INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 12, Issue 3, (2023) E-ISSN: 2226-6348

Bridging Learning Styles and Student Preferences in Construction Technology Education: VARK Model Analysis

Siti Nur Aishah Mohd Noor and Mohd Khairul Amri Ramly

Department of Built Environment and Technology, College of Built Environment, Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, Perak, Malaysia

Email: sitinuraishahmn@gmail.com

To Link this Article: http://dx.doi.org/10.6007/IJARPED/v12-i3/19313 DOI:10.6007/IJARPED/v12-i3/19313

Published Online: 27 September, 2023

Abstract

VARK Model Analysis delves into the diverse landscape of learning preferences exhibited by students enrolled in Construction Technology courses. Recognizing the crucial role of aligning instructional methods with individual learning styles, this study aims to identify the dominant learning modalities within this academic context. It highlights the multifaceted nature of the Construction Technology field and the potential challenges associated with catering to a heterogeneous student population. It underscores the importance of this research in bridging the gap between pedagogical strategies and student needs. Issues arising from the varied learning styles present within the student cohort are acknowledged, emphasizing the potential impact of instructional misalignment on knowledge acquisition and skill development. This study seeks to address these issues systematically. The main objective of this study is to identify the dominant learning styles through rigorous quantitative analysis, employing SPSS as the primary tool. The questionnaire based on the VARK model is administered to selected Construction Technology students to discern their preferred modalities of learning. Findings reveal the prevalence of specific learning styles within the academic context. These results hold significant implications for both lecturers and students. In conclusion, this research contributes valuable insights into the learning landscape of Construction Technology education. By identifying dominant learning styles, it provides a foundation for more effective and inclusive instructional practices. This study underscores the importance of adapting pedagogy to accommodate diverse learning preferences, ultimately enriching the educational experience for both educators and students in Construction Technology courses.

Keywords: Learning Styles, VARK, Construction Technology, Student Preferences, Built Environment

Introduction

In the ever-evolving landscape of construction technology, where innovation drives progress, the role of education cannot be overstated. New tools, techniques, and technology continue to reshape the industry, ensuring that construction professionals are equipped. The knowledge and skills, they need to thrive have become a paramount concern (Payaprom

&Payarom, 2020). Yet, a significant gap persists between the pedagogical strategies employed in construction technology education and the diverse needs of students entering this field. This gap is where the crucial intersection of effective teaching and learning styles assessment comes into play (Ibrahim and Zulkipli, 2022). The need to bridge this gap has never been more pressing, and in this research, the comprehensive exploration is anchored in the pioneering works of Fleming and his VARK model (Visual, Auditory, Reading/Writing, and Kinesthetic), a widely recognized framework for understanding and assessing diverse learning styles. This research intended to shed light on how construction technology educators can leverage the VARK model to align pedagogical strategies with the unique learning preferences of their students. With a growing body of research and evolving insights into effective teaching practices, the research delved into the contemporary application of Fleming's model, offering actionable insights to educators, curriculum designers, and industry professionals alike. In the era where construction is not merely building structures but also shaping the future, ensuring that the bridge between teaching methods and student needs is fortified is essential. Hence, this research serves as a guide towards a more inclusive, effective, and student-centered approach to construction technology education.

Literature Review

Construction Technology Courses

Construction technology knowledge is critical to education in the built environment, encompassing fields such as architecture, construction management, quantity surveying, building surveying, and urban planning. It refers to the understanding to the processes, methods, materials, and technologies used in the planning, design, and construction of buildings and infrastructure. This knowledge is essential for students pursuing careers in the built environment where it becomes the foundation of disciplines within the built environment. On top of it, built environment students often encounter complex theoretical concepts related to design principles, structural analysis, and planning (Chudley & Greeno, 2010). Construction technology knowledge bridges the gap between theory and practice by demonstrating how these concepts manifest in real-world construction projects. In addition to that, it also is characterized by a continuous need for problem-solving and innovation. Hence, construction technology courses usually equip students with the skills to address challenges related to sustainability, energy efficiency, safety, and cost-effectiveness in construction projects. The construction industry also continually evolves with advancements in materials, technologies, and construction methods. In relation to that, educating students in construction technology ensures that they are prepared to meet the demands of a dynamic industry. Construction technology knowledge is not only the cornerstone of education in the built environment but also intersects profoundly with diverse learning styles and learning modes among students. Therefore, equipping students with the skills, expertise, and versatility needed to excel in various roles within the field, aligning with their individual preferences and strengths.

Asynchronous and Synchronous Learning

In the realm of hybrid education, the choice between synchronous and synchronous learning modes plays a crucial role in shaping the learning experience for students. Courses have been designed to accommodate different types of technological support, allowing for both self-learning and interaction in both synchronous and asynchronous formats (Cirrulli, et al., 2016). As for online learning methods, they were divided into two types: synchronous and asynchronous (Panjaitan et al., 2023). Synchronous learning refers to real-time interaction between educators and students, typically through audio or video conferencing platforms. This mode of learning requires both lecturers and students to be present online at the same time, allowing for direct engagement and immediate feedback. On the other hand, asynchronous learning provides flexibility in terms of time and location, allowing students to access learning materials and complete assignments at their own pace (Kokoc, 2019). This mode of learning does not require real-time interaction and allows students to engage with course content at a time. That is most convenient for them.

Learning Styles

Learning styles refer to the individualized approaches, preferences, and strategies that learners employ when acquiring and processing information (Pashler, et al.,2009). These styles encompass the diverse ways in which individuals perceive, interact with, and make sense of the learning material. Learning style theories aim to categorize these preferences and provide educators and learners with insight into how to optimize the learning process to match individual needs and preferences (Cuthbert, 2005). One widely recognized model of learning styles is the VARK model, developed by Neil Fleming.

Fleming's VARK Model

This model is a widely recognized framework for understanding and categorizing different learning styles among individuals. The VARK model categorizes learners into four primary modalities: Visual, Aural (Auditory), Read/Write, and Kinesthetics. These modalities represent distinct preferences in how individuals prefer to receive and process information (Hawk & Shah,2007). Visual learners learn best through visual aids such as diagrams, charts, graphs, and images. They usually benefit from seeing information presented in a graphical or pictorial format. Aural learners meanwhile prefer to learn through listening and auditory cues. They usually grasp information better when it is presented verbally, such as through lectures, discussions, and audio recordings (Fleming, 2001). The read/write learners are inclined toward written communication. They excel when information is presented in textual forms, such as textbooks, written instructions, and notes. On the other hand, kinesthetics learners are hands-on learners who thrive when they can engage in physical activities and interact with tangible objects. They usually learn best through practical experience and experimentation (Fleming, 2001).

These learning styles offer a framework for understanding how individuals engage with and process information. The VARK model recognizes that learners have diverse preferences and strengths. Tailoring instruction to match these preferences can enhance engagement and understanding (Abutaher, 2017). The importance of this model helps to engage students where they are more likely to be motivated, attentive, and invested in the learning process. This eventually benefited by aligning teaching methods with students' preferred learning styles, educators can capture their attention and make learning more enjoyable and relevant, leading to increased engagement (Abante, et.al, 2014). In addition to that, this model is to ensure that students understand and remember the materials taught in the class. Hence, by presenting information in ways that resonate with each student's learning style, educators can improve comprehension and retention. Therefore VARK model plays a significant role in the education field by emphasizing the importance of recognizing and accommodating individual learning preferences. In relation to that, this research intended to assess the learning styles and student preferences in Construction Technology education by using this VARK model.

Methodology

The methodology for this research involves quantitative data collection and stratified random sampling among students enrolled in construction technology courses. The research aims to gather data from a total sample of 43 students coming from two classes. However, after data cleaning, only 37 students' responses were deemed usable for the analysis. Stratified sampling was employed to ensure the representation of students from different classes within the construction technology courses. This sampling allows to maintain a proportional representation of students from each class in the final sample, making the result more reliable and generalizable to the entire student population. A structured questionnaire was used to collect quantitative data. The questionnaire was designed to assess various aspects related to learning styles and preferences in the context of construction technology courses. The selected respondents were approached, and informed consent was obtained. Each respondent was provided with a copy of the questionnaire, along with clear instructions on how to complete it. They were given ample time to complete the questionnaire at their convenience, ensuring that they could provide thoughtful responses.

After collecting the responses, a thorough data cleaning process was undertaken to ensure data quality. This included checking for completeness, consistency, and the removal of any outlier or incomplete responses. After data cleaning, the dataset was reduced to 37 usable responses. The quantitative data analysis then were applied to the cleaned dataset to explore patterns, trends, and relationships related to learning styles and preferences among students. Descriptive statistics and appropriate statistical tests will be used to analyze the data and draw meaningful conclusions. On top of it, the research adheres to ethical guidelines, ensuring the anonymity and confidentiality of respondents. This methodology outlines the process of quantitative data collection and stratified sampling in the context of studying learning styles and preferences among students enrolled in construction technology courses.

Analysis and Findings

Demographic Profiles

This section presents the demographic profiles of the respondents. The results from the data collection revealed that most of the respondents are 25 females (68%) and 12 males (32%), as depicted in Figure 1. The respondents of this research range from 20 to 22 years old based on several key factors, especially considering that they are currently students enrolled in their final year of the diploma program. Focusing on students between the ages of 20 to 22 is academically relevant because this age group typically corresponds to individuals pursuing a diploma program. These students are in their final year of study, which is a critical juncture in their educational journey.

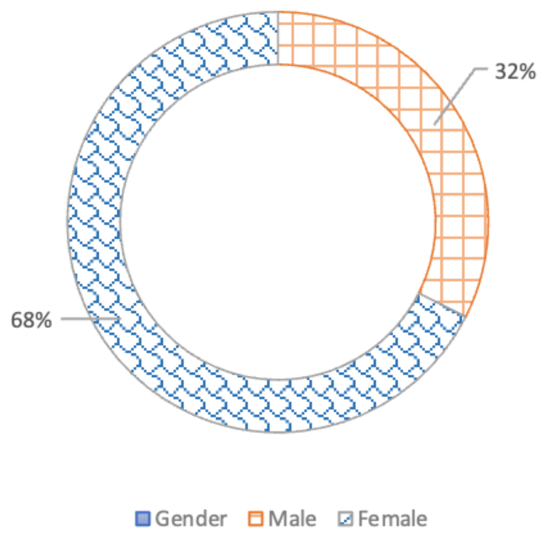

Figure 1. Respondents Gender

The majority of female respondents in this research is justified by the well-documented trend of higher enrollment in many educational programs, including diploma courses. This representation aligns with broader gender demographics in educational institutions where females often outnumber males. On top of it, to accurately reflect real-world gender dynamics within educational settings it is essential to capture the perspectives and experiences of the majority gender. In many diploma programs, females tend to make up a significant portion of the student body, making them a representative sample for this context.

Exploring Student Learning Mode Preferences

According to the findings, a significant majority of students (95%) express a preference for synchronous learning. This mode of education involves real-time interaction with educators and peers, typically through live online classes or face-to-face instruction. Refer to Figure 2, only 5% of the students do not prefer to have synchronous learning. Hence it is undoubtedly that there are several factors contribute to this selection. Synchronous learning allows students to seek immediate clarification of doubts, fostering a dynamic and engaging learning environment which beneficial in complex subjects or when new concepts are introduced. On top of it, as human beings are inherently social creatures, synchronous learning provides a platform for students to interact with peers, facilitating group discussions, debates, and collaborative projects, which enhance the overall learning experiences.

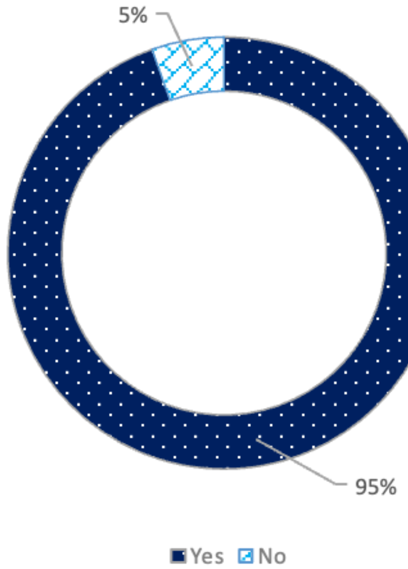

Figure 2. Student Preferences on Synchronous Learning

On the other hand, a smaller percentage (43%) of students express a preference for asynchronous learning, while a slightly larger group (57%) does not favor this mode. Hence, it comes to factors that may contribute to these preferences. Ideally, the cornerstone of asynchronous learning lies in its flexibility. Students who prefer this mode often cite the ability to choose when and where they engage with course materials as a key advantage. This flexibility empowers students to tailor their learning experience to fit their schedules, making it particularly appealing to those with work or family commitments.

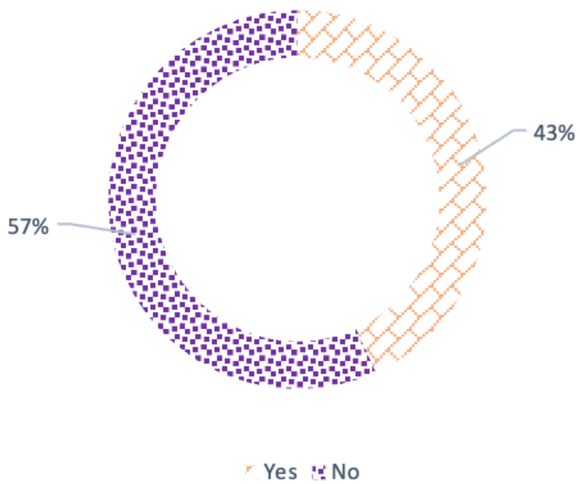

Figure 3. Student Preferences on Asynchronous Learning

The preference for asynchronous learning among a significant portion of students underscores the importance of offering diverse modes to cater to individual needs and preferences. While synchronous learning provides valuable real-time interaction and engagement, it may not align with the schedules or learning styles of all students (Belt & Lowenthal, 2022). Asynchronous learning addresses these concerns by offering flexibility and adaptability, which are particularly crucial in today's dynamic and fast-paced educational landscape. Educators and educational institutions should consider these preferences when designing courses and curricula. A blended approach, combining elements of both synchronous and synchronous learning, can provide a well-rounded educational experience that caters to a broader range of students (Means et al., 2013).

In relation to that, the preferences highlighted in the survey data regarding asynchronous and synchronous learning modes provide valuable insights into how these preferences intersect with various learning styles. Notably, asynchronous learning appeals to those who thrive in flexible and self-paced environments, accommodating diverse learning styles (Rhode, 2009). Students who prefer asynchronous learning appreciate the autonomy it affords, allowing them to customize their learning journey to align with their preferred learning modes, be it visual, auditory, reading/writing, or kinaesthetic.

Distribution of Learning Styles among students in Construction Technology course

In the context of construction technology courses, understanding and accommodating diverse learning styles is crucial for ensuring that students can engage effectively with the technical aspects of the subject matter. The distribution of learning styles among students, as revealed by the findings offers valuable insights into how educators can optimize their teaching strategies.

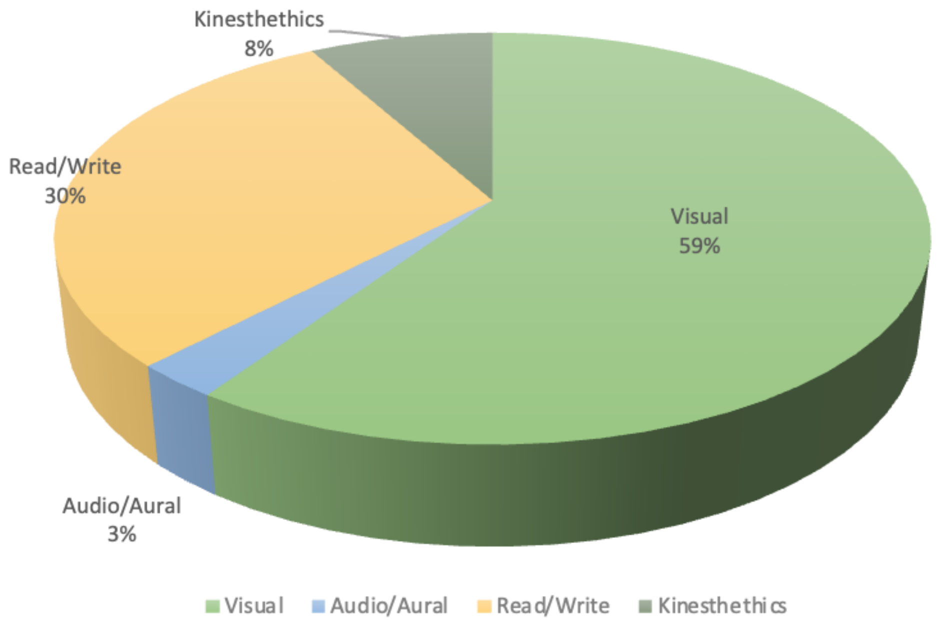

Figure 4. Distribution of Learning Styles among Students

a. Visual Learners (59%)
   Visual learners are those who prefer to process information through visual cues such as
   images, diagrams, charts, and videos. In construction technology courses. Visual learners may excel when presented with blueprints, architectural drawings, or instructional videos demonstrating construction techniques. Visual aids and multimedia resources can be highly effective in engaging the majority of students. The prevalence of visual learners in construction technology courses aligns with the visual and technical nature of the field. Visualizing complex structures, designs, and spatial relationships is an integral part of the construction industry (Bunce, 2010). Therefore,

incorporating visual elements into the curriculum is essential to accommodate these learners effectively.

b. Read/Write Learner (30%)
Read/write learners find traditional text-based materials, such as textbooks and written instructions, most conducive to their learning. In construction technology courses, providing comprehensive written documentation, manuals, and textual explanations can support these students in grasping theoretical and procedural aspects (Hammond et.al., 2019). The presence of read/write learners highlights the importance of textual resources/sketches in construction technology education. Clear and well-structured written content can enhance the learning experience for this group, ensuring they have access to essential information (Felder & Solomon, 1997).

c. Kinesthetics Learner (8%)
Kinesthetics learners thrive when they can engage in hands-on activities and physical experiences. In construction technology courses, these students benefit from on-site experiences and interactive simulations that allow them to apply theoretical knowledge in a tangible manner (Gappi, 2013). While kinaesthetic learners represent a smaller percentage in this context, they play a vital role in construction technology education. Practical experience is fundamental in this field, and integrating hands-on learning opportunities can improve their understanding and retention of the material (Fleming & Mills, 1992). Moreover, for kinaesthetic learners, the opportunity to engage directly with materials and concepts can lead to a deeper understanding and mastery of construction techniques (Coffield et al.,2004).

d. Audio/Aural Learner (3%)
Audio/aural learners prefer auditory experiences. In construction technology courses, lectures, audio recordings, and verbal explanations are valuable tools for them. Incorporating discussion, group presentations, and verbal descriptions during site visits can cater to their learning styles. While a smaller percentage, audio/aural learners can benefit from aural cues and explanations, particularly when dealing with complex technical concepts (Fleming, 2001). Incorporating verbal explanations can enhance their comprehension.

In relation to that, the diverse distribution of learning styles among students in construction technology courses presents both challenges and opportunities. By acknowledging and accommodating these styles, educators can create a more inclusive learning environment that maximizes student engagement and comprehension. To achieve this, construction technology courses can leverage a variety of teaching methods, including visual aids, written material, hands-on activities, and verbal explanations. This comprehensive approach aligns with the multifaceted nature of construction technology education and fosters a more holistic understanding of the subject matter.

Conclusion

The confluence of student learning mode preferences and the distribution of learning styles in construction technology courses sheds light on the nuanced relationship between pedagogy and individualized learning requirements. The finding revealing a student composition consisting of visual learners, read/write learners, kinesthetic learners, and audio//aural learners underscores the importance of designing educational approaches that cater to this diversity within a discipline encompassing technical imagination, site visits, technical terminology, and sketching. The symbiotic relationship between learning styles and learning modes in construction technology courses demonstrates the potential for optimizing the educational experience. The prevalence of visual learners finds resonance in a field inherently reliant on visual representation. Read/write learners' affinity for textual resources aligns with the need for comprehensive documentation and precision in construction technology. For kinesthetic learners, hands-on experiences, practical workshops, and site visits facilitate the translation of theoretical knowledge into practical competence. Meanwhile, audio/aural learners benefit from verbal explanations and discussion, enabling them to grasp intricate technical concepts with greater clarity.

The implication of this intersection extends far beyond the classroom and into the broader context of the quadruple helix which encompasses academia, industry, government, and society. Recognizing and accommodating diverse learning needs within construction technology education has several significant implications. In terms of community engagement, fostering inclusivity in construction technology programs equips graduates with the skills to engage effectively with local communities. As construction projects invariably impact communities, an understanding of diverse perspectives is paramount. On the other hand, aligning pedagogy with learning styles enhances the quality of education in construction technology. This not only prepares students for professional success but also elevates the status of academic institutions as hubs of innovation and inclusivity.

In relation to industry collaboration, industry stakeholders benefit from a diverse and adaptable workforce equipped with practical skills. Hence, collaboration with academia to identify and address various learning needs can lead to more skilled and creative professionals in construction technology. In addition to that on government policy implications, recognizing the importance of accommodating diverse learning styles in education can influence government policy. This, in turn, can lead to investments in educational infrastructure, curricular innovations, and workforce development initiatives in the construction sector. Moreover, future research endeavors should focus on enriching the synergy between learning mode preferences and learning styles as research on pedagogical innovation can be conducted to investigate how emerging technology can be harnessed to create tailored educational experiences that cater to diverse learning styles.

Therefore, this research significantly advances existing knowledge by illuminating the vital intersection of construction technology knowledge, diverse learning styles, and varied learning modes. Its significance lies in enriching pedagogical understanding. Particularly by emphasizing the importance of aligning teaching methods with individual preferences to enhance student engagement and comprehension. Within the context of built environment education, this research underscores the dual role of construction technology knowledge bridging the gap between theory and practice and promoting interdisciplinary collaboration. Moreover, it champions inclusivity by recognizing and accommodating diverse learning preferences, contributing to the border goal of creating inclusive educational environments. Ultimately, this research plays a critical role in preparing future professionals who thrive in a dynamic, collaborative, and diverse built environment sector.

References

Abante, M. E. R, Almendral, B. C., Manansala, J., E and Manibo, J (2014). Learning Styles and Factor Affecting the learning of general engineering students, *International Journal of Academic Research in Progressive Education & Development*, Volume 3, No 1.

Abutaher, M.I.S (2017). Learning Styles Preferences among Quantity Surveying Students.

Belt, E.S., & Lowenthal, P.R., (2022) Synchronous video-based communication and online learning: an exploration of instructors perceptions and experiences, *Education and Information Technologies*, 28, 4941-4964

Bunce, D.M. (2010). Prior knowledge activation: Inducing engagement with complex systems through the construction of interactive concept maps. *Instructional Science*, 38(5), 523-560

Chudley, R., & Greeno, R (2010). Building Construction Handbook (8th Ed.) Routledge

Cirulli, F., Elia, G., Lorenzo, G., Margherita, A., & Solazzo, G. (2016). The use of MOOCs to support personalized learning: An application in the technology entrepreneurship field.

Coffield, F., Mosely, D., Hall, E., & Ecclestone, K. (2004). Learning styles and pedagogy in post -16 learning: A systematic and critical review. *London: Learning and Skills Research Centre.*

Cuthbert, P.F (2005). The student learning process: Learning styles or learning approaches. *Teaching in higher education*, 10(2), 235-249.

Felfer, R.M., & Solomon, B.A. (1997). Index of learning styles. Retrieved from https://www.ncsu.edu./felder-public/ILSpage.html

Fleming, N.D. (2011). Teaching and learning styles: VARK strategies. Christchurch, New Zealand.

Gappi, L.L (2013). Relationship between learning styles preferences and academic performance of students. *International Journal of Educational Research and Technology*, 4(2), 70-76.

Hammond, L.D., Flook, L., Channa, C., Barron. B., Osher,D., (2019). Implications for the educational practice of science of learning and development., *Applied Developmental Science,* Volume 24, Issue 2

Hwang, S.L., Wang, C.Y., Chen, S.Y., Chang, C.H. & Lin, T.C. (2017). The development of an augmented reality-based ubiquitous learning system for science education. *Journal of Educational Technology & Society*, 20(1),32-44

Ibrahim, N. & Zulkipli, Z.A (2022). The Diversity of Learning Styles and Academic Performance of Biology Students, , *International Journal of Academic Research in Progressive Education & Development*, Volume 11 (4), 450-464

Kokoc, M. (2019). Flexibility in e-Learning: Modelling its Relation to Behavioural Engagement and Academic Performance, *Themes in eLearning*, Volume 12, 1-16

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2013). Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies. U*.S. Department of Education*.

Panjaitan, S M., Hutauruk, A J B., Sitepu, C., Gultom, S P., Sitorus, P., Marbun, M R., & Sinaga, C H. (2023). Implementation of Online Learning and its Impact on Learning Achievement of Mathematics Education Students.

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2009). Learning Styles: Concepts and Evidence, *Psychological Science in the Public Interest*, Volume 9, Issue 3, SAGE Journal.

Payarom, S., & Payaprom, Y., (2020). Identifying learning styles of language learners: A useful step in moving towards the learner-centered approach, *Journal of Language and Linguistic Studies*, 16(1), 59-72

Rhode, J. (2009). Interaction Equivalency in Self-Paced Online Learning Environment: An Exploration of Learner Preferences, The International Review of Research in Open and Distributed Learning (Unpublished Doctoral Thesis, Capella University).

Russo, D., Albert, C., & Orozco, L. (2019). Learning construction technology through the virtual construction site: A case study of design-build education in architecture. *Journal of Construction Engineering and Management*, 145(5).