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Development of an ADDIE-Based Self-Learning Website: Usability Analysis and Its Impact on TLE-ICT Students' Learning Outcomes

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ABSTRACT: This research focused on the design, development, and testing of a Self-Learning Modular Website intended for Grade 7 TLE-ICT students. The research employed the ADDIE model to assess the platform's usability, content quality, teaching effectiveness, and its influence on student learning outcomes. In the Methods section, expert validators evaluated the website utilizing the Learning Resource Management and Development System (LRMDS) framework, while students assessed usability through the System Usability Scale (SUS) and the Technology Acceptance Model (TAM). A quasi-experimental design was utilized involving 30 participants, allocated into experimental and control groups (15 participants each), with learning gains assessed via pre-test and post-test scores. Findings indicated significant consensus among experts concerning the website's pedagogical validity, technical competence, and alignment with curriculum standards. The SUS score of 67.70 reflects satisfactory usability, with some minor areas for improvement. The TAM results indicated a high perceived usefulness (M = 4.54) and ease of use (M = 4.52). Both groups exhibited significant learning improvements ($p < .001$); however, no significant difference was observed between the groups ($p = .621$), despite the experimental group showing higher engagement. The study concludes that a self-learning modular website can effectively support or supplement traditional classroom instruction, enhancing independent learning, motivation, and engagement. The findings underscore the platform's potential as a significant digital resource for TLE-ICT education and indicate the need for further refinements to enhance usability and learner experience.

Keywords: modular website, self-learning, technology acceptance model, website digital learning.

***ABSTRAK**: Penelitian ini berfokus pada perancangan, pengembangan, dan pengujian sebuah website modul pembelajaran mandiri yang ditujukan bagi siswa kelas VII mata pelajaran TLE-ICT. Penelitian ini menggunakan model ADDIE untuk menilai kegunaan platform, kualitas konten, efektivitas pembelajaran, serta pengaruhnya terhadap hasil belajar siswa. Pada bagian metode, para ahli validator mengevaluasi website dengan menggunakan kerangka Learning Resource Management and Development System (LRMDS), sementara siswa menilai aspek kegunaan melalui System Usability Scale (SUS) dan Technology Acceptance Model (TAM). Desain penelitian yang digunakan adalah kuasi-eksperimen dengan melibatkan 30 peserta yang dibagi ke dalam kelompok eksperimen dan kelompok kontrol (masing-masing 15 peserta). Peningkatan hasil belajar diukur melalui skor pre-test dan post-test. Hasil penelitian menunjukkan adanya kesepakatan yang tinggi di antara para ahli terkait validitas pedagogis, kompetensi teknis, serta kesesuaian website dengan standar kurikulum. Skor SUS sebesar 67,70 menunjukkan tingkat kegunaan yang memadai, meskipun masih terdapat beberapa aspek yang perlu ditingkatkan. Hasil TAM menunjukkan tingkat persepsi kegunaan yang tinggi (M = 4,54) dan kemudahan penggunaan (M = 4,52). Kedua kelompok menunjukkan peningkatan hasil*

belajar yang signifikan (p < .001); namun, tidak terdapat perbedaan yang signifikan antara kedua kelompok (p = .621), meskipun kelompok eksperimen menunjukkan tingkat keterlibatan yang lebih tinggi. Penelitian ini menyimpulkan bahwa website modul pembelajaran mandiri dapat secara efektif mendukung atau melengkapi pembelajaran tatap muka, serta meningkatkan kemandirian belajar, motivasi, dan keterlibatan siswa. Temuan ini menegaskan potensi platform tersebut sebagai sumber belajar digital yang penting dalam pendidikan TLE-ICT serta menunjukkan perlunya penyempurnaan lebih lanjut untuk meningkatkan kegunaan dan pengalaman belajar siswa.

Kata kunci: *pembelajaran digital berbasis website, pembelajaran mandiri, technology acceptance model, website modul.*

INTRODUCTION

Driven by the vision of producing nationally and globally competitive citizens, the Department of Education (DepEd) in the Philippines aims to inculcate in every pupil/student and, at the same time, equip him or her with possession of appropriate knowledge, skills, and values for his or her contribution to the national development. At the core of this mission are the Edukasyong Pantahanan at Pangkabuhayan (EPP), which covers Grades 4-6, and Technology and Livelihood Education (TLE), which covers Grades 7-10, both of which aim to provide students with the necessary skills for life. MATATAG Curriculum is an education reform in the Philippines that seeks to address the current problems in teaching and learning and to identify the relationship between learning outcomes and those of other countries.

The MATATAG Curriculum aims to instill in learners' skills that will enable them to lead successful, lifelong lives by equipping them to become globally competitive, workforce-ready individuals. Edukasyon sa Pantahananan at Pangkabuhayan (EPP) and Technology and Livelihood Education (TLE) provide practical, relevant knowledge needed to develop these skills and prepare students to pursue careers and perform other roles in life. The TLE curriculum exposes students to various specializations, allowing them to explore their interests and prepare for future jobs. The world is developing rapidly, and the skills acquired should enable one to adapt to future challenges. Critical thinking, innovation, and reflective problem-solving are considered to be 21st-century skills (DepEd, 2023).

The initial quarter in EPP/TLE 7 MATATAG Curriculum presents basic ICT literacy, including working with web conferencing tools, sending emails with attachments, analyzing communication services, filtering information, evaluating the credibility of websites, and assessing media trends. The courses focus on generating knowledge products using productivity tools, e.g., word processors, presentation software, and spreadsheets. Also, students are required to develop online media to exchange and coordinate in online communities. These lessons give students the skills they need to succeed in a digital world, allowing them to develop competencies of their own choosing.

Although its curriculum provides many opportunities, many students encounter them individually, including a lack of interest and the inefficiency of conventional teaching and learning techniques. These difficulties underscore the need for more innovative instructional materials to engage learners and enhance

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retention. To fill in these, this paper proposes developing a self-learning modular site for Grade 7 TLE-ICT lessons in Quarter 1. The site will be created using Google Sites, a web page editor, and the Google Docs Editors package. Other tools for developing lessons include Microsoft 365, Microsoft PowerPoint, ClassPoint, and Microsoft Word. This self-modular website will fill the missing link, enabling the user to be more actively engaged in learning and have a stimulating learning experience, ultimately leading to classroom retention. This strategy aligns with the growing need to integrate technologies with traditional learning methods to provide learners with new, practical learning activities.

To address this gap, the study proposes the development of a Self-Learning Modular Website for Grade 7 TLE-ICT, Quarter 1, designed using the ADDIE model and built in Google Sites, with complementary digital tools. The website aims to offer structured lessons, interactive materials, and accessible modules that enhance learner autonomy, engagement, and mastery of ICT skills. Specifically, the study seeks to develop a self-learning modular website aligned with Grade 7 TLE-ICT competencies; evaluate its quality in terms of usability, content, and pedagogical effectiveness; and examine its effect on student learning outcomes compared to traditional instruction. Specifically, it examines whether there is a significant difference in learning outcomes between students who use the modular website and those who receive conventional classroom instruction, and whether student engagement differs between the two groups. In addition, the study investigates whether students who use the self-learning modular website show a significant improvement in their learning outcomes after exposure to the digital platform. Together, these questions aim to evaluate both the effectiveness and the engagement value of the developed website as an innovative supplemental learning tool.

Related Literature

Self-learning modules (SLMs) have become more and more popular as an alternative or addition to the traditional classroom learning, which allows the learner to study at the pace that suits him or her best and thus removes the time-strain that comes with set schedules. In particular, Bernardo (2021) established that SLMs offered structured lessons, exercises, and tests that stimulated self-directed learning that translated into better critical thinking and problem-solving abilities. The integration of the multimedia components (videos, interactive simulations) proved to be helpful in terms of understanding and involvement. But Bernardo also has observed that there were still problems, including the motivation of students and the unavailability of immediate teacher feedback.

These findings have been supported and elaborated on by recent empirical studies. The Xu et al. (2023) meta-analysis confirmed that the impact of SRL-based interventions on academic achievement in online and blended learning (effect size ≈ 0.69) was of moderate value, which showed the necessity to design modules that provide explicit scaffolding of SRL processes. Meanwhile, Jin et al. (2023) investigated the role of AI-based tools in metacognitive, cognitive, and behavioural regulation in SRL; they found that SRL tools generated by the

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researchers assist in enhancing cognitive and behavioural regulation, but motivation regulation is not sufficiently supported. The evidence provided above highlights the need to develop SLMs that are not just focused on content delivery but include self-regulation and motivation scaffolding.

Through the technology-acceptance prism, the Technology Acceptance Model provides an effective outline of the reasons behind the digital tool uptake of learners. In a study by Barz et al. (2024) on German university students, the authors discovered that both the SRL and affinity to technology had a significant predictive relationship with the core TAM constructs of the perceived ease of use and perceived usefulness. Likewise, in an adapted version of the TAM study, Belew et al. (2024) found that perceived ease of use (0.210) and perceived usefulness (0.330) were significant predictors of acceptance of e-learning among Ethiopian postgraduate learners. These new findings confirm once again that the modular websites that are to be self-learned are supposed to be adopted with a design that will reach the level of usability and obvious usefulness, and will have to take into account the characteristics of learners, including self-regulation and technology affinity.

Regarding the instructional design, the ADDIE Model (Analysis, Design, Development, Implementation, Evaluation) is a framework that is still used to develop quality modules. One of the critical design requirements that arose through the literature of digital modules is that the content of the curriculum (analysis) should be reflected in the digital module, learner-centred multimedia (design/develop) should be included, autonomous pacing (implementation), and usability and outcomes assessment (evaluation). These modules follow such an iterative design that, according to the literature, do better in supporting learning outcomes.

According to Constructivist Learning Theory, learners, through learning, actively construct knowledge by having meaningful interactions with the content in a learner-centred environment. This conceptual frame encourages SLMs where interactive exercises, simulation, and exploration through self-pacing are integrated within the module to promote more engagement and development of higher-order skills (Kivunja, 2015). Recent studies on SRL (e.g., Do et al., 2023) suggest that the capability of students to control their learning processes (goal setting, monitoring, and reflections) interacts with the design of the module and affects the results.

Self-directed modular websites are especially appropriate in the framework of competency-based national curricula, such as the MATATAG Curriculum (Department of Education, 2022), which focuses on literacy, numeracy, and other 21st-century and technical skills, including digital literacy and problem-solving. They fit the areas of student autonomy, flexibility, and development of digital skills of the curriculum: students are free to coordinate modules according to their own plan, participate in the interactions, and apply what they have studied to real-life activities.

Whereas the previous studies (Bernardo, 2021) have highlighted the possibilities of SLMs as a self-paced learning tool and an approach to multimedia,

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the most recent studies focus on the need to incorporate scaffolds to SRL and the need to design with technology acceptance (Barz et al., 2024; Belew, known as Bernardo et al., 2024). As an illustration, despite the flexibility offered by SLMs, there might be a lack of potential benefits without a specific design with self-regulation and motivation assistance (Jin et al., 2023). Appreciation of usefulness and usability, in their turn, are also paramount: adoption cannot be automatic as long as a system is present, and beliefs of learners about the system do count (Barz et al., 2024). Additionally, despite the provided iterative design, there are still a lot of modules that are not fully evaluated (e.g., usability testing, long-term sustainability), even according to the ADDIE model. The merging of these theories makes it possible to think that the success of a self-learning modular website is not only dependent on the content and multimedia, but also on design in terms of autonomy, usability, motivation, and acceptance.

Overall, it can be concluded that, according to the existing literature, the well-planned self-learning modules may have a strong positive impact on the learning outcomes of secondary students (including within the subjects such as TLE-ICT), as long as they include multimedia, self-regulation scaffolds, correspond with the curriculum objectives, and receive a positive perception of usability and usefulness as predicted by TAM. These trends and theoretical frameworks are, therefore, closely related to your study of a Grade 7 TLE-ICT self-learning modular site.

Conceptual Framework

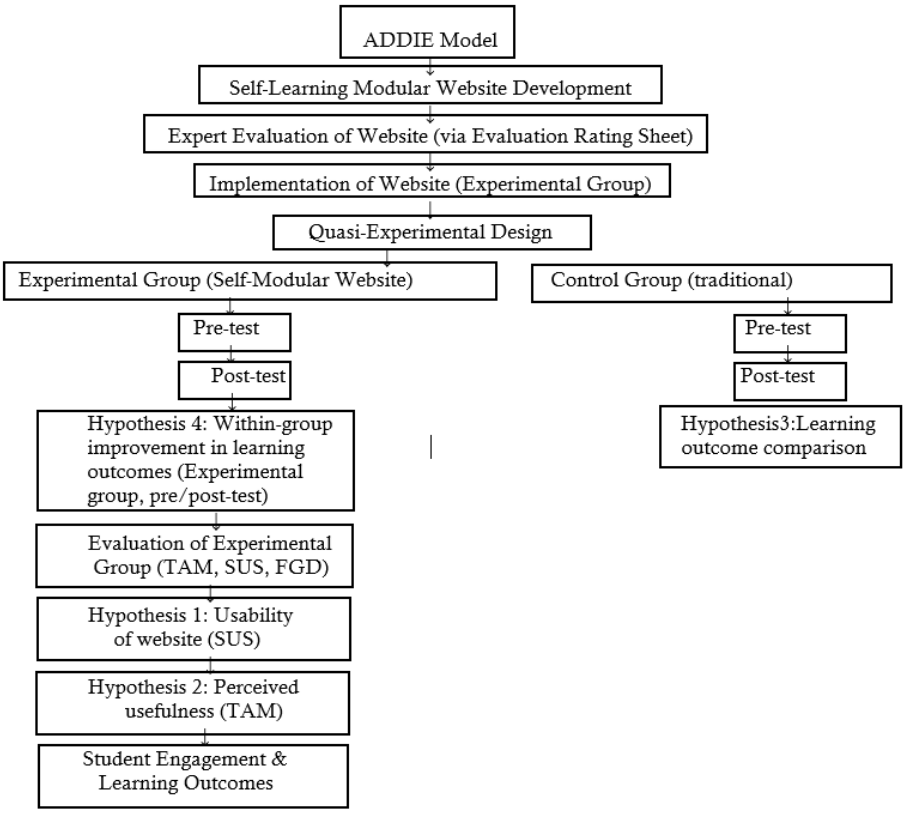

Figure 1. Diagram of the Conceptual Framework of the Study

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The research is based on the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) as a logical structure for designing and evaluating the self-learning modular website of Grade 7 TLE-ICT. This website was created according to the curriculum and was supplemented with multimedia and interactive qualities to stimulate active learning. Pedagogical validity and usability would have been assessed by experts before going to classrooms. The quasi-experimental design involved a comparison of learning outcomes in students with and without the use of the website and a pre-test and post-test among learners in both groups.

Most important learning theories also support the framework. Constructivist Learning Theory (Piaget, 1973; Vygotsky, 1978) reaffirms the importance of learner-centered, experiential, and scaffolded learning, whereas Multimedia Learning Theory by Mayer (2001) states the efficiency of mixed visual/auditory channels in order to take the cognitive load off. The perceived usefulness, ease of use, and overall usability in the evaluation were based on the Technology Acceptance Model (Davis, 1989) and the System Usability Scale (SUS).

In this regard, the framework implies that the website is usable, useful, and effective to enhance student outcomes and engage them. Through the combination of instructional design concepts and learning theories, the research has an opportunity to form the foundation for judging the educational effects of digital self-learning tools within the context of secondary education.

Table 1. Theoretical and Conceptual Frameworks Guiding the Development and Evaluation of the Self-Learning Modular Website

Theory/Model	Key Concepts	Application in the Study
ADDIE Model	A five-phase instructional design model: Analysis, Design, Development, Implementation, and Evaluation.	Ensures systematic development of the self-learning modular website, guiding content structure, multimedia integration, implementation, and assessment.
Constructivist Learning Theory	Learners actively construct knowledge through experiences, problem-solving, and collaboration.	The website incorporates problem-based learning (PBL), scaffolding, peer interactions, and self-reflection tools to promote active learning.
Personalized Learning Paths	Adapts content based on student needs, preferences, and progress.	The website allows self-paced learning, topic selection, and adaptive content difficulty, enhancing engagement and effectiveness.
Multimedia Learning	People learn better with a combination of words and	The website uses visuals, animations, voice-over

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Theory (Mayer, 2001)	images rather than text alone. Key principles include multimedia, modality, redundancy, concurrency, coherence, segmentation, signaling, and personalization.	narrations, and structured content to optimize learning and reduce cognitive overload.
Technology Acceptance Model (TAM) (Davis, 1989)	Users' acceptance of technology depends on Perceived Usefulness (PU) (how beneficial it is) and Perceived Ease of Use (PEU) (how easy it is to navigate).	The website is designed with user-friendly navigation, engaging interactive content, and clear instructions to encourage adoption and consistent use.
System Usability Scale (SUS) (Brooke, 1986)	A 10-item scale assessing usability, efficiency, and user satisfaction. A higher SUS score indicates better usability.	The website undergoes usability evaluation, ensuring it is accessible, intuitive, and user-friendly for students. Feedback helps refine its design.

Table 1 introduces an array of theoretical and conceptual models that are used to develop and analyze a self-learning modular website. The frameworks are the ADDIE model, Constructivist Learning Theory, Personalized Learning Paths, Multimedia Learning Theory, Technology Acceptance Model (TAM), and System Usability Scale (SUS).

ADDIE model emphasizes a systematic method of designing the instruction, and therefore it is a systematic development of the website with the phases being analysis, design, development, implementation, and evaluation. Constructivist Learning Theory is based on the active connection between learners and the construction of knowledge based on experience and problem-solving that can be traced in the integration of problem-based learning (PBL), peer interaction, and self-reflection tools into the site. Personalized Learning Paths are applied in order to adjust the material according to the advancement and the requirements of the learner, and provide self-paced learning and individualized difficulty level in order to add more engagement and effectiveness.

The Multimedia Learning Theory emphasizes that both words and visuals should be used together to facilitate learning in order to decrease cognitive overload by using multimedia features such as visuals, animations, and narrations. The Technology Acceptance Model (TAM) focuses on the acceptance of the technology by the user in terms of perceived usefulness and ease of use, which is addressed through the simplicity of the design of the Web page. Finally, the System Usability Scale (SUS) will be employed to gauge the usability, efficiency, and satisfaction of the site, to make sure it is usable and user-friendly to students. The usability testing feedback assists in streamlining the design of the site and in enhancing the overall user experience.

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METHODOLOGY

This research employed a quasi-experimental design based on the ADDIE model to develop and evaluate a self-learning modular website application for Grade 7 TLE ICT students. Two intact Grade 7 sections (N = 30) from Miguel E. Esmade Memorial Integrated School, including an experimental and a control group, each with 15 students. The participants (17 females and 13 males) were, on average, 12–13 years old and were purposively selected to minimize baseline differences in academic performance and digital literacy. The intervention period was 4 weeks; participants in the experimental group practiced on the modular website during TLE-ICT classes, whereas those in the control group learned traditionally.

Data collection occurred in a staged manner. Both groups took a pretest adapted from the MATATAG curriculum competencies during week 1. The intervention was delivered over weeks 2–3. Over this interval, time-on-task, module completion rates, and click-stream patterns for the experimental group were recorded using website analytics tools, and participants' engagement in the control group was observed in class. At week 4, both groups took the post-test and filled in the SUS, Technology Acceptance Model (TAM) questionnaire, and Focus Group Discussions (experiment group only). Expert validation was conducted before its use using the LRMDS rubric, SUS, and TAM-based evaluation sheets.

Learning outcome disparity was further investigated using paired and independent-samples t-tests, and we calculated effect sizes (Cohen's d) to gauge the magnitude of learning gains. Visual representations, such as pre-post mean plots, SUS distribution charts, and TAM factor bar graphs, were also constructed to reinforce the visual interpretation of the results. Usability ratings were used to describe the findings, and qualitative analysis of FGD transcriptions further elucidated the student experience, facilitators, and barriers to engagement. The combination of qualitative and quantitative analysis enabled a thorough examination of the website's pedagogical effectiveness, usability, and engagement.

RESULTS AND DISCUSSION

This chapter reflects the results of the research conducted, analyzing the obtained data on the pre-tests and post-tests, usability surveys, and focus group discussions. The chapter is a full account of the effect of the self-learning modular web on student learning outcomes, engagement, and user satisfaction. The results compared the experimental group, which used the site, with the control group, which used traditional teaching, present the website's effectiveness in improving learning Furthermore, student and expert feedback illuminate site using situation better practical, and the feedback's information on this website's strong and weak points the general all but emotional impression differs clearly from online or print medium.

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Table 2. Experts' Evaluation of the Usability and Design of the Self-Learning Modular Website

Website Usability and Design	Mean (M)	Standard Deviation (SD)	Interpretation	Description
The website interface is well-designed and visually engaging.	4.85	0.37	Strongly Agree	The respondent fully supports or highly agrees with the statement.
The navigation and menu system are user-friendly.	4.85	0.37	Strongly Agree	The respondent fully supports or highly agrees with the statement.
The content is logically structured and easy to follow.	5.00	0.00	Strongly Agree	The respondent fully supports or highly agrees with the statement.
The website is compatible with various devices and screen sizes.	4.71	0.48	Strongly Agree	The respondent fully supports or highly agrees with the statement.
The interactive features (quizzes, discussions, gamification) enhance learning.	5.00	0.00	Strongly Agree	The respondent fully supports or highly agrees with the statement.
The website functions smoothly with minimal errors or technical issues.	4.71	0.48	Strongly Agree	The respondent fully supports or highly agrees with the statement.
Overall Weighted Mean	**4.85**	**0.28**	**Strongly Agree**	**The respondent fully supports or highly agrees with the statement.**

The expert review of the self-study modular website clearly indicates a high level of usability and pedagogical quality, which is evident in relation to better-established instructional design and learning theories. Given that an average score above the neutral point of 3 would indicate technical adequacy, as well as evidence of instructional integrity in each test item indicator, it is fair to say that the development of this product was systematic and designed in accordance with the ADDIE framework. Specifically, a very high degree of assessments for interface quality (M = 4.85) and navigation clarity (M = 4.85) suggests that the Design and Development stages sufficiently converted learner needs – identified in Analysis – into an easily navigable interface that does not obstruct learners' cognitive flow through the system's full text flexibilities. This is consistent with the conclusions

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of Nielsen and Tahir (2012), who have found that visual coherence and intuitiveness in the user interface inspire users while facilitating a healthy user experience.

The unanimity among experts in relation to the systematic structuring of content (M = 5.00) highlights the platform as having been constructed based on multimedia learning principles. In line with Mayer's (2001) Cognitive Theory of Multimedia Learning, pedagogically well-structured and chunked information can decrease cognitive load and facilitate the process of 'meaningful' learning. From a constructivist perspective, such an organization constitutes an important "scaffold" which enables learners to generate new knowledge by interactively engaging with – rather than passively receiving – the content. Cognitive-constructionist learning environments depend on explicit explanations and coherence, with the ability to engage in activities being dramatized in expert ratings.

The above-average scores obtained for the platform's screen design across all devices (M = 4.71) also indicate mindfulness about accessibility, an important aspect in such a digital learning design in current times. Responsive design is an indicator of a good eLearning interface (Marcotte, 2010), and on the ADDIE model, that result indicates iteration during early development/formative Evaluation. Moreover, the technological accessibility would have a direct impact on the Perceived Ease of Use (PEU) dimension in the Technology Acceptance Model (TAM). With reduced technical issues, learners are more likely to adopt and continue using the technology, which in turn supports TAM's model that ease of use affects overall system acceptance (Davis, 1989).

The experts also fully agreed on the website's interactivity features like quizzes, discussion, and light gamification (M = 5.00). These characteristics follow Constructivism and the principles of active learning, prompt feedback, and learner control. Content is supported with interactive quizzes and gamification elements to allow learners to theorize, test out ideas, evaluate knowledge, and reflect on their thinking in alignment with Deterding et al. (2011) highlight that gamification has been shown to increase motivation and engagement. These features serve not only to facilitate learner autonomy but also to realize the constructivist perspective of knowledge-building through active rather than passive interpretation.

Technical operability received high scores (M = 4.71), indicating non-tricky interfaces. This is consistent with Brooke's (1986) SUS, which ranks reliability and predictability as fundamental factors in usability. This means ADDIE's evaluation stage let the word go forth." This high overall weighted mean (M = 4.85) indicates that the website provided a user experience comparable to effective digital learning environments found in educational technology literature.

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The findings demonstrate how interactions between ADDIE, TAM, and Constructivist learning theories contributed to the instructional effectiveness of the website. Consequently, the stepwise construction and perfection promoted by ADDIE led to a technology-reliant system supported by sound pedagogy. Learners' attitudes predicted to be positive by TAM would probably stay so due to the well-presented usefulness, ease of use, and enjoyment. The platform promotes the construction of knowledge by giving learners engaged and scaffolded learning opportunities that are fundamental to Constructivist theory. In contrast with other digital learning systems, the site shows equivalent levels of design quality, interactivity, and responsiveness as well as overall learner support features, which makes it a pedagogically viable and theoretically robust tool that develops knowledge in varied educational contexts.

Table 3. Experts' Evaluation of the Content and Instructional Quality of the Self-Learning Modular Website

Content and Instructional Quality	Mean (M)	Standard Deviation (SD)	Interpretation	Description
The lessons align with the MATATAG Curriculum objectives.	5.00	0.00	Strongly Agree	The respondent fully supports or highly agrees with the statement.
The instructional materials are pedagogically sound and promote active learning.	5.00	0.00	Strongly Agree	The respondent fully supports or highly agrees with the statement.
The website supports differentiated learning for students with various needs.	4.71	0.48	Strongly Agree	The respondent fully supports or highly agrees with the statement.
The website effectively supplements traditional classroom instruction.	4.71	0.48	Strongly Agree	The respondent fully supports or highly agrees with the statement.
Overall Weighted Mean	4.85	0.24	Strongly Agree	The respondent

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				fully supports or highly agrees with the statement.

The professional opinion rating of content and instructional quality of the self-learning modular website was found to be consistently high, reflecting high overall curricular alignment and pedagogical appropriateness. The materials were perfectly aligned with MATATAG Curriculum standards and highly appropriate pedagogically (M = 5.00, SD = 0.00). This result dovetails with the ADDIE model's Analysis and Design phases, when curriculum needs and learner objectives are established, and content is purposefully arranged to serve these. The results also complement Mayer's (2001) Cognitive Theory of Multimedia Learning, which postulates that instructional materials must be linked closely with learning objectives to facilitate meaningful learning.

Experts also described how the site was capable of differentiation of instruction (M = 4.71, SD = 0.48), which means that it can address a wide variety of learners' needs through multiple pathways and pacing. With a Constructivist view, this flexibility would allow learners to process information dependent on their existing subject knowledge and learning strategies in accordance with Tomlinson's (2001) principles of differentiated instruction. This reflects that the Development stage of ADDIE calls for designers to incorporate tools that accommodate learner diversity by encouraging an inclusive learning environment.

The platform also obtained a high rating for value added to traditional teaching (M = 4.71, SD = 0.48). This is in line with Clark and Mayer's (2011) claim that well-designed e-learning complements classroom teaching by promoting self-study, retrieval practice, and multimedia repetition. In TAM, this high level of assessment about strong usage stands for high PU as per expert advice on the potential of the website to improve teaching and learning beyond time and space.

The global weighted average (M = 4.85, SD = 0.24) confirms the excellent teaching level of the site in pedagogical and technical terms. The findings are in accordance with Anderson and Dron's (2011) model of technology-enhanced learning environments, advocating that the application effectively reinforces active engagement, accessibility, and enhanced learning performances. Likewise, comparative research in digital learning illustrates that structured and interactive platforms with robust curriculum matching perform better than plain-Jane systems when promoting student engagement.

In conclusion, the outcomes indicate that the self-learning modular website is effective in terms of all curriculum alignment, pedagogy coherence, well-rounded, supported, and instructionally enriched. Viewed through ADDIE, TAM, and Constructivism, the results conclude that the platform is theoretically sound, instructionally solid, and technologically able to support both independent learning and classroom learning.

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Table 4. Experts' Evaluation of the Content Quality of the Self-Learning Modular Website Using LRMDS Standards

Criteria	E1	E2	E3	E4	E5	E6	E7
Content is consistent with topics/skills found in the DepEd Learning Competencies for the subject and grade/year level it was intended.	4	4	4	4	4	4	4
Concepts develop, contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	4	4	4	4	4	4	4
Content is accurate.	4	4	4	4	4	4	4
Content is up-to-date.	4	3	4	4	4	4	4
Content is logically developed and organized.	4	4	4	4	4	4	4
Content is free from cultural, gender, racial, or ethnic bias.	4	4	4	4	4	4	4
Content stimulates and promotes critical thinking.	4	3	4	4	4	4	4
Content is relevant to real-life situations.	4	4	4	4	4	4	4
Language (including vocabulary) is appropriate to the target user level.	4	4	3	4	4	4	4
Content promotes positive values that support formative growth.	4	4	4	3	4	4	4
Total Points	40	38	39	39	40	40	40
Note: Resource must score at least 30 points out of a maximum 40 points to pass this criterion. Please put a check mark on the appropriate box					☐ Passed ☐ Failed		
Average Points	**39.42**		**Decision**		**Passed**		

Legend: E - Expert

The expert assessment based on DepEd LRMDS criteria produced an excellent average score of 39.42 out of 40, indicating that the learning material is considered in compliance (at some points over-compliance) with the Philippine national standard on instructional content quality. High scores on accuracy, relevance, logical structure and alignment with competencies indicate that the content is instructionally well integrated and appropriate for use in Philippine classrooms. This "full" performance is consistent with Biggs' (1996) Constructive Alignment, which suggests that learning materials are most effective when the objectives, content, and assessment are closely aligned, as was evidently true in relation to the experts' interpretations.

The consistently high scores for cultural and social inclusivity also confirm conformity to UNESCO's (2017) guidelines of equitable, bias-free teaching materials. These augers well with the Philippine K–12 curriculum move that

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prescribes culturally-sensitive and user-friendly instructional materials (DepEd, 2012). This is consistent with studies conducted by Prado (2016) and Mateo (2018), which revealed the preference of Filipino teachers for instructional materials that mirror contextual realities and are not biased in terms of culture or gender. Such a fact can be derived from the perfect to near-perfect scores of experts.

Best-Judged Agreement was slightly smaller in these three criteria, because some adjudicators gave a score of 3 to these aspects. These signals match the theoretical predictions. Indeed Anderson & Krathwohl's (2001) Bloom's Revised Taxonomy clearly suggests that higher-order thinking skills activities should be integrated into instructional materials, while Vygotsky's (1978) Zone of Proximal Development similarly states that vocabulary must match the developmental level of learners. These minor differences underscore the potential for improvement in future versions—most notably, in the addition of more analytical tasks and provision of text that is linguistically simpler.

High scores in the values formation criterion indicate that it supports cognitive as well as affective learning outcomes, and this aligns with the emphasis on character education found within the Philippine K–12 curriculum (DepEd, 2016). From an instructional design perspective, this is consistent with Reigeluth's (1999) belief that educational resources should induce intellectual and moral development.

Overall, Table 4 shows that the material is of overwhelmingly high quality, has a rigorous design based on theory, and conforms to national and international pedagogical standards. More specifically, in the ADDIE model, this form of assessment is indicative of a favorable phase practicum with minor changes required to the classroom application for ideal use.

Table 5. Experimental Group Evaluation on the Accessibility and Effectiveness of the Self-Learning Modular Website (n=15)

Indicator	Mean	SD	Interpretation
The website is visually appealing and engaging.	4.40	0.82	Strongly Agree
The website is easy to navigate and use.	4.26	0.45	Strongly Agree
The lessons are well-organized and easy to understand.	4.93	0.25	Strongly Agree
The instructional materials are relevant and useful.	5.00	0.00	Strongly Agree
The interactive activities enhance my learning experience.	4.60	0.50	Strongly Agree
The website is accessible on different devices (mobile, tablet, computer).	4.86	0.35	Strongly Agree
The quizzes and exercises help reinforce my learning.	4.73	0.45	Strongly Agree
The self-learning modular website helps me become more independent in learning.	4.86	0.35	Strongly Agree

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The website helped me understand TLE-ICT concepts better.	4.60	0.73	Strongly Agree
I feel more confident in applying ICT skills after using the website.	4.53	0.51	Strongly Agree
The self-paced learning approach improved my comprehension.	4.60	0.507	Strongly Agree
The website encouraged me to take more responsibility for my learning.	4.60	0.50	Strongly Agree
The multimedia elements (videos, animations) made learning more effective.	4.86	0.35	Strongly Agree
I performed better in assessments after using the website.	4.46	0.63	Strongly Agree
Weighted Mean	**4.66**	**0.45**	**Strongly Agree**

When evaluating the self-learning modular website for its accessibility and effectiveness, we can see exemplary responses from participants in many different categories. Their comments demonstrate that they perceive the project as quite useful indeed, one that helps them learn Chinese with greater ease than was previously possible.

The score for accessibility on the website among different devices (mobile, tablet, computer) was 4.86 points, and the score relating to ease of navigation was 4.26. This indicates that the website can be easily reached from various media, offering consistent user experiences throughout-a following points agreement with ADDIE model, which emphasizes realizable and accessible platforms. Furthermore, this was also supported by TAM, which points out how much ease of use has a major impact on whether people take technology aboard or continue to use it. Studies have indicated that where websites are easy to negotiate, users are likely to remain engaged and satisfied learning is more efficient. It reduces cognitive load for them. It thus seems that Zhuhai Clinton & Clinton (2022) will be mentioned

In the end such results coincide with Constructivism. By adding plentiful media elements such as videos or animations (4.86), the website enables students to understand and retain difficult concepts better--this reflects the intrinsic nature of Constructivist learning theory. Doing quizzes and exercises (4.73) is also in support of this idea, recognizing that engagement with learning content enriches students 'understanding and is itself part of the learning process.

Furthermore, with a scale for self-paced learning ranking as 4.60, it can reflect students' self-study circumstances and independent ability to take responsibilities. This is the basis of Constructivist theory, emphasizing students ' autonomy and capacity for self-motivation. Recent developments corroborate this point, such as the integration of self-paced learning into certain components of study. Over the last few years, students have become more and more passive during this process and more successful only in using consumable resources (Jackson & Yang, 2022): This website's ability to foment independent learning is a

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key way of cultivating faculties for critical thinking and problem solving. These results show that the website not only offers students a deepened knowledge of TLE-ICT concepts, but also greater confidence in employing ICT skills in real-life contexts as well. These outcomes are both in accord with the central tenets of TAM and Constructivism, which assign a key role to user engagement and the application of skills in the learning process. According to TAM, if users feel that the technology not only improves learning outcomes (Kentóin & Vashistel, 2022).

In summary, the self-learning modular website presents an eminently efficient way of making advances in accessibility, student engagement, and learning outcomes. Its excellent ratings for ease of use, device accessibility, relevancy of online information, and the effectiveness of interactive activities (all over 4) further testify to its adherence to the ADDIE model, TAM, and Constructivism. Plus, the positive feedback it gained from boosting learners' confidence and performance points to this website's potential for self-directed learning as well as improved academic results in general.

Table 6. Experimental Group Evaluation on the Perceived Usefulness (PU) and Perceived Ease of Use (PEU) of the Self-Learning Modular Website (n=15)

Indicator	Mean	SD	Interpretation
Perceived Usefulness (PU)			
The website helps me understand TLE-ICT topics better.	4.53	0.51	Strongly Agree
Using the website improves my academic performance in TLE-ICT.	4.46	0.63	Agree
The website allows me to complete learning tasks more efficiently.	4.33	0.48	Agree
The website provides relevant and useful learning materials.	4.60	0.50	Strongly Agree
The website enhances my motivation to learn TLE-ICT.	4.80	0.41	Strongly Agree
Weighted Mean	**4.54**	**0.51**	**Strongly Agree**
Perceived Ease of Use (PEU)			
The website is easy to navigate.	4.40	0.50	
The interface of the website is user-friendly.	4.73	0.45	Strongly Agree
Learning how to use the website requires little effort.	4.66	0.48	Strongly Agree
I can access lessons and activities without difficulty.	4.46	0.51	Agree
I can complete tasks on the website without technical problems.	4.33	0.48	Agree
Weighted Mean	**4.52**	**0.49**	**Strongly Agree**

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Overall Weighted Mean	**4.53**	**0.50**	**Strongly Agree**

The self-learning modular website, judged on perceived ease of use and Perceived Usefulness, yielded encouraging results. These were, in fact, in line with key educational theories such as the ADDIE, the Technology Acceptance Model (TAM), and Constructivism. Under "Perceived Usefulness," the site was rated highly by respondents for promoting their grasp of TLE-ICT topics (4.53), increasing academic performance (4.46), and notably boosting their motivation to study (4.80). These results show that the website is effective in supporting academic engagement and performance, and thus accord with the TAM model. According to this, users are willing to adopt technology if they perceive it as useful, a relationship that recent research supports. For example, Venkatesh et al. (2022) have confirmed that technologies perceived as useful do in fact greatly increase users' intentions to adopt them. Moreover, this data confirms Constructivist Learning Theory, which also values personal involvement and intrinsic motivation. From this, we can deduce that, with such high levels of support for motivation and task effectiveness, the website offers both tasks that are meaningful and encouraging for those who want to learn how to learn--a crucial aspect in Constructivism (Vygotsky, 1978).

Similarly, the Perceived Ease of Use section evokes similarly positive findings, with participants rating the website for ease of navigation (4.40) and learning how to use it (4.66). These findings are consistent with the ADDIE model, particularly as it relates to the Design and Development phases. Both stages emphasize systems being intuitive and user-friendly. This view is reinforced by the TAM model, which indicates that if technology is seen as easy to use, user engagement is more likely. Recent studies support this. Thus, Clark and Mayer (2022) argue well well-designed digital learning environments ease cognitive overload and result in more efficient learning. Again, this is consistent with the principles of the TAM model. A user-friendly interface (4.73) and the ability to perform tasks without encountering technical issues (4.33) are very much in line with the general principle that ease of use is decisive for user acceptance of technology.

International research adds weight to these conclusions. Anderson et al. (2023) stress that digital platforms with a user-friendly interface, for instance, and developed based on models like ADDIE, enormously advantage both usability and educational effectiveness. Jackson and Yang (2022) discovered that platforms built around Constructivist ideas also have a noticeable effect on academic performance. As students interact with meaningful content in an active way to construct knowledge, they enhance their education.

In conclusion, the high ratings for both Perceived Usefulness and Perceived Ease of Use of the self-learning modular website indicate that users have taken to the site. This corresponds with theories of TAM: the better designed digital learning platforms are, provided they are also user-friendly, will lead to a better learner experience. These results are compatible with both the TAM model and

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Constructivism: good digital learning platforms--like that self-learning modular website, in short--entail great learner satisfaction and inevitably great educational success.

Students perceive the self-learning modular website as useful and easy to use

The measurement of the perceived usefulness (PU) and the ease of use (PEU) will act as the foundation for testing Hypothesis 2. (Table 5) Scale: Accessibility and Effectiveness weighted Mean = 4.66, interpreted as: Strongly Agree. (Table 6) Scale: Perceived usefulness and ease of use averaged weighted mean = 4.53, interpreted as: Strongly Agree. These results reveal that the students have always had the view that a self-learning modular website is useful and easy to navigate.

It can confirm the Alternative Hypothesis: Students find the self-learning modular website useful and easy to use. (Davis 1989) Technology Acceptance Model (TAM), perceived usefulness, and ease of use encompassed the most important predictors of technology acceptance among the users. The high ratings in both categories indicate that learners not only appreciate the platform as useful in helping them complete their studies but also convenient to use, and this will make them use it more frequently. Analogous results noted in the e-learning literature indicate that the degree of usefulness and usability in systems positively influences the students through increased motivation, engagement, and the adoption of the digital tools (Teo, 2011; Al-Emran et al., 2018).

Therefore, the homogeneous scores in the two tables confirm that the modular website satisfied the expectations of the learners to offer relevant, accessible, and user-friendly instructional support. This indicates that the platform did not just work in terms of technology but even pedagogically had been effective in creating positive learning opportunities.

Table 7. Experimental Group Evaluation on the System Usability of the Self Learning Modular Website (n=15)

Statement	Average Scores
I think that I would like to use this website frequently.	65.00
I found the website unnecessarily complex. *(Reverse Scored)*	70.00
I thought the website was easy to use.	67.00
I think I would need assistance to use this website. *(Reverse Scored)*	66.00
I found the various functions of the website well-integrated.	69.00
I thought there was too much inconsistency in this website. *(Reverse Scored)*	69.00
I imagine most people would learn to use this website quickly.	70.00
I found the website cumbersome to use. *(Reverse Scored)*	65.00
I felt confident using the website.	71.00
I needed to learn many things before I could use this website effectively. *(Reverse Scored)*	65.00

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Total Average Score	**67.70**
Interpretation: **Acceptable, needs improvement**	

The usability analysis of the self-learning modular website had shown a total score of 67.70 on the system usability scale (SUS), which fell within the range of a marginally acceptable score (Bangor, Kortum, and Miller, 2009). The SUS suggests that a score is 65-70 means an area that is at the basic level of usability but needs more expansion. The ease of use, accessibility, and user-friendliness of the site were therefore found to be sufficient but could be improved. The highest ratings concerned elements associated with the trust that students had in using the site (M = 71.00) and the capability of acquiring knowledge on how to use the site within a short period of time (M = 70.00), which pointed to the fact that although the design is practical, there were still difficulties connected to the usability factors such as complexity and navigation.

The analysis also showed the points of concern, especially the complexity of the system (M = 70.00) and the fact that the user has to acquire several elements before he can use it (M = 65.00). These results are consistent with the principles of usability proposed by Nielsen (2012) and insinuate that a system ought to reduce cognitive load as the sole way of guaranteeing long-term acceptance by the end-users. Moreover, the reverse-scored items indicated that though the platform is usable, students had cognitive problems that complicated their navigation, which aligns with the results of Brooke (1996) and Sauro (2011), who highlighted the role of simplicity as the key to usability. The functionality of the system (M = 69.00) was considered reasonable, although such problems as inconsistent navigation were noticed, which Zaharias and Poylymenakou (2009) and Al-Fraihat et al. (2020) believe are the main predictors of user satisfaction and retention in online learning.

The results give strong support in terms of the hypothesis, which is that the self-learning modular website is perceived to be usable in terms of ease of use, accessibility, and user-friendliness. The total SUS score of 67.70, which is slightly lower than the 68-point mark, which is generally regarded as acceptable (Bangor et al., 2009; Sauro, 2011), is nonetheless within the marginally acceptable range, which proves that the website was viewed as usable. This permits us to reject the null hypothesis and accept the alternative hypothesis, which means that students in general found the site usable but found ways of improving it. These results are also consistent with the framework by Nielsen (2012), who identifies learnability, efficiency, and user satisfaction as the fundamental measures of usability determination.

Altogether, the self-learning modular site corresponds to the minimum requirements of usability, although the interface design, better simplification of the navigation process, and the decrease in the complexity of the system can be improved. The attention to the areas may help to increase the usability rating of the website and offer a more convenient experience to students, ensuring the improvements of the learning process and greater student satisfaction. With the enhancement of these factors, the site can be made to offer a more efficient and interesting learning process.

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Table 8. Paired Samples t-Test Results of Pre-test and Post-test Scores in the Experimental and Traditional Groups

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Experimental Group	Pre-test – Post-test	-17.67	8.01	2.069	-22.10	-13.22	-8.53	14	0.00
Traditional Group	Pre-test – Post-test	-19.13	8.04	2.076	-23.58	-14.67	-9.21	14	0.00

The paired samples t-tests showed significant posttest and pretest differences in both the Experimental and Traditional group, where p = 001 in each of the groups, which means that effective learning did take place in both settings. The high improvement in the Experimental group is a direct support of the hypothesis, which postulates that the self-learning modular site was found to significantly improve the learning outcome. This enhancement shows the potential of the modular platform regarding knowledge acquisition and skill development.

These are in line with other researchers who found that technology-mediated learning systems have the ability to enhance academic performance due to the interactive nature, self-directed learning, and the use of resources (Bernard et al., 2009; Tamim et al., 2011). The features of the modular site, which included ease of navigation and access to information by the learner at a single click, would have enhanced more engagement and immersion in the learning process, and this could be attributed to the self-regulated learning beliefs (Zimmerman, 2002).

In the meantime, the Traditional group also had great improvements, which highlights the importance of well-organized learning settings, both virtual and real, in improving student performance. The conventional teaching strategies, which grant easy feedback, clarity, and continuity, have been known for the past to have a positive influence on learning gains (Hattie, 2017). In this way, the results indicate that good teaching (both face-to-face and electronic) can result in significant learning improvements.

These findings endorse the modular site as an alternative that could prove useful in substituting conventional instruction, especially regarding flexibility, access, and independence of the learner. The results suggest that the modular site might be an additional useful tool to the conventional pedagogical activities, but not its alternative.

The hypothesis also indicated that the Experimental group significantly improved compared to the scores in the pretest and posttest, with the mean difference of -17.67, t (14) = -8.53, with a p value of under .001. This gives a good indication to disapprove the null hypothesis and approve the alternative

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hypothesis to support that the self-learning modular Web site showed a significant improvement in learning results among the Experimental condition. This aspect justifies the notion that learning platforms with interactive material, flexibility, and self-directed learning can contribute to better academic results (Mayer, 2009; Clark and Mayer, 2016).

The positive change in the Experimental group can be attributed to the auto-regulated learning model (Zimmerman, 2002) that puts an emphasis on the advantages of learners' autonomy and self-directed learning. Multimedia activities, as well as the opportunity to revise the materials, move through the lessons at their own speed, and practice, helped to achieve quantifiable academic improvements. These results resonate with the prior studies on the effectiveness of digital and modular learning interventions (Bernard et al., 2009; Tamim et al., 2011) and the promise of the modular site as a scalable and student-centered learning format in both blended and independent learning settings.

Table 9. Independent Samples t-Test Results on the Gain Scores of Experimental and Traditional Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
GAIN	Equal variances assumed	.070	0.79	-.500	28.0	0.62	-1.46	2.93	-7.47	4.53
	Equal variances not assumed			-.500	28.0	0.62	-1.46	2.93	-7.47	4.53

The independent samples t-test demonstrated that there was no significant difference between the mean gain scores of the groups. Either Experimental (self-learning Modular Website) or Traditional (classroom training) groups were not, t (28) = - 0.50, p=0.621. Given that the p-value is well over the 0.05 significance level, both instructional methods in this context yield effectively equivalent results on student performance. The small mean difference (-1.47) and confidence interval (-7.47 to 4.54) suggest that the observed difference might be due to chance in interpretation. Therefore, the null hypothesis is not rejected, favoring the conclusion that there is no significant difference between the two methods.

These results are consistent with earlier studies, which have found that digital and modular learning - while more flexible and accessible than traditional settings - do not necessarily yield better results in terms of academic achievements (Bernard et al., 2009; Tamim et al., 2011). Hattie (2017) contended that instructional effectiveness depends more on how well teachers train people

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than learning mode. So even if the self-learning modular website was more flexible, it did not increase effectiveness in test scores.

It is important to note that learning effectiveness is not solely reflected in academic achievement. By contrast, the self-learning modular website can boast several pluses in such areas as access and independence that were not reflected in the results but could be gauged with techniques like usability scales or qualitative feedback surveys (Davis, 1989; Nielsen, 2012).

Synthesis on FGD and Quantitative Findings

The findings of the statistical analysis and the focus group discussion (FGD) are consistent in demonstrating that the self-learning modular website is an efficient tool to improve the learning outcomes. The paired samples t-test supported these results by supporting the Hypothesis, indicating that the students in the experimental group had significantly greater learning outcomes between pretest and posttest ($p < .001$). This finding is aligned with the student feedback, where all participants were able to learn and use the platform without problems, with their main concern being the intuitive design, well-structured materials, and interactive activities contributing to an enhanced learning experience.

Theoretically, the findings can be linked to the Technology Acceptance Model (TAM), which indicates that perceived ease of use and perceived usefulness are key factors in deciding the technology use and the levels of engagement (Davis, 1989). The positive answers of the students to the easy-to-use design and interactive experience of the website can be used in this situation as an illustration of the importance of usability in a productive learning environment. In addition, the students can learn at their own time and speed, which is a characteristic of self-regulated learning principles (Zimmerman, 2002), and it was made easy by the modular nature of the site. This freedom is consistent with Kizilcec et al. (2017), who discovered that digital learning solutions have the potential to give a learner a feeling of independence, which encourages more interaction with learning materials.

Also, the students have emphasized the video tutorials and interactive quizzes as the most useful tools because, in this way, the students have managed to grasp the challenging topics more easily. This fact is explained by the fact that, according to the cognitive theory of multimedia learning supported by Mayer (2009), multimedia materials and, especially, videos and other interactive features, enhance the osmotic knowledge and can contribute to the deeper retention of the concepts than text-based learning in isolation. In a similar vein, Clark and Mayer (2016) contend that learning conditions supported by multimedia allow developing more dynamic, interesting learning experiences, which was manifested in the students' liking the platform.

Another major advantage students identified in the modular site was the fact that it did not need the constant supervision of the teacher. This aspect is congruent with the article by Moore et al. (2011) that addresses the topic of independent learning in blended and distance learning, as students need to be responsible in terms of their learning. The fact that the site was self-paced made

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the students interested and independent in their learning, which made them feel autonomous and motivated. It is possible to connect these results to the self-determination theory as well (Deci and Ryan, 2000), according to which the intrinsic motivation depends critically on autonomy and competence. In this respect, the fact that students are more motivated to accomplish the modules on their own volition indicates that the site is effective in fostering these fundamental psychological needs of the students.

Nevertheless, the problem of slow internet connectivity was noted by students as one of the major weaknesses that does not allow them to watch videos and perform interactive assignments effectively. The issue highlights the general issues surrounding the delivery of e-learning solutions in developing countries, where technical infrastructure can be lacking to enhance the best learning experiences (Basilaia and Kvavadze, 2020). Notwithstanding this, students were willing to do the modules, which implies that the interactive and structured aspect of the platform was a strong motivation to get past the technical obstacles. The desire to continue may be connected to the postulates of the self-determination theory, according to which a feeling of achievement due to the movement of self-motivation increases intrinsic motivation.

When we compare the effectiveness of the self-learning modular website and traditional teaching methods, an independent samples t-test demonstrated no significant difference between the gain scores of either of the two groups ($p = .621$). This result confirms the Hypothesis, meaning that the two teaching approaches were operationally equal in the academic performance measured. These findings are in line with the previous studies, which have indicated that although technology-enhanced learning settings are flexible and engaging, they do not imply statistically better results than traditional learning (Tamim et al., 2011; Bernard et al., 2009). According to Hattie (2017), aspects like teacher-student relationships and quality of feedback influence the learning outcome more than the mode of delivery.

Finally, the self-learning modular site proved to be equally effective as traditional teaching in improving academic performance, and it would have more advantages, including higher engagement, motivation, and autonomy of learners. The fact that quantitative data is used in combination with qualitative feedback may be interpreted as the idea that the site can be used as an effective complement to traditional teaching, especially in situations when flexibility and accessibility are regarded as the top priorities. The effects of the website on long-term knowledge retention, critical thinking, and emotional engagement should be studied in future research to evaluate its educational usefulness.

CONCLUSION

This paper has established that the self-learning modular site is a feasible and efficient instructional tool offered to Grade 7 TLE-ICT students, which offers similar academic performance results in comparison to conventional education. The findings were in favor of the hypotheses, showing that the modular website made a significant improvement in the learning outcomes between pretest and

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posttest. Also, the hypothesis was validated because there was no significant difference observed in the gain score in the experimental and traditional groups, which showed that both the instructional methods were equally effective in improving student achievement.

User-friendly aspects (videos, quizzes, and adaptive content) enabled by the interactive system of the platform contributed to a high level of student motivation, engagement, and autonomy that corresponds to the Technology Acceptance Model (TAM). Although the usability score is rather low, and makes 67.70, the platform was considered effective and user-friendly. These results imply that the modular website can be a useful additional tool in education that provides flexibility and convenience. The suggestions for further development are to make it more user-friendly, to include the offline resources, and to train teachers to be able to use it successfully in different learning settings.

Implications

In the research, the authors note the opportunities of self-learning modular websites as an alternative or supplemental mode of instruction, which gives students independence and allows them to learn independently. The correspondence of the platform to MATATAG standards indicates that digital tools are capable of addressing the objectives of the curriculum, provided they are properly designed. Educators and policymakers must consider adopting such platforms as a part of an official curriculum delivery to make sure that they are mobile-friendly, interactive, and accessible to every student. Moreover, the study is one of the first references to the significance of usability and learner-centered design in e-learning platforms, which adds to the plentiful evidence on integrating technology in learning.

limitations

Although the study offers some important information, its limitation lies in the sample size and period, which restricts the generalization of the findings. It would be desirable to conduct a larger sample and a longer intervention period to have a more holistic representation of the long-term effect of the platform. Also, technical problems like internet connectivity influenced the experience of the students, especially where there is limited infrastructure, and this could have contributed to the outcomes. The emotional and cognitive context of learning and the effectiveness of the platform in enhancing higher-order thinking and application of the skills to the real world should also be studied further.

Recommendations

Based on the results of the study, several recommendations are proposed for the primary beneficiaries identified in this research.

1. To Students: The modular site must be constantly upgraded with additional interactive and customized features and offline supplies to address the problem of connectivity. It makes students use the platform to engage in self-paced learning to develop ICT skills.

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2. To Teachers: Teachers ought to use the platform in their lessons so as to engage the students more and monitor their progress. Teachers should be given a chance to develop digitally in terms of their pedagogies.
3. To Curriculum Developers: The ADDIE model must be used in the continued improvement of the website, making sure that it is in line with the competency-based objectives of learning. The adaptive learning features should be incorporated to make the learning experience even more personalized.
4. To School Administrators and Policymakers: Schools and policymakers ought to focus on the inclusion of digital learning platforms and facilitate infrastructure enhancement, including the availability of internet connectivity and access to devices, in order to make the platform long-term effective.
5. To the Researchers: Future research ought to use size, duration, and higher-order cognitive outcomes on a larger sample of participants to understand the influence of self learning modular websites more adequately. It might also be possible to use advanced analytics in assessing the behavior of learners and patterns of adaptive learning in K-12 education.

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