

DEVELOPING INTERACTIVE E-LEARNING CONTENT: A SUBJECT MATTER EXPERT PERSPECTIVE

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ABSTRACT

The COVID-19 pandemic has compelled universities worldwide to adopt online teaching and learning as a necessary measure. However, the rapid transition to online learning has presented challenges for educators in selecting appropriate practices and technological content to deliver effective education in the online environment. Concurrently, students have reported feeling overwhelmed with numerous tasks and an excessive amount of information. This study addresses the research problem by focusing on the design and creation of suitable Management Information System (MIS) e-learning materials tailored for graduate students. The Waterfall Model serves as a reference framework for this investigation. The study participants were 25 highly knowledgeable subject matter experts (SMEs) with experience in e-learning. The data processing was carried out using the Scale Ranking Type. Additionally, the study explores the use of HTML5 Package (H5P) in blended learning through the Moodle learning management system (LMS) platform and evaluates the perceptions of SMEs through a survey. The results indicate that SMEs prioritize integrated approaches, flip methods, task-centered strategies, presentation techniques, and hybrid styles when delivering interactive visual information for master's level Information System courses. The evaluation of students' performance in MIS subjects demonstrated a significant 75% improvement in various learning outcomes.

Keywords:

IR4, Education 4.0, e-learning, information system, interactive visual content.

INTRODUCTION

Education 4.0 is a revolutionary experience-based education system that leverages digital technology instead of rote and personalised learning (Frederick, 2019). This approach combines technology, individualism, and discovery-based knowledge to teach future generations about Industry 4.0 (Xu et al., 2018). The application of technology has had a positive impact on education. Higher education also emphasises the use of digital technologies. Although most educators in higher education continue to employ conventional methods, they also make excellent use of technological tools in the classroom and online. Creative manipulation of multimedia elements such as text, graphics, animation, audio, and video are applied to the learning materials to supply a more engaging environment for learning. Self-learning is promoted through website application platforms such as Learning Management Systems (LMS). Technology in education can foster a creative, innovative, and competitive generation prepared to confront the challenges of the 4.0 Industrial Revolution, where humans and computers work together to solve problems, generate innovative ideas, and raise the quality of life (Sharma, 2019).

For this reason, educators must become proficient in Information Communication Technology (ICT) to transfer their knowledge through online teaching and learning (Dela Fuente & Binas, 2020). Content development for online learning includes the creation of instructional materials and learning activities, the design of interactive courses, the creation of quizzes and evaluations, and the incorporation of multimedia elements. Frequently, content development is used to create e-

learning materials and digital content. It can take any form, including text, photographs, video, audio, and animation (Khojasteh e al., 2022).

Problem statement

The COVID-19 pandemic has necessitated universities globally to turn to online teaching and learning, which has created a new challenge: choosing the appropriate practices (approach, method, strategy, technique, and style) and technological content to effectively deliver education in the online environment (Zhang et al., 2022; Smith et al., 2022). Figure 1 shows the results of a study conducted by Al-Kumaim et al., 2021 on the challenges among students during the pandemic related to online learning. Two-thirds of the university students (69.5%) who participated in the study felt overburdened when following up with their online courses, while 30.5% of the students reported no sensations of overload.

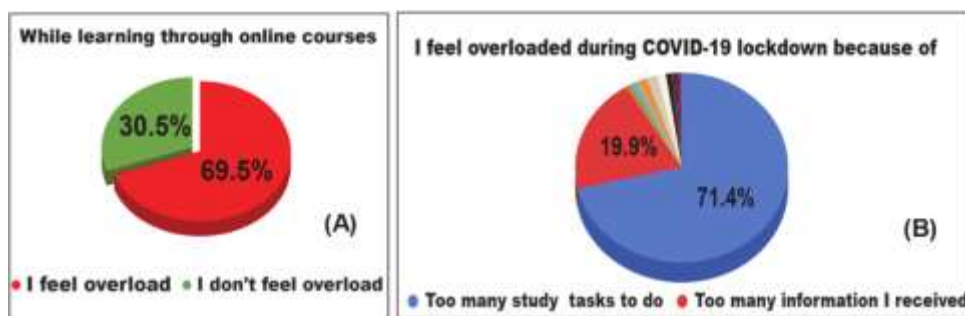


Figure 1: Students overload feeling and causes during online courses. A: Students' overload feeling; B: Causes of information overload during online courses (Al-Kumaim et al., 2021)

The preliminary study shows there are three main challenges among students and educators during the pandemic in relation to online learning: a lack of interactive content, a lack of appropriate resources, and a lack of professional development opportunities. During the pandemic, most of the educational content delivered online was in the form of static visual material, such as images, slideshows, and presentations (Arunaz et al., 2021). This is because the transition to online learning was hasty. According to Doe's research in 2023, educational content must be delivered considering the needs of learners, the goals of the course, and the available resources.

Additionally, there is a lack of high-quality, affordable online learning resources available to students. This can make it difficult for students to find the resources they need to succeed in online learning. Furthermore, many educators lack the training and skills necessary to teach effectively in an online environment. This can make it difficult for educators to create engaging and effective online learning experiences for their students. Educators are supposed to provide clear instructions, use interactive activities, and offer opportunities for students to collaborate with each other (Roe, 2023).

Objectives

The goal of this study was to address key aspects within the field of online teaching and learning of a Management Information System (MIS) subject. The first objective involves a thorough analysis of various approaches, methods, strategies, styles and material delivery philosophies that are particularly appropriate to the online teaching and learning environment. This evaluation seeks to identify the ideal practises for MIS education delivery in an online environment.

The second objective centers on the development of learning content tailored to the preferences and expertise of subject matter experts (SMEs), utilizing the Moodle LMS and HTML5 Package (H5P) platforms. This objective implies utilizing these platforms to create and alter instructional materials in accordance with the preferred instructional design and learning styles of the SMEs. By accomplishing this objective, the study aimed to provide valuable insights into the utilization of these platforms for the enhancement of the online learning environment in the MIS subject.

LITERATURE REVIEW

E-learning vs Blended Learning

E-learning, also referred to as online training or distance learning, is a digital form of education that leverages information and communication technologies such as computers, smartphones, and tablets. E-learning programs comprise learning modules designed for individual or group learners and employ a variety of forms such as text, video, audio, and quizzes. Educators utilize a learning management system to manage and conduct the e-learning program. The convenience of e-learning is that students can complete their learning from their desks, and mobile learning is accessible both online and offline, enabling anytime, anywhere learning. Despite its benefits, e-learning was not delivering the desired outcomes, leading to the development of blended learning. Blended learning, also known as hybrid learning, merges traditional classroom instruction with online content and technologies (Singh et al., 2021). The term "blended learning" was first used in the 1990s to describe the integration of computer-based instruction with conventional teaching strategies (Kwak et al., 2015; Akcil & Bastas, 2021).

Blended learning is a unique approach to education that brings together the benefits of in-person and online learning. It encompasses various elements such as e-learning modules, virtual classes, in-person instruction, and group activities through web chats or forums (Awal Kurnia et al., 2021). This form of learning provides greater flexibility and adaptability in training courses. By combining both synchronous and asynchronous learning, blended learning delivers personalized learning experiences for students. It is a more effective teaching method as it combines the theoretical aspects taught through e-learning modules and the hands-on aspect taught in person. The COVID-19 pandemic has led to a significant increase in the popularity of blended learning as online and distance education become more prevalent. Even those who are not fully prepared for online environments are adopting blended learning (Widyawan et al., 2020). The advancement of technology, such as mobile devices, interactive whiteboards, and online resources, has further enhanced the widespread acceptance of blended learning as a teaching technique.

Some researchers claim that blended learning models can improve student learning competence since students conduct more learning activities such as observing, undertaking, presenting, creating, and transferring (Lim et al., 2019). Students have access to the content and resources available online in a blended learning environment, which allows them to augment the education they receive in traditional classroom settings. The content that is available online can either be used for independent study or as part of an online class. Significant benefits of a blended learning strategy include engaging students and aiding in their knowledge retention. According to research, blended learning enhances learning, reduces failure rates, and increases student engagement (Vallee et al., 2020)

The literature suggests that e-learning with interactive features and multimedia-rich information can increase its efficiency. One approach to achieving this is by utilizing H5P interactive visuals as instructional resources, which align with the fundamental principles of blended learning. The H5P content can be integrated into the Moodle LMS platform to provide an interactive and enjoyable learning experience among learners.

Approach, method, strategy, technique, and style in teaching and learning

A teaching approach can be described as the methods or techniques a teacher uses to deliver instruction and engage students with the subject matter (Akimenko, 2016). It represents a set of guiding principles, beliefs, and theories about learning that inform a teacher's classroom practices (Nasiba et al., 2021). Essentially, a teaching approach is what distinguishes one teacher's method of teaching from another, and how they aim to achieve the desired educational outcomes (Jesús et al., 2022). Thus, it provides a philosophical framework for the overall teaching process.

In the context of teaching and learning, a teaching approach refers to the systematic method employed by a teacher in organizing and delivering educational content and activities to meet specific learning goals. The effectiveness of a teaching approach can be evaluated through comprehensive educational assessment to ensure that students receive the proper knowledge (Leovigildo et al., 2021). To maximize the impact of teaching, a combination of approaches should be employed to meet the diverse needs of students and to provide a dynamic learning experience (Ismail, 2013). Effective teachers are those who are proactive in exploring new methods and techniques, and who are willing to adapt their approach when necessary to meet the changing needs of their students (Veda, 2021). Thus, a teaching approach should be flexible and continuously evolving to ensure optimal educational outcomes.

The procedures used to help students learn course material and achieve their goals are referred to as teaching strategies (Ravindra, 2018). These strategies take into consideration different learning methods, allowing teachers to design the most effective plan for their target group of students (Abulhul, 2021). The COVID-19 pandemic has heightened the need for creative and innovative teaching strategies, especially for online learning. Utilizing technology such as computers, laptops, and the internet has proven to be incredibly beneficial in facilitating online teaching (Norita, 2021). The widespread adoption of technology-based teaching strategies by universities worldwide during the pandemic has highlighted the importance of embracing technological advancements in education.

Teaching techniques are methods utilized by teachers to achieve optimal results during instructional sessions. These techniques involve the practical application of skills and strategies to support student learning. According to the Collins Dictionary, a technique is defined as a specific method or activity (Collins, 2022), while the Cambridge Dictionary defines it as the skilful execution of an activity (Cambridge, 2022). To put it simply, teaching techniques are a collection of resources, technologies, and attitudes that teachers use to clarify and solidify learning objectives. They are key to enhancing the educational process and can be used to improve curriculum, instructional methods, and teacher competencies.

In essence, a teaching approach is a plan that outlines the desired outcomes and what is feasible. A teaching technique refers to the specific tools and actions used by the teacher to achieve specific goals. A teaching method, on the other hand, is a set of guidelines that dictate what should or should not be done in certain situations. A teaching strategy is an educated guess about what will be most effective in helping students learn. Understanding these terms is crucial in creating and implementing educational content that caters to the needs of both students and educators. By considering the learning style of students, the learning process can be made more effective and efficient.

Learning Theories

Many people around the world use e-learning as a modern way to teach. Many online materials do not meet good teaching and learning standards, highlighting the need for rules to structure online materials for effective learning (Muhajirah, 2020). Learning theories were developed so that researchers could better understand and predict the learning process. Since their job is facilitating learning, e-learning experts should understand how that process works. This section looks at behaviorism, cognitivism, and constructivism learning theories and conveys the principles that can be applied in e-learning settings. The implications of these principles are discussed to show how e-learning can be used to help students learn and to help engage them.

Behaviorism is one of the most prevalent learning theories (Scheer et al., 2012). This idea was first proposed by John B. Watson and later expanded by B.F. Skinner (Moore, 2010). This theory is founded on the premise that all human behavior can be explained by a person's environment and past experiences. Skinner argued that all human actions, including language and thought processes, may be learned through conditioning (Burhanuddin et al., 2021). As the term implies, a behavioristic approach focuses on helping students reach learning goals that have already been set. When learners get these expected outcomes, which are meant to meet the learning goals of the e-learning course, this is seen as learning. So, the purpose of an Instructional Design strategy for e-learning based on behaviorism must be to give learners the right stimuli, that is, opportunities to demonstrate that they can express desired behaviors that prove that learning has taken place (Samaduzzaman, 2021).

Cognitive psychologists study mental processes such as attention, memory, problem-solving, perception, and language processing (Dolegui, 2013). The cognitive perspective emphasises the significance of mental functions in comprehending how individuals think, remember, and solve issues (Bandono & Suharyo, 2021). Cognitive learning promotes continuous learning and long-term learning. It connects students' prior knowledge with new material to successfully use it. Cognitive learning enables students to comprehend in detail, hence fostering comprehension. Thus, learner comprehension is enhanced (Ghazali et al., 2021). Students will also apply the techniques with confidence. Cognitive learning allows students to better comprehend the subject matter by exploring it. Students can develop practical problem-solving abilities through cognitive learning.

According to the constructivist perspective, all knowledge is produced and subject to change (Alzahrani & Woollard, 2013; Shah, 2019). Constructivists believe that learners construct meaning through interactions with their environment and that these meanings can be shared with others to build a shared understanding (Grady et al., 2018). This idea significantly supports the adult learning strategy. An online teacher is a facilitator or tutor overseeing and providing students with essential skills and knowledge. To properly administer online courses, online educators must first understand the characteristics of online adult education. Adult students, according to Knowles (1975) and Brookfield (1985), are responsible for their education and their lives. Adults must comprehend why they must invest in each circumstance. The success of online courses can be increased if online educators better understand their students (Bada, 2018).

In conclusion, all the theories discussed have a significant role in building e-learning content. Each idea gives a different view of how students learn and what they need to do to learn. The behaviorist learning theory is still employed in online courses, typically in drag-and-drop exercises, to organise content into relevant categories. In this framework, feedback plays a crucial role in determining whether a person's actions are appropriate. Additionally, the theory of cognition is also highly significant. Social cognitive learning is utilised in e-learning as social learning. Cognitive behavioral learning is employed by reminding learners of concepts they already know at the beginning of a course to activate brain nodes relating to the subject.

On the other hand, the constructivist learning theory is the most extensively employed by eLearning practitioners today. The principle is applied in e-learning by presenting learners with real-life perspectives through storytelling or simulation, providing learners with something to relate to or

emotionally connect. E-learning professionals must use various e-learning strategies while keeping in mind the learning theories they follow to help modern learners learn and remember things better. Every theory has changed how educators teach and do something; innovative ideas will do the same in the future. Therefore, e-learning designers must begin training design by determining the purpose of the training. They must then choose the proper theoretical framework or a mix of frameworks to help learners reach their learning goals.

Content development model

The Waterfall Model is a development model for educational materials used in this study as shown in Figure 2. This model consists of five key stages: requirement analysis, design and development, implementation, testing and evaluation, and maintenance. The systematic approach of the Waterfall Model ensures all necessary processes are completed to develop successful applications and produce effective learning content. The study started with requirement analysis, where the problems of SMEs in the MIS course were identified through a literature review and questionnaire. The design and development stage involved the creation of the User Interface (UI), flowcharting and providing the application content, video, tutorial, ePUBs, and H5P interactive content.

The implementation stage involved the implementation of the application design into a program using the Moodle learning management system. The testing and evaluation stage was carried out using Black Box Testing to evaluate the performance of the e-learning system platform and interactive content. The subject of this study was used to test the functionality and usability aspects of the application, with the functional suitability test being carried out by expert respondents and SMEs with experiential learning and understanding of e-learning materials.

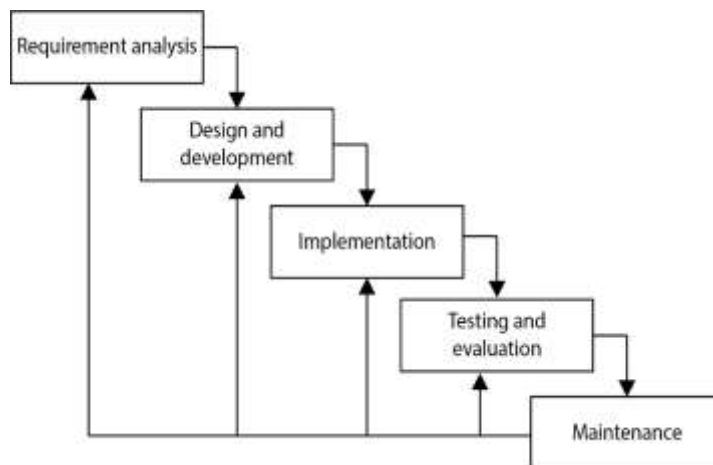


Figure 2. Stages of the Waterfall Model (Adeagbo et al., 2021)

In conclusion, the Waterfall Model is an effective model for developing educational materials, as it ensures all necessary processes are completed in a systematic manner. The study demonstrates the implementation of the Waterfall Model to produce an e-learning system platform, with a focus on evaluating the functionality and usability aspects of the application.

Moodle and H5P

Moodle is a system for managing different classes used in various educational settings. It is designed for collaborative learning; therefore, it makes sense to utilise H5P. H5P is interactive content based on PHP to develop, manage, and publish material (Singleton & Charlton, 2019). It interacts well with Moodle, making it excellent for managing course content. With H5P, the H5P library content can be integrated directly into Moodle courses, making it simple to incorporate high-quality scientific content. H5P is also compatible with several major learning management systems (LMS), including Blackboard, Canvas, and Brightspace. H5P is extremely user-friendly and may be modified to match the demands of the students.

H5P enables the creation and distribution of interactive multimedia content, including presentations, quizzes, games, and more. In addition, the learning materials are frequently updated so students can always access the most current knowledge. It is a content production tool for creating and editing HTML5 documents. It was discovered that H5P could efficiently empower students in e-learning courses (Mir et al., 2021). The Open University of the Netherlands (OUNL) discovered that students who utilised H5P to develop and share their learning content had a more positive perspective on their education than those who did not.

H5P has several benefits, including the ability to create rich media content, simplicity of use, adaptability, and the capacity to share content with others (Addhiny, 2022). However, there are disadvantages to adopting H5P, such as its limited ability to track learner interactions, the requirement for a robust internet connection, and its incompatibility with all browsers and devices. Despite these shortcomings, H5P continues to be a popular alternative for those who develop content for online learning and provides students with an excellent opportunity for online education. Users can begin quickly and effortlessly to start their learning experience (Unsworth & Posner, 2022). The UI is intuitive and well-organised, making locating the desired resources and courses simple.

H5P is also a plug-in for Moodle that allows instructors to create interactive digital books called ePUBs for online learning. With H5P, instructors can add audio and video to their ePUBs and create interactive exercises. ePUBs may be read on a computer, tablet, or smartphone. The books are saved in an electronic format after being downloaded to the user's device. The content is presented in a way that is intended to be more engaging and participatory than a conventional book (Hanif et al., 2019). Not only is it beneficial to the health of the eyes, but it is also beneficial to the environment, as it does not result in the production of any waste, and it reduces the amount of paper used. It can also be utilised to conserve space because fewer books are required as physical copies. The key features that make it effective are: (i) it provides the learner with a customised experience, (ii) it is compatible with mobile devices, (iii) it offers simple navigation via hyperlinks, and (iv) it includes multimedia content. As a result, educators or instructors should adopt this new format, which has proven successful in several ways (Nasrulloh et al., 2018).

METHODOLOGY

Digital questionnaires were distributed to 25 SMEs in the field of Information Systems (IS). They are facilitators in this domain with over five years of teaching experience in public and private universities. During the pilot test phase, a questionnaire was distributed to four professionals specializing in IS to gather their feedback. The limited number of experts involved in the pilot test facilitated the collection and analysis of input, enabling a more thorough and focused evaluation of the outcomes. Additionally, this smaller group allowed for efficient decision-making based on the feedback received. The selection of these four respondents adheres to the typical guideline of 10-20% of the full-scale survey sample size.

Scale Ranking Type (SRT) questions establish how the facilitator prioritised. The SRT required respondents to compare a range of variables and utilised the principle of multiple-choice questions. When a facilitator decides to be influenced by multiple elements, each aspect has a different priority in the decision-making process. Education researchers employ SRT questions to identify which feature of a teaching approach, method, strategy, technique, or style they valued the most. It is often utilised for educational research throughout the pre-production and post-production phases.

Based on the result, contents for one of the MIS courses were developed with modification to the basic ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model as shown in Figure 3. In this approach, users' wants and experiences could be captured, and content could be tailored to the intended audience. The integrated strategy for designing this system provided a robust and dependable procedure due to the combination of the ADDIE and SDLC (Software Development Life Cycle) models. Student assessment results before and after the implementation of this newly developed contents were compared to see the effectiveness of this approach.

The ADDIE model was used for instructional design and training development projects, whereas the SDLC model was utilised for software development projects. Both models, however, have similarities in their repetitive character and emphasis on evaluation. An institution can include instructional design ideas in the software development process by combining the two models. This integration can ensure that training and user demands are considered throughout the development lifecycle and that the final software product matches the instructional objectives.

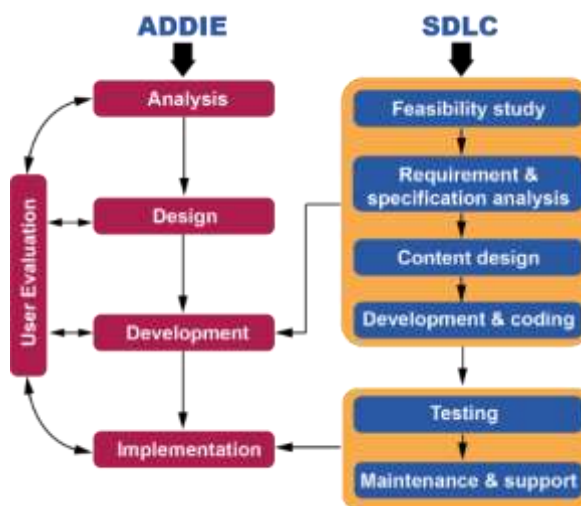


Figure 3: ADDIE and SDLC synergy

In this study, the Analysis phase of the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model was utilized to identify user needs and learning objectives, which was then incorporated into the Software Development Life Cycle's (SDLC) requirements gathering phase. By integrating the ADDIE Design phase into the software design process, the UI and interactions were aligned with instructional methodologies. During the Development and Implementation phases, careful consideration was given to designing and deploying software that prioritized instructional content and usability. Moreover, the Evaluation phase of ADDIE was seamlessly integrated into the SDLC's testing and quality assurance processes, allowing for an analysis of the software's effectiveness in meeting instructional goals. The combination of ADDIE and SDLC offered a comprehensive approach that considered both instructional design and software development components, ultimately leading to a more successful and user-centered final product.

RESULT AND DISCUSSION

Education is a continuous process that requires continuous improvement to keep pace with the changing demands of society. In recent years, there has been a significant shift in the way education is delivered, with the increasing use of technology and the rise of online learning. With the rise of technology-based teaching methods, it is crucial to understand which strategies are most favored by SMEs and how they are impacting student performance. To gain insight into this, a survey was conducted to gather data from SMEs in the field of MIS, focusing on their favored teaching and learning approaches. The results were analyzed and presented in six figures (Figure 4 to Figure 8), each of which provides a comprehensive overview of the most favored methods and their impact on student performance.

Finding and Discussion on Teaching Approaches

The results of the Rank Analysis, presented in Figure 4, indicate a clear preference among SMEs for integrative approaches, with 29% of respondents favoring this method. The inductive and deductive approaches followed closely behind, at 24% each, with eclectic approaches trailing slightly behind at 23%. This result suggests that the integrative method leads to improved student performance in learning modules. This finding aligns with the existing literature on teaching approaches, which suggests that a combination of approaches should be employed to meet the diverse needs of students and provide a dynamic learning experience (Ismail, 2013). This approach integrates students' abilities, prior knowledge, and cognitive processes, fostering a more comprehensive understanding of the subject matter. Furthermore, it challenges students to apply their knowledge in innovative ways, promoting their critical thinking skills and creativity.

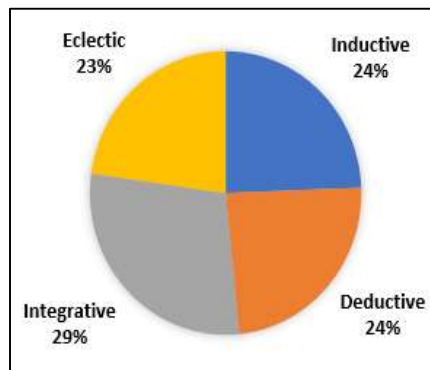


Figure 4: Teaching approach

The results of the Rank Analysis, presented in Figure 5, highlight a strong preference among SMEs for flipped methods, with 23% of respondents indicating their preference for this approach. The Direct method followed closely behind at 22%, with personalized methods at 20%, inquiry methods at 19%, and expeditionary methods at 16%. The results indicate that the flipped method is a highly effective teaching approach, particularly in terms of enhancing student engagement and comprehension. By flipping the traditional classroom structure, educators were able to personalize instructions based on student performance data gathered through assessments and quizzes. This finding supports the notion that teaching methods are a collection of resources, technologies, and attitudes that educators use to clarify and solidify learning objectives (Collins, 2022).

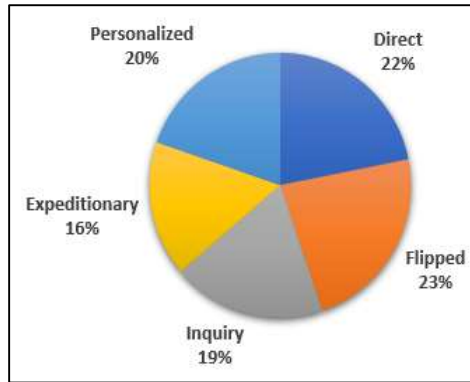


Figure 5: Teaching method

According to the Rank Analysis presented in Figure 6, it can be observed that Task-Centered Strategies were highly favored by SMEs, with the highest percentage of 29%. This is followed by Activity-Centered Strategies (28%), Learner-Centered Strategies (28%), and Teacher-Centered Strategies (16%). The results reveal that Task-Centered Strategies were the preferred and most used instructional method among the SMEs. The findings align with the literature, emphasizing the importance of hands-on and task-oriented approaches in teaching strategies. Task-Centered Strategies support effective planning for student learning and take into consideration diverse learning methods (Abulhul, 2021; Ravindra, 2018).

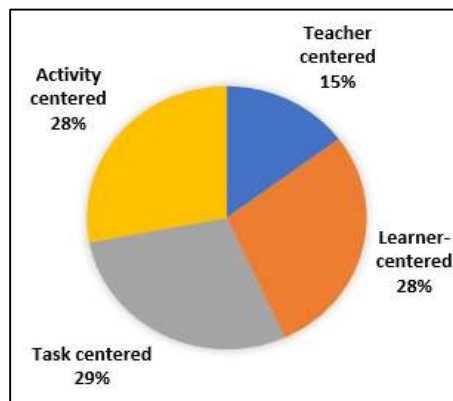


Figure 6: Teaching strategy

The findings from the Rank Analysis presented in Figure 7 highlight that among the SMEs, presentation techniques were the most favored instructional approach, receiving the highest preference from SMEs at 27%. This is followed by discussion techniques at 25%, case study techniques at 21%, debate techniques at 14%, and report techniques at 13%. The SMEs' preference for presentation techniques aligns with the recognition of presentations as a crucial tool for enhancing students' communication skills and preparing them for public speaking (Jones, 2019). Effective communication skills, including oral, written, and listening abilities, are highly valued by employers in today's job market (Santoro & O'Brien, 2020). Therefore, it is essential for students to have ample opportunities to develop and refine these skills during their education.

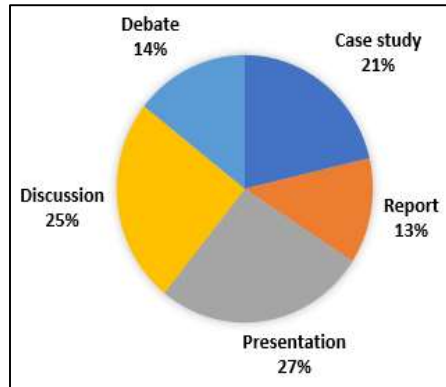


Figure 7: Teaching technique

According to the Rank Analysis depicted in Figure 8, the hybrid style was favored by the SMEs with the highest proportion of respondents favoring it (28%), followed closely by the facilitator style (26%). The demonstrator and delegator styles each received a relatively lower proportion of support at 21% and 14% respectively, while the authority style was favored by the smallest proportion of respondents (13%). The SMEs' preference for the hybrid teaching style aligns with the recognition of the importance of combining traditional and modern instructional methodologies to provide a comprehensive and engaging learning experience (Akimenko, 2016). The hybrid style leverages current technologies, such as interactive movies and virtual reality, alongside conventional tactics like group work and lectures, to facilitate dynamic learning (Cosme Jesús et al., 2022).

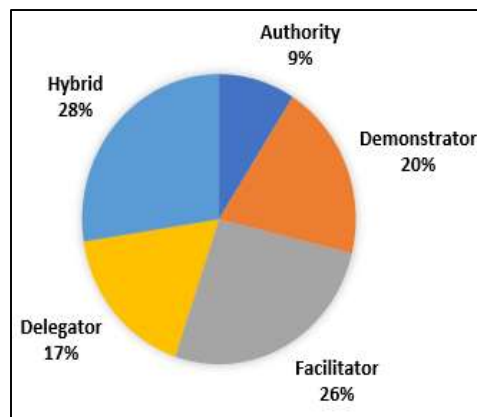


Figure 8: Teaching style

In conclusion, SMEs prefer a blend of integrative, flipped, task-based, presentation-focused, and hybrid teaching and learning methods, which are believed to improve student performance and participation. The integrative method, flipped method, task-based strategies, and presentation techniques are popular for their holistic, personalized, practical, and communication-focused approach respectively. The hybrid style combines traditional and modern methods, utilizing technology for enhanced learning. These findings highlight the need for a blended approach in higher education to provide students with a comprehensive and engaging experience.

Findings and discussion on learning content development

The research findings provide evidence in favor of utilizing the Waterfall Model for the development of educational materials, specifically within the context of the MIS subject. Figures 9 and 10 show how adding visually appealing examples to the UI can increase student engagement and focus, and encourage interactive and participative learning. The teaching resources also include resources for independent study and self-directed learning. Evaluation of students enrolled in MIS subjects at IUKL before and after the implementation of ICT teaching for one semester revealed a 75% improvement in various learning outcomes, including increased engagement in the classroom, increased interest in independent subject exploration, motivation to do project assignments, and finally, better evaluation results.

The Waterfall Model ensures a systematic approach to the development of effective learning content, as highlighted by Singleton and Charlton (2019). This study adopted this strategy, starting with a needs analysis through a detailed literature review and a questionnaire to identify the difficulties faced by SMEs in the MIS course. The learning management system Moodle, which is well known for its collaborative learning capabilities, was used by the researchers to put this paradigm into practise (Addhiny, 2022). Moreover, the incorporation of H5P interactive content into Moodle made it easier to produce and disseminate interactive multimedia learning resources, including presentations, tests, and games (Mir et al., 2021; Hanif et al., 2019).

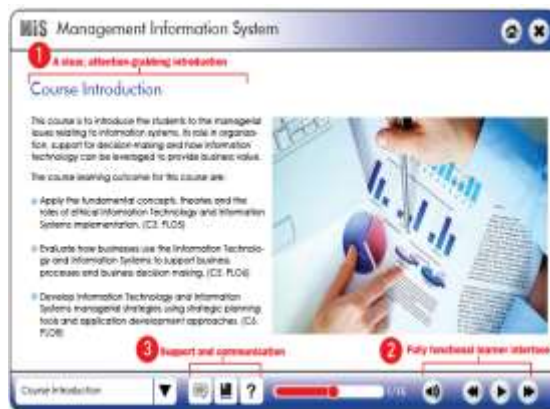


Figure 9: User Interface

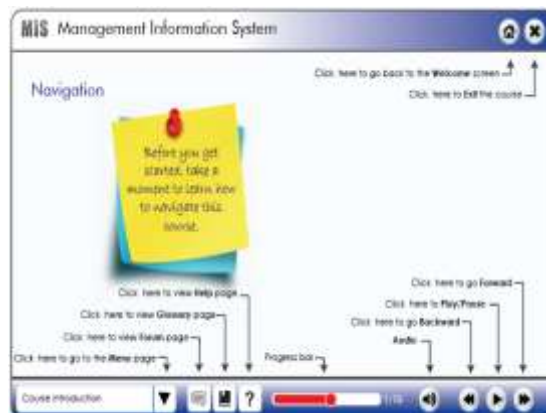


Figure 10: Functions for self-directed learning

The adoption of Moodle and H5P in the development of teaching materials for the MIS subjects aligns with the findings of the literature review, emphasizing the advantages and effectiveness of these tools. The integration of visually appealing examples increases student engagement and encourages collaborative and participatory learning experiences in the UI (Mir et al., 2021). Additionally, Moodle and H5P provide tools for independent study and self-directed learning, giving students the freedom to research a topic independently and create project assignments (Nasrulloh et al., 2018).

In conclusion, the findings of this study affirm the successful implementation of the Waterfall Model, Moodle, and H5P in the development of effective teaching materials for the MIS subjects. The use of these tools and approaches to improve student learning outcomes through aesthetically pleasing interfaces, interactive information, and the promotion of self-directed learning is supported by the alignment between the research findings and the literature review.

CONCLUSION

The study results have shown that integrative approaches, flip methods, task-centered strategies, presentation techniques, and hybrid styles are prioritised by SMEs while delivering interactive visual content for Information Systems courses at the master's level. The considerations above need to be incorporated into developing interactive visual content to boost students' overall performance in Information Systems courses. Due to this, interactive visual content was generated using ePUB and H5P-HTML5 digital tools and then uploaded into the Moodle Learning Management System. Moodle gives educators access to a wide range of resources as well as supplemental exercises and games, which they can use to improve their students' educational experiences. This research is highly pertinent to digitisation and IR 4.0, which aims to produce intelligent and technologically competent communities.

For future development, the input of multiple experts on this research could be developed into an adaptive structure and contents for MIS teaching and assessment methods. A successful trial is already tested at the pilot site for an MIS subject. But this content delivery may be applied in the same subject offered to the public in an e-learning platform. Both these are in demand now as IT/S skills are essential for work to be always competitive. From this foundation, templates for MIS online courses can be developed, or it may also be expanded for any IT/S management courses. Some educators may require training for creating and selling their courses, and this can be considered as a commercialization effort too. We also believe that this template may be used to develop micro-credential courses for the public to upgrade their work and life skills.

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