana A. Peningkatan Kesehatan Melalui Program Informal Sport Masa Pandemi Covid-19 Menuju New Normal pada Masyarakat Dsn. Kalapanunggal dan Dsn. Ancol, Kec. Sindang, Kab. Ciamis. J Pengabdi Siliwangi. 2021;7(1):17–22.

Tekedere H, Goker H. Examining Effectiveness of AR. Int J Environ Sci Educ. 2016;11(16):9469–81.

Wicaksono, A., & Handoko, W. (2020). Aktivitas Fisik Dan Kesehatan. Iain Pontianak Press.

ENHANCING SECURITY IN VISIONARY SELF-DRIVING ELECTRIC VEHICLES USING HYBRID CLASSIFICATION MODEL

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ABSTRACT
The sustainability of urban growth relies on the integration of smart city infrastructure and the spread of electric vehicles (EVs). Artificial intelligence (AI) improves the capabilities of electric vehicles, enabling them to provide connected, safe, and efficient transportation. It's fascinating to consider mixing visionary artificial intelligence computers with Full Self-Driving (FSD) electric vehicles. Using real data from the surrounded environment, sophisticated technology can gather and analyze data to help vehicles predict and avoid obstacles on the road ahead. By utilizing the capabilities of AI, electric vehicles can traverse urban areas with improved safety, diminishing the likelihood of accidents and safeguarding the welfare of both occupants and pedestrians. Visionary AI computing enables real-time communication between electric vehicles and the cloud to enhance the Full self-driving experience by visioning and learning. Therefore, this Visionary approach allows electric vehicles to seamlessly communicate data on traffic, weather, and possible events, allowing them to predict ahead of time any potential incidents and make decisions to adjust their routes accordingly. Security is the primary concern when it comes to FSD technology, however they also encounter new obstacles. This study presents a new approach using hybrid model classifier composed of Random Forest, Convolutional Neural Networks, One-Class SVM and RL agent. The primary objective of the integrated model intended to enhance the precision of threat detection while maintaining a harmonious equilibrium between identifying familiar threats and adjusting to unanticipated ones. This model ensured resilient and all-encompassing security for the FSD systems in EVs.

Keywords: Autonomous vehicles; full self-driving; Electric Vehicles; Security; Smart city.

INTRODUCTION

The Self-driving EVs represent a significant technological advancement in the revolutionize urban transportation and the automotive industry. Equipped with advanced sensors, machine learning algorithms, and artificial intelligence, these automobiles provide enhanced safety, efficiency, and environmental benefits (Hassan, 2024). Therefore, autonomous EVs are gaining popularity in public transit, ride-sharing services, and personal usage due to significant investments from automotive manufacturers such as Tesla, Nissan, Waymo, Uber, BYD, and digital firms such as Nvidia (Neha et al. ,2024). This growing trend highlights the need for robust security solutions to safeguard the complex systems that govern different self-driven EVs.

Vision systems in autonomous EVs pose numerous challenges primarily due to the intricate nature and interconnections of their various components. The task of ensuring reliable perception in adverse weather conditions, such as rain, fog, and snow, which can potentially degrade the quality of sensor data from LiDAR and cameras, stands out as a significant hurdle. The utilization of advanced methodologies like reinforcement learning and physics-based data augmentation becomes imperative for the purpose of modelling and identifying potential errors in such scenarios, as the degradation in performance could lead to failures in tracking objects and predicting trajectories (Naz et al., 2022; Ige et al., 2023). The contemporary self-driving vehicles rely heavily on vehicle-to-everything (V2X) communications, which bring about

security concerns of their own. The secure transmission of messages is crucial to prevent cyberattacks exploiting vulnerabilities in the vehicle's sensors, communication systems, and controls, which could potentially result in accidents or loss of lives (Ibn-Khedher et al., 2021). Ensuring the security of autonomous vehicles is crucial due to the numerous cyber risks they face, including loss of control, unauthorized data access, and potential physical harm (Delecki et al., 2022). This article discusses the security vision of self-driven electric vehicles (EVs) in smart cities, highlighting the importance of vision systems for their functionality. In this regard, hybrid classification models have become a possible solution to improve the security of vision systems in autonomous vehicles. Hybrid models, like HSRFNN, combine RF, SVM, and ANN to enhance threat detection and response accuracy, outperforming individual models. This study aims to contribute to the field of autonomous EV security and facilitate the safe adoption of these transformative technologies by conducting an in-depth analysis of existing literature and proposing innovative approaches.

BACKGROUND

Different studies are highlighting the key advancements of EVs which include the development of sophisticated subsystems such as energy storage, cell balancing for battery systems, vehicle charger layouts, electric vehicle motor mechanisms, and braking systems, which are crucial for the efficient functioning of autonomous EVs. Companies like Tesla, Google's Waymo, and Uber and Chines EVs are at the forefront of this technological race, pushing the boundaries of what is possible with autonomous driving technology (Patil, 2024). Despite these advances, multiple challenges prevent level 5 autonomous vehicles. AI enables self-driving EVs to perform complex tasks independently, using sensors like laser, radar, lidar, and GPS. AI algorithms process vast data for vision, route planning, and motion control (Wen et al., 2024). Deep learning (DL), ML, computer vision (CV), and CNN are essential for the development of these systems. They enable the vehicle to adjust to external conditions and acquire knowledge from real-time experiences on the road (Liu et al., 2024). These technologies, combined with real-time, intelligent decisions based on thorough environmental data and advanced AI models, allow complete self-driving EVs to increase transportation efficiency, road safety, and the overall driving experience (Koppiahraj et al. ,2024).

METHODOLOGY

A hybrid model classifier combines RF, CNN, One-Class SVM, and RL agents to improve security in electric self-driving vehicles. The framework collects data from sensors, environmental data, and cybersecurity information. Data preprocessing involves multiple datasets, including cybersecurity threat data, sensor and vision data, and operational data from telemetry systems. Benchmark datasets like KITTI, Cityscapes, and Waymo Open Dataset are crucial for testing and evaluating machine learning models in autonomous vehicles. These datasets provide a baseline for comparison. The models consist of RF, CNN, One-Class SVM, and RL agents. The RL agent's policy receives ongoing updates from real-world feedback and simulations. For this process, a range of software tools come into implementation stages. Frameworks like TensorFlow and PyTorch are key for deep learning models. Scikit-learn applies to RF and One-Class SVM implementations. OpenAI Gym creates environments for training and testing RL agents. Simulation and testing happen in environments that imitate real-

world situations, using penetration testing and cross-validation techniques to assess model performance while avoiding overfitting. When deploying and monitoring the system, it is critical to properly integrate this hybrid model into the vehicle's onboard systems. The goal here is to ensure that it meets the demands of real-time data processing while also implementing continuous monitoring for new threats. As fresh data and threats emerge, feedback loops assist in updating and retraining models. Regular software updates are vital they include the most recent security patches and improvements.

Expected outcomes from this approach involve improved threat detection, adaptive security measures, and enhanced safety and reliability overall. By diligently executing each step and continually refining models, there is a strong aim here for building a solid security framework specifically for electric full-self-driving vehicles.

RESULT AND RECOMENDATION

The proposed hybrid model classifier aims to enhance the security of electric full-self-driving automobiles by integrating many components such as RF, CNN, One-Class SVM, and RL. This strategy is anticipated to enhance the ability to identify potential dangers, achieve equitable rates of detection, and adjust to changing risks. The hybrid model in vehicles enhances safety and reliability by incorporating adaptive security features like dynamic threat response and continuous learning, facilitating real-time data analysis. Furthermore, it diminishes susceptibilities by using a wide range of datasets and doing thorough testing in simulated scenarios. Assessing and validating performance against benchmark datasets and real-world scenarios, using cross-validation methods, and meticulous tweaking during development ensures a model with strong generalization capabilities. Recommended measures including prioritizing data accuracy and variety, integrating a wide range of potential threat scenarios, conducting frequent updates and monitoring, conducting comprehensive real-world testing, doing penetration testing, fostering cooperation among stakeholders, and incorporating user input. For the hybrid model to be successful, it is crucial to have data of excellent quality. Additionally, by including a wide range of cybersecurity risks and adversarial attacks, the model will become more resilient against manipulation and spoofing. Consistent updates and constant evaluation are crucial to ensure the model's long-term efficacy. Through conducting experiments in self-driving situations, collaborating with industry experts, and incorporating user input, significant insights may be gained about the model's actual performance and areas that need development.

CONCLUSION

In conclusion, the Hybrid Classification Model for SDEVs, by integrating RF, CNNs, One-Class SVM, and RL agents, provides a comprehensive and adaptive security solution. It addresses the limitations of traditional methods and other machine learning approaches by offering enhanced feature extraction, anomaly detection, and adaptive decision-making capabilities. This positions it as a superior choice for ensuring the security and integrity of self-driving electric vehicles in an increasingly connected and vulnerable environment. A comprehensive approach encompassing environmental resilience, algorithmic accuracy, and

cybersecurity measures is imperative to ensure the safety and reliability of vision systems in autonomous EVs.

REFERENCES

Bo, Wen, Yang., Shushan, Wu., Kun, Hu., Jin, Ye., W., Song., Ping, Ma., Jianjun, Shi., Peng, Liu. (2024). Enhanced Cyber-Attack Detection in Intelligent Motor Drives: A Transfer Learning Approach With Convolutional Neural Networks. IEEE journal of emerging and selected topics in industrial electronics. https://doi.org/10.1109/JESTIE.2023.3346802

Delecki, Harrison, Masha Itkina, Bernard Lange, Ransalu Senanayake, and Mykel J. Kochenderfer. "How do we fail? stress testing perception in autonomous vehicles." In 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 5139-5146. IEEE, 2022. https://doi.org/10.1109/IROS47612.2022.9981724

Hassan, Rehan. (2024). The Future of Electric Vehicles: Navigating the Intersection of AI, Cloud Technology, and Cybersecurity. International Journal of scientific research and management. https://doi.org/10.18535/ijsrm/v12i04.ec04

Hatem, Ibn-Khedher., Mohammed, Laroui., Mouna, Ben, Mabrouk., Hassine, Moungla., Hossam, Afifi., Alberto, Nai, Oleari., Ahmed, E., Kamal. (2021). Edge Computing Assisted Autonomous Driving Using Artificial Intelligence. https://doi.org/10.1109/IWCMC51323.2021.9498627

Koppiahraj, Karuppiah., S., Bathrinath., Syed, Mithun, Ali., Ramesh, Priyanka. (2024). A fsQCA-Based Framework for Cybersecurity of Connected and Automated Vehicles: Implications for Sustainable Development Goals. Vehicles. https://doi.org/10.3390/vehicles6010022

Luyang, Liu., Zaman, Sajid., Costas, Kravaris., Faisal, Khan. (2024). Detection and analysis of cybersecurity challenges for processing systems. Chemical engineering research & design. https://doi.org/10.1016/j.psep.2024.03.088

Naz, Neelma, Muhammad Khurram Ehsan, Muhammad Rizwan Amirzada, Md Yeakub Ali, and Muhammad Aasim Qureshi. "Intelligence of autonomous vehicles: A concise revisit." Journal of Sensors 2022, no. 1 (2022): 2690164. https://doi.org/10.1155/2022/2690164

Neha, Jain., Richa, Shukla., Deepesh, Tamrakar. (2024). A review paper on self-driving car using machine learning and artificialintelligence.https://doi.org/10.58532/nbennurch184

Shivagouda, M, Patil. (2024). Regulatory Frameworks for Ethical AI Development in Coding. International Journal For Science Technology And Engineering. https://doi.org/10.22214/ijraset.2024.63445

Tosin, Ige., Abosede, Kolade., Olukunle, Kolade. (2023). Enhancing Border Security and Countering Terrorism Through Computer Vision: a Field of Artificial Intelligence. arXiv.org. https://doi.org/10.1007/978-3-031-21438-7_54

A BIBLIOMETRIC REVIEW OF COMMUNITY OF INQUIRY FRAMEWORK INSIGHTS INTO STUDENT ENGAGEMENT

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INTRODUCTION
This bibliometric analysis investigates the application and development of the Community of Inquiry (CoI) Framework in relation to student engagement over the past two decades.

METHOD
Utilizing the PRISMA framework, 481 documents were analyzed from the Scopus database, focusing on articles, conference papers, and book chapters published between 2003 and 2023. The study explores key research questions, including the yearly distribution of publications, national contributions, influential institutions, prominent authors, and central research terms.

FINDINGS
Findings indicate a significant increase in research output, with the United States leading in publications, followed by Australia and Canada. Institutions like the University of Toronto and Macquarie University have made substantial contributions. Prominent authors include Jimoyiannis Athanassios and Dragan Gašević. The analysis of research terms reveals a strong focus on "e-learning," "teaching presence," and "cognitive presence."

CONCLUSION
This study provides a comprehensive overview of the CoI Framework's development and highlights emerging trends and areas for future research. The findings contribute to the ongoing discourse on enhancing student engagement through effective educational frameworks.

EXPLORING NEW FRONTIERS: A SYSTEMATIC LITERATURE REVIEW OF AUTISM SPECTRUM DISORDER SCREENING APPROACHES THROUGH EXTENDED REALITY EXPERIENCES

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ABSTRACT
This systematic review article emphasizes the Autism Spectrum Disorder (ASD) screening approaches through Extended Reality (XR) experiences. Generally, researchers have conducted several relevant studies on ASD screening via conventional approaches such as behavior observation and ASD clinical screening checklist. However, not many of the previous studies targeting XR experiences as the alternative screening. Thus, the present study reviewed a considerable amount of past literature on the mentioned viewpoints. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was adopted for the review of the current research which utilized three journal databases, namely IEEE, ACM and ScienceDirect. Accordingly, the research effort resulted in a total of nine articles that can analyzed systematically. Significantly, the review managed to formulate three main themes, namely gaze behaviors, facial emotion and head orientation. Finally, several recommendations were presented at the end of this paper for future scholar's reference.

Keywords: Autism; ASD; screening; extended reality; systematic review

INTRODUCTION

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition that affects how people communicate and interact with the world. Early diagnosis and intervention are crucial, as the average age of diagnosis is six years old, with some children diagnosed even earlier (Golestan, Soleiman, & Moradi, 2018). Screening tools like the Autism Diagnostics Observation Schedule (ADOS-2) and the Autism Diagnostic Interview-Revised (ADI-R) help clinicians make diagnoses, but researchers are constantly working to improve their accuracy (Thabtah & Peebles, 2019). While standardized screening tools exist for early detection, they often focus on high-risk individuals and have their limitations (McCarty & Frye, 2020). To improve autism assessments, national guidelines are embracing new technologies like Extended Reality (XR). XR, which encompasses Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), blends the physical and digital worlds to create immersive experiences. In the context of ASD screening, XR has the potential to provide controlled and standardized environments for evaluating social and communication skills, leading to more accurate diagnoses and tailored interventions (Kandalaft et al., 2014). Systematic reviews are a rigorous way to analyze existing research on a particular topic. They involve a structured approach to searching for relevant studies, carefully evaluating them, and summarizing the findings in a clear and unbiased way. While there have been numerous systematic reviews on ASD screening tools, relatively few have explored the use of XR experiences in this context

(Desideri, Pérez-Fuster, & Herrera, 2021). This systematic review is driven by the question: How can XR experiences enhance ASD screening? The study focuses on data collection related to ASD screening and emphasizes the importance of understanding how XR can contribute to this process. The approach taken to answer this question is outlined in detail, followed by a systematic review and synthesis of relevant literature on ASD screening via XR experiences. The review aims to identify and evaluate significant research in this area, laying the groundwork for future studies and highlighting the implications of this emerging field.

METHODOLOGY

This section delves into the methodology employed in this systematic literature review, outlining the key steps taken to answer the research question: How can ASD screening be enhanced through XR experiences? The review adheres to the PRISMA protocol, a widely recognized framework for reporting systematic reviews, ensuring transparency and rigor in the research process (Page et al., 2021). The research question was formulated using the PICo framework, which guides researchers to identify the Population (ASD individuals), Interest (screening approaches), and Context (XR experiences) relevant to the study (Petticrew & Roberts, 2006). The systematic search strategy involved three key phases: identification, screening, and eligibility. The search string, developed in March 2024, targeted relevant keywords related to ASD screening and XR technologies, retrieving a total of 176 articles from IEEE, ACM, and ScienceDirect databases.

The screening phase focused on removing duplicates and applying inclusion and exclusion criteria to ensure the selected articles met specific criteria, such as publication type (journal research articles), language (English), and timeline (2013-2024). The eligibility phase involved a thorough review of titles, abstracts, and full-text content to confirm that the remaining articles directly addressed the research question and focused on XR experiences related to ASD screening. Ultimately, nine articles met all inclusion criteria and were selected for analysis. To ensure the quality of the selected articles, two experts independently assessed the nine articles using a three-tier ranking system (high, moderate, low) (Petticrew & Roberts, 2006). Both experts had to agree on the quality ranking, with any disagreements resolved through discussion. This process resulted in four articles being ranked as high and five as moderate, making all nine eligible for the review. Thematic analysis was employed to identify patterns and themes within the extracted data, highlighting key insights related to ASD screening through XR experiences (Braun & Clarke, 2006). This comprehensive methodology, guided by established frameworks and expert review, ensures the robustness and reliability of this systematic literature review.

FINDINGS

This section delves into the findings of the systematic literature review, highlighting three key themes identified through the analysis of nine selected articles: gaze behaviors, facial emotion, and head orientation. These themes represent significant aspects of social communication and interaction that are often affected in individuals with ASD, making them crucial considerations for incorporating into XR experiences for ASD screening. The review identified six studies that focused on gaze behaviors, three on facial emotion, and three on head orientation. This suggests

that gaze behaviors, particularly eye contact and patterns, are a prominent area of research in ASD and XR experiences. Atypical gaze patterns, such as limited eye contact or a focus on specific details rather than faces, are often observed in individuals with ASD (Artiran, Bedmutha, & Cosman, 2024). Facial emotion, another critical aspect of social communication, is also frequently studied in relation to ASD and XR. Individuals with ASD may exhibit fewer facial emotions or struggle to interpret the emotions of others, highlighting the importance of facial emotion recognition technology in XR environments (White et al., 2018). Finally, head orientation, a key element of non-verbal communication and spatial awareness, is also being explored in the context of ASD and XR. Atypical head movements or limited range of head orientations may indicate challenges in processing spatial information or social cues (Artiran et al., 2024). The review revealed that two of the nine selected articles were published in 2024, while the remaining articles were published between 2013 and 2022.

The themes identified in this review provide valuable insights into the specific aspects of social communication and interaction that XR experiences can be designed to assess. All these elements reflected as significant aspects or elements that should be incorporated in XR experiences of ASD screening. Subsequently, the collected data will be used to diagnose ASD individuals. Thus, the discussion will focus on how those three themes could be integrated and assisted the screening process. XR environments can be designed to track and analyse gaze behaviours, including the duration and frequency of eye contact or the avoidance of eye contact. Gaze tracking technology can be utilized to measure how individuals with ASD engage with virtual characters or objects within the XR environment. Atypical gaze patterns, such as a focus on specific details of objects rather than faces, might be indicative of ASD characteristics (Artiran et al., 2024). On top of that, XR experiences can incorporate facial recognition in assessing how individuals with ASD respond emotionally to various stimuli presented in the virtual environment.

White et al. (2018) believed facial emotion recognition and expression contribute to the observed core social communication disability that characterize ASD. For instance, limited emotional variability or atypical emotional response may be indicative of social communication difficulties associated with ASD. In the other hand, head orientation is a crucial aspect of spatial awareness and social interaction. Atypical head orientation, such as limited or excessive head movements, might be indicative of challenges in processing spatial information or difficulties in adapting to the interactive aspects of the XR scenario.

CONCLUSION

This systematic literature review investigated the potential of Extended Reality (XR) experiences for Autism Spectrum Disorder (ASD) screening. The review identified three key themes – gaze behaviors, facial emotion, and head orientation – that represent significant aspects of social communication and interaction often affected in individuals with ASD. XR experiences, incorporating gaze tracking, facial emotion recognition, and head orientation tracking technologies, can provide a more comprehensive and objective assessment of potential ASD characteristics. This information can be used to guide early diagnosis and intervention,

ultimately improving the lives of individuals with ASD. Future research should focus on developing a data collection framework specifically for ASD screening through XR experiences, building upon the recommendations outlined in this review. This would involve further exploration of the identified themes, testing the reliability and validity of XR-based assessment tools, and investigating the potential of XR for personalized interventions.

REFERENCES

Artiran, S., Bedmutha, P. S., & Cosman, P. (2024). Analysis of Gaze, Head Orientation, and Joint Attention in Autism With Triadic VR Interviews. *IEEE Transactions on Neural Systems and Rehabilitation Engineering : A Publication of the IEEE Engineering in Medicine and Biology Society*, *32*, 759–769. https://doi.org/10.1109/TNSRE.2024.3363728

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2). https://doi.org/10.1191/1478088706qp063oa

Desideri, L., Pérez-Fuster, P., & Herrera, G. (2021). Information and communication technologies to support early screening of autism spectrum disorder: A systematic review. In *Children* (Vol. 8, Issue 2). https://doi.org/10.3390/children8020093

Golestan, S., Soleiman, P., & Moradi, H. (2018). *A Comprehensive Review of Technologies Used for Screening, Assessment, and Rehabilitation of Autism Spectrum Disorder*. 1–12.

Kandalaft, M. R., Didehbani, N., Krawczyk, D. C., Allen, T. T., & Chapman, S. B. (2014). Virtual Reality Social Cognition Training for Adults With Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders*, *43*, 34–44.

McCarty, P., & Frye, R. E. (2020). Early Detection and Diagnosis of Autism Spectrum Disorder: Why Is It So Difficult? In *Seminars in Pediatric Neurology* (Vol. 35). https://doi.org/10.1016/j.spen.2020.100831

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. In *The BMJ* (Vol. 372). https://doi.org/10.1136/bmj.n71

Petticrew, Mark., Roberts, H., & Petticrew, R. (2006). Systematic reviews in the social sciences a practical guide / Mark Petticrew and Helen Roberts. In *Systematic Reviews in the Social Sciences* (Vol. 42, Issue 5).

Thabtah, F., & Peebles, D. (2019). Early autism screening: A comprehensive review. *International Journal of Environmental Research and Public Health*, *16*(18). https://doi.org/10.3390/ijerph16183502

White, S. W., Abbott, L., Wieckowski, A. T., Capriola-Hall, N. N., Aly, S., & Youssef, A. (2018). Feasibility of Automated Training for Facial Emotion Expression and Recognition in Autism. *Behavior Therapy*, *49*(6). https://doi.org/10.1016/j.beth.2017.12.010

UTILIZING EYE TRACKING TECHNOLOGY TO MEASURE AND MANAGE FATIGUE IN LEARNING MANAGEMENT SYSTEM USING FATIGUE INDEX MODEL

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ABSTRACT
Eye tracking technology has become an essential tool for assessing cognitive processes such as attention and fatigue in educational settings. Learner fatigue in e-learning environments can significantly impact learning outcomes. E-learning platforms have reformed education by providing flexibility and accessibility, but they also pose challenges such as cognitive overload and learner fatigue, which can hinder academic performance. By analyzing eye movement patterns, including fixation duration, saccade amplitude, and pupil diameter, in conjunction with learner performance metrics and self-reported fatigue levels, a Random Forest classifier was employed to predict fatigue states. Results indicate a promising correlation between eye-tracking metrics and fatigue, with the model demonstrating acceptable accuracy in classifying fatigue levels. The study contributes to the understanding of learner fatigue and provides a foundation for developing adaptive learning systems that can mitigate its effects. Future research should focus on refining the model, incorporating additional physiological measures, and conducting longitudinal studies to assess long-term impacts. Such advancements hold the potential to transform the e-learning experience, optimizing it for better engagement and efficacy.

Keywords: Fatigue; Learning management systems; Eye-tracking technology; Cognitive fatigue; Personalized learning.

INTRODUCTION AND BACKGROUND

Scientifically, eye tracking technology operates on the principle of monitoring eye movements to gather valuable information about a person's gaze (look or observation) and focus. The application of this technology span across various fields, including individual with disabilities, special education to improve attention and engagement in online learning. In educational settings, eye tracking technology offers a non-intrusive method for assessing cognitive engagement, attentional focus, and mental workload during learning tasks. By capturing and analyzing eye movement patterns, researchers can identify indicators of cognitive fatigue, such as increased fixation durations, decreased saccade frequency, and gaze aversion, which may impede learning effectiveness (Ginns & Leppink 2019). For instance, (Malik et al., 2021), developed a software to assist visually impaired individuals in accessing the internet. It also provides a voice-based interface for interacting with websites, reading out content, and automating tasks, thus giving a more intuitive and efficient means of interacting with web content for all users. Similarly, Khaleel et al. (2024) provided an in-depth technical analysis of eye tracking technology in detecting abnormalities, improving learning and enhancing human computer interaction. Two methods for determining the eye region were used: facial landmarks or the Haar cascade technique. The shift to digital learning platforms, particularly through Learning Management Systems (LMS), allows learners to engage with educational content at their own pace and on their own terms. One of the key advantages of eye tracking technology

is its ability to provide objective measures of cognitive processes that may not be accurately captured through self-report or traditional behavioral measures. For example, in the context of LMS, where learners are often required to navigate complex interfaces and process large amounts of information, eye tracking can reveal patterns of visual attention and information processing strategies that influence learning efficiency and effectiveness (Barrios et al., 2020). By understanding how learners allocate their attentional resources and interact with instructional content, educators can tailor learning experiences to better suit individual needs and preferences.

Gaze tracking, is otherwise regarded as a subset of eye-tracking technology. It involves the continuous measurement of eye movements to determine where and how long a learner looks at various parts of a visual display. In educational settings, gaze tracking provides detailed insights into students' visual attention and cognitive processes. Gaze tracking allows researchers and educators to gain deeper understanding, monitor and analyze where learners direct their visual attention. This information is crucial in understanding how students engage with different types of content, such as text, images, videos, and interactive elements. Gaze tracking has been extensively used to study reading behaviors. By analyzing fixation durations and saccades, researchers can assess how efficiently students read and comprehend text. Yamada and Kobayashi (2018), demonstrated that skilled readers exhibit shorter fixations and longer saccades compared to less skilled readers. These findings can inform the design of reading interventions and support tools tailored to individual learners' needs. In multimedia learning environments, gaze tracking helps in understanding how learners process and integrate information from multiple sources, such as text and images. Also, gaze tracking supports the development of personalized learning experiences by providing real-time feedback on learner engagement and comprehension.

The research focuses on the application of eye-tracking technology to measure and manage cognitive fatigue in Learning Management Systems (LMS). Learner fatigue in e-learning environments can stem from several factors. These include the constant exposure to digital screens, the passive consumption of content without sufficient interactive elements, and a lack of immediate, real-time feedback that is often available in traditional learning settings. As fatigue sets in, learners may struggle to maintain focus, exhibit slower cognitive processing, and experience decreased retention of the material being taught. This has serious implications for educational outcomes, as fatigued learners are less likely to fully engage with content or complete online courses successfully.

To address these challenges, emerging technologies such as eye-tracking offer a promising avenue for detecting and managing learner fatigue. Eye-tracking technology provides insights into a learner's cognitive processes by measuring key visual attention indicators such as Fixation Duration (FD), Saccadic Velocity (SV), Blink Rate (BR), and Pupil Dilation (PD). These metrics have been shown to correlate strongly with cognitive load and fatigue, offering a way to assess how mentally fatigued a learner may be in real time. By integrating eye-tracking technology into LMS platforms, educators and system designers can track learner fatigue levels

and provide adaptive learning experiences that cater to the learner's current cognitive state.
In addition to improving learner engagement, this research contributes to the broader goal of personalizing e-learning experiences. With the increasing use of artificial intelligence (AI) and machine learning in education, the integration of eye-tracking data into LMS platforms represents a significant advancement in creating intelligent systems that adapt to each learner's unique needs. The Fatigue Index developed in this study is one step toward achieving that goal, offering a scalable solution that can enhance educational outcomes across various e-learning contexts.

METHODOLOGY

To develop a predictive model for learner fatigue, this research employs a combination of eye-tracking metrics that have been empirically shown to correlate with cognitive load and fatigue. The research employs a quasi-experimental design involving 50 undergraduate students enrolled in online courses. Participants engage with a series of online learning modules while wearing eye-tracking glasses that record their eye movement data, including fixation duration, saccade amplitude, and pupil diameter. This data is synchronized with LMS interaction metrics, such as time spent on pages and interactions with learning materials. Additionally, pre- and post-learning assessments are conducted to evaluate knowledge acquisition, alongside self-reported fatigue ratings collected through questionnaires. A Random Forest classifier is utilized to develop the fatigue index model, which correlates the eye-tracking metrics with learner performance and fatigue levels.

The research leverages these four metrics to develop a comprehensive Fatigue Index (FI), which is calculated through the following mathematical formula:

$$FI = \gamma_1 * FD + \gamma_2 * (1/SV) + \gamma_3 * BR + \gamma_4 * PD$$

In this formula, γ_1, γ_2, γ_3 and γ_4 are coefficients determined through regression analysis. These coefficients represent the weight of each variable in contributing to overall fatigue, and they are derived from analyzing large datasets of eye-tracking data from learners engaging in various LMS activities.

FINDINGS

Preliminary analyses of the data collected suggest a strong correlation between the four eye-tracking metrics and cognitive fatigue. The results indicate that:

i. Longer Fixation Durations are consistently associated with higher levels of cognitive load. As the learner's cognitive resources become taxed, they spend more time fixating on individual points, suggesting that their brain is working harder to process information.
ii. Reduced Saccadic Velocities signal the onset of cognitive fatigue. When learners are fresh and engaged, their eyes move quickly between points of focus, but as fatigue sets in, these movements slow down.
iii. Increased Blink Rates are observed in fatigued learners, as they blink more frequently to relieve strain and momentarily disengage from visual stimuli.
iv. Larger Pupil Dilations correspond with increased cognitive load, though pupil size also

fluctuates in response to physical and emotional factors. Nonetheless, irregular pupil size changes often accompany cognitive fatigue

Key findings from the study indicate a significant correlation between eye-tracking metrics and cognitive fatigue, with the fatigue index model demonstrating acceptable accuracy in classifying fatigue states. Specifically, longer fixation durations, decreased saccade amplitudes, and increased pupil dilation were identified as indicators of heightened cognitive fatigue. The analysis revealed that the fatigue index could effectively quantify fatigue levels, providing a basis for real-time feedback and adaptive learning interventions tailored to individual learner needs. These findings underline the potential of eye-tracking technology to enhance understanding of learner engagement and fatigue dynamics in e-learning environments.

CONCLUSION

In conclusion, the study highlights the feasibility of utilizing eye-tracking technology to measure and manage learner fatigue within LMS. The developed fatigue index model offers a quantifiable measure of cognitive fatigue, suggesting that educational strategies should incorporate real-time monitoring and adaptive learning paths to improve learner engagement and performance. The integration of eye-tracking technology into Learning Management Systems represents a significant advancement in the ability to monitor and manage cognitive load in real-time. By continuously tracking metrics such as Fixation Duration, Saccadic Velocity, Blink Rate, and Pupil Dilation, the Fatigue Index provides an objective measure of learner fatigue that can be used to dynamically adjust the learning environment.

The real-time feedback and adaptive learning capabilities enabled by this system have the potential to address one of the major challenges of e-learning cognitive overload and fatigue. By personalizing the learning experience to match the learner's cognitive state, this approach can improve engagement, reduce dropout rates, and enhance overall educational outcomes.
Future research directions include refining the fatigue index model and exploring additional physiological measures on learning outcomes. The integration of eye-tracking technology into LMS represents a significant advancement in educational research, with the potential to transform e-learning experiences by optimizing them for better engagement and efficacy.

REFERENCES

Barrios, L., Ochoa, X., & Luján-Mora, S. (2020). Eye tracking for e-learning: A systematic review. *IEEE Access*, 8, 22762-22779.

Ginns, P., & Leppink, J. (2019). Special issue on cognitive load theory. *Educational Psychology Review, 31, 255-259.*

Khaleel, A. H., Abbas, T. H., & Sami Ibrahim, A. W. (2024). Best low-cost methods for real-time detection of the *eye and gaze tracking. i-com,* 23(1), 79-94.

Malik, L.,Gaur, L., Goyal,D.,Yadav, M., & Ravinder, M. (2021). A literature review on virtual assistant for visually impaired. *Artificial Intelligence and Speech Technology, 447-452.*

Yamada, Y., & Kobayashi, M. (2018). Detecting mental fatigue from eye-tracking data gathered while watching video: Evaluation in younger and older adults. *Artificial intelligence in medicine*, 91, 39-48.

Zhang, C., Ma, Y., Chen, S., Zhang, J., & Xing, G. (2024). Exploring the occupational fatigue risk of short-haul truck drivers: effects of sleep pattern, driving task, and time-on-task on driving behavior and eye-motion metrics. Transportation research part F: *traffic psychology and behaviour*, 100, 37-56.

DESIGNING CUTE AND ROLE REVERSAL VIRTUAL REALITY LEARNING SYSTEM FOR PRIMARY SCHOOL CHILDREN ON CLIMATE CHANGE

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ABSTRACT
Climate change is one of the most significant global problems. This proposal first gives an overview of the relationship between VR and climate change. This includes explaining firstly the challenges of climate change for various aspects of the world. Secondly, the educational relevance and potential commercial value of VR education and its feature, role reversal. Therefore, this research proposal proposes a study on the prototype of Cute and Role Reversal Virtual Reality Learning System (CR-VR) that would enable children to effectively learn the climate change happens in the real world, which leads to enhance their literacy of environment protection experiences. Virtual Reality (VR) is chosen because it is an effective visual communication tool to deliver knowledge to children. As one of the educational mediums introducing climate issues to primary school children, CR-VR potentially solves the problems in learning climate change, ultimately, this proposal research will potentially achieve the 2030 Sustainable Development Goals (SDGs).

Keywords: climate change; role reversal; virtual reality; environment education; primary school children.

INTRODUCTION

Climate change poses a critical global challenge, with substantial implications for China's economy and environment due to its high CO_2 emissions. Although China has implemented various policies to reduce environmental impact, the need for effective climate education remains. Virtual reality (VR) is highlighted as a transformative educational tool that can visually communicate climate change concepts. The CR-VR system focuses on engaging children through VR, utilizing role-reversal and cute design elements to make learning enjoyable and impactful.

PROBLEM STATEMENT

The idea of visual communication design has rarely been incorporated in school environmental protection education, even though effective visual communication design can outperform wording in presenting and explaining complex concepts, such as the case of climate change. For instance, based on the idea of visual communication design, to accurately explore the visual meanings and information embedded in environmental education, there is a need for designers to understand viewer's responses and feedback to images (Fahmy, Bock, & Wanta, 2014), especially when such education is performed in schools.

Another problem that occurred in learning climate change is that the designers who designed the learning system failed to attract the children's attention. Stimulating the learners' attention potentially brings them to critically think about environmental protection. In fact, it is found that the information embedded in the digital learning system nowadays is not presented in an accurate and efficient way that can attract children's attention. Notably, the goals of

sustainability of United Nations (2019) where “Design for sustainability” and “Design for good behaviours” are usually not considered to design learning materials (Cozen, 2013; Spangenberg, Fuad-Luke & Blincoe, 2010).

The third problem in learning climate change is that learning materials designed by graphic designers tend to ignore the expected impact of visual designs. Instead, they just focus on innovation (Gaede, Chmela-Jones & Buys, 2007). They fail to design effective materials for knowledge delivery (Ceschin & Gaziulusoy, 2016; Lilley, et al., 2017). In China, multiple ways have been used to transfer information on environmental education. The educators typically conduct visual communication media such as videos, audios, graphics, animations, and data texts to provide environmental information as part of environmental education for primary school (Zhu, Wang, & Wang, 2004). Nevertheless, the application of VR to introduce climate change knowledge to primary school children is still not widely used.

However, the Cute and Role Reversal (CR) based VR learning system proposed in this study would be a novel pedagogy to overcome these challenges and will also potentially provide a blueprint in other fields and topics.

RESEARCH OBJECTIVES

This proposed research aims to:

1) Design and develop a novel VR technology to present and deliver information of climate change to students based on the visual communication designs.
2) Propose to apply two effective design ideas, namely Role Reversal and Cute Designs into VR learning system to explore the effectiveness of visual communication design in school environmental education. This system is therefore named as “Cute and Role Reversal Virtual Reality Learning System” (CR-VR).
3) Relate visual communication design and VR in educating school children in understanding the basic ideas and importance of environmental sustainability using the case of climate change as an example in the context of primary schools in China.
4) Investigate CR-VR Learning System’s influence on primary school children's thoughts and behaviors in learning about climate change.

RESEARCH QUESTIONS

The proposed study tends to investigate the following Research Questions (QR):

RQ1: How visual communication design can be applied in VR technology in educating climate change?

RQ2: Can both “role reversal design” and “cute design” function effectively in VR towards the goal of environment protection?

RQ3: Are there any differences in the effectiveness of the two designs?

RQ4: How to use a co-design approach with VR and relevant stakeholders to achieve a more significant social impact of visual communication design towards sustainability?

THEORETICAL FRAMEWORK

Gestalt theory underpins the CR-VR's design, focusing on principles like similarity, continuation, and closure to structure visual perception and enhance learning engagement. These principles help ensure that the visual elements in CR-VR resonate with children's learning styles, facilitating better comprehension of environmental concepts.

RESEARCH METHODS

1) Document Analysis: Review existing visual communication designs on climate change, especially those that use cute and role-reversal themes.
2) Focus Groups: Collect feedback from children on selected visual designs.
3) Co-Design Sessions: Engage primary school teachers and students to refine VR designs, ensuring they meet educational goals effectively.
4) Qualitative Data Analysis: Evaluate the CR-VR's impact on children's engagement and understanding through focus groups and interviews with primary school participants in Jiangxi Province, China.

SIGNIFICANCE OF THE STUDY

Overall, this study will help fill the gap in understanding the role of an effective novel VR learning system designed based on visual communication design amongst primary school children in environmental sustainability in general and climate change in specific. The study will contribute to the literature on visual communication design in the context of cute and role reversal designs (Fahmy, Bock, & Wanta, 2014; Hansen and Machin, 2013). The results of the study may also offer practical and managerial implications for school environmental education in China (Cozen, 2013; Spangenberg, Fuad-Luke & Blincoe, 2010). The finding will be essential for instructional designers to comprehend how to design the VR learning system effectively. To this end, the deployment of VR technology in visual communication will contribute to the knowledge body of VR in education.

FINDINGS

The findings suggest that role reversal and cute design have the potential to increase children's engagement with climate change education and motivate them to become aware of environmental protection. Role reversal enables students to empathize with different perspectives, while cute designs capture attention and make learning enjoyable. The immersive nature of VR allows students to experience climate change impacts directly, resulting in deeper understanding and retention of environmental concepts.

CONCLUSION

CR-VR presents a novel approach to educating primary school children about climate change, combining VR with role reversal and cute designs to create an immersive and engaging learning environment. The system holds significant potential for use in schools, providing an innovative method to teach environmental concepts and encourage pro-environmental behaviors among young learners. Future research should explore the long-term impacts of CR-VR on children's attitudes and behaviors toward environmental issues.

REFERENCES

Fahmy, S., Bock, M., & Wanta, W. (2014). *Visual communication theory and research: A mass communication perspective*. Springer.

Ferguson T. (2019) Climate Change Education for Sustainable Development. In: Leal Filho W. (eds) *Encyclopedia of Sustainability in Higher Education*. Springer, Cham. https://doi.org/10.1007/978-3-319-63951-2_372-1

Li, Y. (2018). Study of the effect of environmental education on environmental awareness and environmental attitude based on environmental protection law of the People's Republic of China. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(6), 2277-2285.

Markowitz, D. M., et al. (2018). "Immersive Virtual Reality Field Trips Facilitate Learning About Climate Change." *Frontiers in Psychology, 9*.

McKinsey Global Institute. (2018). *China's digital economy: A leading global force*.

Poorman, P. B. (2002). "Biography and role-playing: Fostering empathy in abnormal psychology." *Teaching of Psychology, 29*(1).

Spangenberg, J. H., Fuad-Luke, A., & Blincoe, K. (2010). "Design for Sustainability (DfS): The interface of sustainable production and consumption." *Journal of Cleaner Production, 18*(15).

Statista. (2023). Online University Education - China | *Market Forecast*. Statista. https://www.statista.com/outlook/dmo/eservices/online-education/online-university-education/china.

COMPARISON BETWEEN HAIPER AND LUMA DREAM MACHINE GENERATIVE AI TOOLS IN TERMS OF USER-FRIENDLINESS AND SPEED

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ABSTRACT

The rapid advancement of artificial intelligence (AI) has led to the development of generative multimedia tools that assist users in creating complex visual and textual contents with minimal efforts. Among these tools, Haiper and Luma Dream Machine have emerged as popular options. Each of them offers unique features and capabilities. This paper presents a quantitative experimental study comparing these two AI generative tools in terms of user-friendliness, usability, speed, and overall user experience. The study involved 20 tertiary students in Malaysia, of which they are divided into two groups, with one group using Haiper and the other group using Luma Dream Machine. Using a combination of research instruments, task completion tests, and user feedback, which tool appears to better over the other one would be able to be determined. Such comparative results provide insights into which tool offers superior performance in each category. The findings of this research will be beneficial for both users and developers, thereby offer guidance on which AI generative tool is better suited for different tasks and user needs.

Keywords: AI generative applications; usability; user friendliness.

INTRODUCTION

Generative AI tools have revolutionized the way content is created. They are now allowing users to produce high-quality multimedia with minimal input. *Haiper* and *Luma Dream Machine* are two such AI tools that have gained popularity for their ability to generate diverse content, ranging from images to text and beyond. As the use of AI in content creation becomes more widespread, it is essential to understand how these tools compare in terms of usability and user experience. This research seeks to provide a comparative analysis of *Haiper* and *Luma Dream Machine*, focusing on key performance indicators such as user-friendliness, usability, speed, and overall experience.

PROBLEM STATEMENTS

Despite the growing popularity of AI generative tools, there is a lack of empirical research comparing the performance and user experience of different platforms that allow the users to decide which tools to use. Most existing studies focus on the capabilities of these tools in isolation rather than in direct comparison with one another. As a result, users and developers often rely on anecdotal evidence or personal preferences when choosing a tool. This gap in the literature highlights the need for a systematic and quantitative comparison of AI generative tools to provide a clearer understanding of their strengths and weaknesses. This study addresses this gap by comparing *Haiper* and *Luma Dream Machine* in a controlled experimental setting.

RESEARCH OBJECTIVES

The primary objectives of this study are as follows:

RO1: To compare the user-friendliness of *Haiper* and *Luma Dream Machine*.

RO2: To evaluate the usability of *Haiper* and *Luma Dream Machine*.

RO3: To assess the speed and efficiency of *Haiper* and *Luma Dream Machine* in generating contents.

RO4: To analyze the overall user experience of both AI tools.
RO5: To provide recommendations for users and developers based on the findings.

RESEARCH QUESTIONS

The study seeks to answer the following Research Questions (RQ):
RQ1: Which AI generative tool, *Haiper* or *Luma Dream Machine*, is more user-friendly?
RQ2: How do *Haiper* and *Luma Dream Machine* compare in terms of usability?
RQ3: Which tool offers faster content generation, *Haiper* or *Luma Dream Machine*?
RQ4: What is the overall user experience of using *Haiper* compared to *Luma Dream Machine*?

THEORETICAL FRAMEWORK

This study is grounded in the Technology Acceptance Model (TAM), which posits that perceived ease of use and perceived usefulness are the primary factors influencing user acceptance of technology. According to Davis (1989), these factors directly impact users' attitudes toward using a technology, which in turn affects their behavioral intention to use it. In the context of this study, user-friendliness and usability correspond to perceived ease of use, while speed and overall experience relate to perceived usefulness. The comparison of *Haiper* and *Luma Dream Machine* will be framed within this model to understand how these factors influence user preferences and choices.

LITERATURE REVIEW

Generative AI refers to machine learning models that can generate new data similar to the input data they were trained on. These tools have seen rapid development, with applications ranging from image and text generation to music and video creation (Goodfellow et al., 2014). *Haiper* and *Luma Dream Machine* are both such generative AI tools designed to assist users in generating multimedia contents with minimal input, using advanced algorithms to produce high-quality results. *Haiper* is known for its versatility and the range of contents it can generate, such as text, images, audio, and videos. The tool is designed to be user-friendly, with extremely simple interface that allows users to input parameters and receive output quickly. According to Smith et al. (2021), *Haiper* is particularly popular among content creators and marketers due to its ability to produce diverse and engaging contents. *Luma Dream Machine*, on the other hand, focuses more on visual contents, with an emphasis on generating high-quality images and videos from textual descriptions. The tool uses a complex neural network to understand and interpret user inputs. It allows the users to create detailed and realistic outputs. Recent studies by Johnson and Lee (2022) have highlighted the tool's effectiveness in generating creative contents for the entertainment and advertising industries.

User-Friendliness in AI tools is one parameter for investigation in this research. User-friendliness is one essential factor in the adoption of AI tools, particularly for users who may not have technical expertise. Research by Venkatesh and Davis (2000) suggests that tools with intuitive interfaces and easy-to-use features are more likely to be adopted by a wide range of users. Both *Haiper* and *Luma Dream Machine* are designed with user-friendliness in mind, but their effectiveness in this regard has not been empirically compared.

Usability refers to the ease with which users can achieve their goals using a tool. Nielsen (1993) identified five attributes of usability, namely learnability, efficiency, memorability, errors, and satisfaction. Previous studies have utilized these attributes to evaluate various AI tools, but a direct comparison between *Haiper* and *Luma Dream Machine* in terms of usability is lacking.

Speed and Efficiency in AI Tools refers to the speed at which an AI tool can generate content. It is another key performance indicator, particularly in fast-paced industries like marketing and media production. Research by Chen et al. (2020) indicates that faster tools are generally preferred by users,

as they allow for more rapid iteration and experimentation. This study aims to quantify the speed of content generation for both *Haiper* and *Luma Dream Machine*.

User Experience (UX) encompasses all aspects of a user's interaction with a tool, including emotions, preferences, perceptions, and responses. Hassenzahl (2010) suggests that UX is influenced by both the pragmatic qualities (usability and functionality) and hedonic qualities (aesthetics and pleasure) of a tool. Comparing the UX of *Haiper* and *Luma Dream Machine* will provide insights into how these tools are perceived and experienced by users.

RESEARCH METHODOLOGY

The research employs an experimental method to compare *Haiper* and *Luma Dream Machine*. A total of 20 participants, all tertiary students from various institutions in Malaysia, will be recruited for the study. The participants will be randomly assigned to one of the two groups of 10 to use the AI tools over a period of one week. This ensures a balanced distribution of demographics such as age, gender, and academic background. The participants will perform a series of tasks designed to evaluate the tools' user-friendliness, usability, speed, and overall experience.

The following research instruments will be used to collect data:

i. ***Task Completion Test:*** Participants will be given specific tasks to complete using the assigned AI tool. These tasks will be designed to assess the tool's user-friendliness, usability, and speed.
ii. ***Post-Task Surveys***: After completing each task, participants will fill out a survey measuring their perceptions of the tool's ease of use, usefulness, and overall experience. The survey will include Likert-scale questions as well as open-ended questions for qualitative feedback.
iii. ***System Usability Scale (SUS):*** The SUS will be used to measure the usability of each tool. The SUS is a reliable, 10-item scale that provides a global view of subjective usability (Brooke, 1996).
iv. ***Time-On-Task:*** The time taken by participants to complete each task will be recorded to assess the speed of the AI tools.
v. ***User Experience Questionnaire (UEQ):*** The UEQ will be administered to measure the overall user experience of each tool, focusing on aspects such as attractiveness, efficiency, dependability, stimulation, and novelty.

RESEARCH PROCEDURE

The study will be conducted in two phases. In the first phase, participants will receive an introduction to the AI tool assigned to them, along with a brief tutorial. They will then complete the assigned tasks and fill out the post-task instruments. In the second phase, participants will complete the SUS and UEQ. The data collected were analyzed using descriptive statistics and *t*-tests.

DATA ANALYSIS

Quantitative data from the surveys, SUS, and UEQ will be analyzed using SPSS to compare the two AI tools across the different variables. Descriptive statistics will provide an overview of the results, while *t*-tests will be used to determine any significant differences between the two groups.

10.0 Conclusion

The comparison of generative AI applications would allow the users to determine which AI tools work best for them. By examining its strength and weakness, this research provides valuable insights into the capability of the two generative AI multimedia applications in universities. This ensures that such AI applications will be used in ways that optimize learning and minimize cognitive load.

REFERENCES

Brown, A., & Lee, J. (2022). Cognitive Load and User Experience in AI-Powered Educational Tools. *International Journal of Educational Technology in Higher Education*, 19(4), 102-118.

Chen, X., Liu, Y., & Wang, Q. (2022). The Impact of AI Tools on Student Engagement and Learning Outcomes: A Meta-Analysis. *Journal of Educational Technology Research and Development*, 70(2), 85-101.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340.

Sweller, J., Ayres, P., & Kalyuga, S. (2019). Cognitive Load Theory: Exploring the Interaction Between Information Structures and Cognitive Architecture. *Educational Psychology Review*, 31(2), 261-278.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2020). Unified Theory of Acceptance and Use of Technology: A Synthesis and the Road Ahead. *Journal of the Association for Information Systems*, 21(6), 328-376.

Zhang, L., & Wu, H. (2023). Exploring the Role of AI Generative Tools in Creative Arts Education. *Journal of Creative Arts and Technology*, 15(1), 67-82.

SOCIAL TAGGING MONITORING AND MANAGEMENT FOR CORPORATE REPUTATION OF HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

In the digital age, the corporate reputation of higher education institutions (HEIs) is increasingly shaped by online interactions and social tagging. This study explores the critical role of social tagging monitoring and management in safeguarding and enhancing the corporate reputation of HEIs. Utilizing a qualitative methodology, this research employs content analysis and in-depth interviews to gather rich, nuanced data. The content analysis examines social tagging trends and their implications for institutional corporate reputation, while interviews with officers in charge of the HEI's social media. Findings indicate that proactive monitoring and strategic management of social tags can significantly influence public perception, enhance engagement, and mitigate reputational risks. The study underscores the importance of incorporating social tagging strategies into the broader reputation management framework of HEIs, providing a comprehensive approach to maintaining positive vibes and resilient corporate reputation in the competitive educational landscape.

Keywords: Corporate Reputation; Higher Education Institution; Facebook; Social Tagging; Folksonomies.

INTRODUCTION

These days, social media ideals play a big role in any organization's reputation. Folksonomies produced by a variety of users and profiles, can potentially boost a company's reputation in both good and bad ways (Allam et al., 2020; Al-Thuhli & Al-Badawi, 2020). The viral problems indicated in the tags will spread uncontrollably in an instant. Adherence to appropriate mechanisms and guidelines is necessary to promptly adapt to changing circumstances. Higher education institutions are one of the organization types that should utilize social media for competitive advantage winning the hearts of their stakeholders (Nardella et al., 2022; Aledo-Ruiz et al., 2022). A guided folksonomy focused on the corporate reputation of higher education institutions (HEIs) should be developed in order to ensure that the reputation of these institutions improves and grows (Omar Raja 2023; Al-Thuhli & Al-Badawi, 2020).

Using the same tags across all social media, websites, and digital platforms would make it common for people to follow or like each other on social media. It draws attention to the challenges folksonomies, which are powered by user-defined information, encounter, including the usage of synonyms, semantic problems, and categorization concerns (Andersen, 2021; Pi et al., 2011). Due to its reflection of users' goals, feelings, and cognitive levels, social tagging can be unclear, misleading, and prejudiced even while it provides a wealth of relevant information. This can affect a business's reputation and image, particularly if it becomes viral (Fürst et al., 2023). The paper emphasizes how companies, especially Higher Education Institutions (HEIs), perceive the consequences of social tagging on reputation and highlights the paucity of research on the subject. In order to enhance the corporate reputation of HEIs, the

research intends to investigate the process of monitoring and controlling social media, particularly Facebook.

METHODOLOGY

A qualitative approach was employed to complete the study goal using insight from the interviews as well as document content analysis techniques. The document content analysis was used to explore current policies and procedures before putting them into a theoretical framework or practical instructions Pinsker (2020). Two corporate officers were interviewed at a selected higher education institution in Malaysia after getting approval and remain as unidentified due to ethical clearance. The choice of HEI is one public education institution that is highly representative online through almost all types of social media such as Facebook, X (formerly Twitter), Instagram, Youtube and Tiktok, guaranteeing that the results will offer important and new findings.

The HEI has been chosen when considering the crucial of handling and managing vast stakeholders online occupying the physical location of the HEI which has the biggest number of branches and students in Malaysia nationwide. Both officers have more than five year's experience in monitoring HEI's official social media. The duration of the interview session was approximately 30 minutes and later the transcribed data was returned to the officers for verification and clarity for the reliability of data (Lincoln and Guba, 1985). Data analysis was carried out by using thematic analysis (Boyatzis, 1998).

FINDINGS

The university is utilizing an app that analyses reviews, comments, and postings to determine how the public feels about the school. This aids in comprehending public opinion and quickly resolving unfavorable comments. One of the corporate officer explains that his job is to keep an eye on the HEI Facebook page using a social media analysis tool able to analyse data using topic modelling, sentiment analysis, and social media analytics. Another officer clarify about role of the officer overseeing social media at a higher education institution (HEI) and stresses out the importance of being prepared for a sudden spike in negative social media posts that follow a contentious issue, such as one involving the quality of teaching or inappropriate behavior by academic staff.

For instance, when parents, alumni, and students voice their indignation, a viral backlash ensues that jeopardizes the institution's image. To manage such issues, the HEI social media team moved immediately to release an open and warm statement outlining the circumstances and promptly obtained an appropriate response from the relevant parties. They have already established a specific FAQ website to handle frequently asked questions about fees, facilities, and general matters. They also host live Q&A sessions with important administrators to interact with the community directly. The HEI may lessen negative attitudes, regain stakeholder trust, and show its dedication by quickly admitting the problem, giving clear information, and keeping lines of communication open. In term of sentiment analysis results, Facebook mentions and likes on social media were routinely tallied and shown to HEI's upper management. The sentiment data value for 2022, 2023, and May 2024 is classed as Positive, Negative, and Neutral. Words like "congratulations," "thank you," and "success" are examples of positive

attitudes. They witnessed a modest decrease from 52.00% in 2022 to 47.33% in 2023 before increasing to 51.00% in 2024. Negative sentiment dropped from 32.50% in 2022 to 32.33% in 2023 and then to 27.80% in 2024, as determined by officers using terms that indicated unfavorable impacts. Posts containing neutral emotions concerning things like dining establishments, rental properties, and reference books were included in the category of neutral feelings, which grew from 15.75% in 2022 to 20.33% in 2023 and 21.20% in 2024. Overall, this pattern shows a slow increase in neutral postings over time along with a relative stability of positive and negative views.

CONCLUSION

Social tagging on social media generates user-generated content (UGC) for organizations like Higher Education Institutions (HEIs), influencing their reputation. For example, hashtags like #uitm on platforms like X (formerly Twitter) represent the institution's brand and facilitate collaborative filtering based on user preferences (Kalloubi & Nfaoui, 2023). Real-time monitoring of social media can help organizations detect and address potential crises by responding to negative sentiment or controversial topics swiftly (Rialti, 2016). Researchers emphasize the importance of consistent monitoring and well-planned digital strategies, such as pre-crisis preparation and interactive crisis management, to safeguard corporate reputations (Diddi & Wei, 2022). Various response strategies, including apologies, humanized communication, and corporate social responsibility (CSR) activities, can enhance reputation management (Zhang et al., 2024; Okur & Vakifli, 2020).

For HEIs, social media is essential for building and maintaining brand reputation by engaging with stakeholders such as students, employees, and the public. Strategic communication and frequent online engagement help HEIs manage public opinions and enhance institutional reputation (Carrillo-Durán & García García, 2020; Rashid & Mustafa, 2020). Tools for real-time social media monitoring would further enhance reputation management, allowing HEIs to respond effectively to feedback. Both user-generated and firm-generated content contribute to building brand equity, with electronic word-of-mouth playing a significant role (Sagynbekova et al., 2020). Institutions must leverage social media data to refine their communication strategies and better connect with their audiences across virtual and real spaces.

REFERENCES

Aledo-Ruiz, M. D., Martínez-Caro, E., & Santos-Jaén, J. M. (2022). The influence of corporate social responsibility on students' emotional appeal in the HEIs: The mediating effect of reputation and corporate image. *Corporate Social Responsibility and Environmental Management*, *29*(3), 578-592.

Allam, H., Bliemel, M., Al Amir, O., Toze, S., Shah, K., & Shoib, E. (2020, November). Collaborative ontologies in social tagging tools: a literature review of natural folksonomy. In *2020 Seventh International Conference on Information Technology Trends (ITT)* (pp. 126-130). IEEE.

Al-Thuhli, A. and Al-Badawi, M. (2020). A Framework to Analyze Social Tagging and Unstructured Data. *2020 3rd International Conference on Information and Computer Technologies (ICICT)*, 46-53. https://doi.org/10.1109/ICICT50521.2020.00016

Anderson, J., (2021). Genre as digital social action: the case of archiving, tagging and searching in digital media culture. *Journal of Documentation.* 78(2). 228-241. https://doi.org10.1108/JD-01-2021-0023

Bledsoe, T., & Chan, T. (2023). Folksonomies: User-generated classification and its impact on digital content discovery. *Journal of Information Science and Technology*, 59(3), 245-262. https://doi.org/10.1234/jist.v59i3.456

Carrillo-Durán, M. V., & García García, M. (2020). Exploring the need for stakeholders' engagement through social networking sites to build the reputation of higher education organisations. *Higher Education Quarterly*, *74*(4), 442-457.

Diddi, P., & Wei, L. (2022). Crisis management on social media: Effect of pre-crisis inoculation strategy and midst-crisis organizational interactivity. *Public Relations Review*, *48*(5), 102206.

Fürst, S., Schäfer, M. S., Vogler, D., & Sörensen, I. (2023). Beyond the news media logic? Analyzing the social media orientation of university leadership. *Swiss Journal of Sociology*, *49*(3), 567-588.

Guba, E. G., & Lincoln, Y. S. (1987). The countenances of fourth-generation evaluation: Description, judgment, and negotiation. *The politics of program evaluation*, *15*, 202-234.

Kalloubi, F. (2023, May). A ListNet-based Combination of Lexical and Semantic Features to Homogenize Folksonomies in Online Social Networks. In *2023 3rd International Conference on Innovative Research in Applied Science, Engineering and Technology (IRASET)* (pp. 1-6). IEEE.

Nardella, G, Brammer, S & Surdu, I. (2022) The social regulation of corporate social irresponsibility: reviewing the contribution of corporate reputation. International journal of management reviews. https://doi.org/10.1111/ijmr.12311

Okur, M. E., & Vakifli, I. (2021). Sosyal sorumluluk faaliyetlerinin sosyal medyada kurumsal itibar yönetimine etkisi. *Öneri Dergisi*, *16*(55), 342-362.

Omar Raja, E. D. (2023). Building student loyalty in higher education: the role of corporate reputation. *F1000Research*, *12*.

Pi, S. M., Liao, H. L., Liu, S. H., & Lin, C. W. (2011, January). Framework for classifying website content based on folksonomy in social bookmarking. In *International Conference on Intelligent Computing and Information Science* (pp. 250-255). Springer, Berlin, Heidelberg.

Pinsker, E. (2020). Quantitative and qualitative content analysis methods for document review for monitoring purposes. *European Journal of Public Health*, *30*(Supplement_5), ckaa165-1206.

Rashid, S., & Mustafa, H. (2020). Antecedents of corporate reputation with employees in higher education institutions: a systematic review. *International Journal of Educational Management*, *35*(1), 297-309.

Rialti, R., Zollo, L., Caliandro, A., & Ciappei, C. (2016). Social media strategies to protect brand image and corporate reputation in the digital era: a digital investigation of the Eni vs: report case. *Mercati e competitività: 4, 2016*, 65-84.

Sagynbekova, S., Ince, E., Ogunmokun, O., Olaoke, R., & Ukeje, U. (2020). Social Media Communication and Higher education brand equity: The Mediating Role of eWOM. *Journal of Public Affairs*, 1-9.

Zhang, N., Wang, X., Guo, X., Cheng, X., & Pang, Z. (2024). How organization response influences public sentiment and behavior in online crises: The role of response strategies, tenor of discourse and executives. *Public Relations Review*, *50*(1), 102395.

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