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Development and Validation of Interactive Computer-Based Learning Module in English

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Abstract: *This study focused on the development and validation of an interactive computer-based learning module designed for Grade 8 English under the K to 12 Curriculum. The module was created following a Research and Development design and evaluated using an experimental approach. Participants were selected from heterogeneous sections of a secondary public school in the Division of Mabalacat City. The experimental group utilized the interactive module, while the control group followed the traditional discussion method. The t-test was used to determine whether there would be a difference between the scores of the control and experimental groups in the pre-test and post-test. It was found that the students in the experimental group performed better than those taught using the traditional method. Expert validators in both English and Information Technology provided positive evaluations of the module's content and design. These results demonstrate the module's effectiveness in enhancing students' academic performance. This study underscores the potential of interactive computer-based modules as valuable tools in fostering 21st-century skills and adapting to evolving educational platforms.*

Keywords*: ICT instruction, interactive learning, module development, K-12*

INTRODUCTION

In the twenty-first century, the goal of education is becoming more widely acknowledged as a crucial support system that encourages the development of abilities in line with current demands from around the world. This change is a result of educational systems' need to adjust to the quickly evolving global workforce, placing a greater emphasis on students' critical thinking, problem-solving, and multidisciplinary teamwork.

Preparing graduates to successfully meet the demands of the global workforce is one of the main objectives of contemporary education. Dirani and Hamie, for example, point to the important changes made to Middle Eastern educational systems, where authorities have made human resource development a top priority in order to boost competitiveness internationally. They stress how important it is to develop students' critical thinking and problem-solving skills, as these are crucial for negotiating the intricacies of the contemporary labor market (Dirani & Hamie, 2017). Comparably, competency-based education (CBE), which emphasizes predetermined skills that match educational achievements with workforce

demands, is becoming more and more popular worldwide (Silva et al., 2015). This strategy is also used in the healthcare industry, where it is believed that incorporating competences into curriculum is essential to equipping medical practitioners to handle global health issues (Papamalis et al., 2023).

Furthermore, creating productive learning environments is also aided by the layout and organization of educational institutions. In their discussion of the role that school design plays in educational transformation, Leiringer and Cardellino point out that a variety of elements interact with the physical environment to affect educational outcomes (Leiringer & Cardellino, 2011). This viewpoint is reinforced by research showing that instructional methods and student learning outcomes can be greatly impacted by the quality of school environment (Lagiou et al., 2021). Therefore, developing the abilities required for success in a worldwide society requires the creation of favorable learning settings.

The necessity for qualified teachers is critical in the context of STEM education. The quality of education needed for K–12 pupils may not be sufficiently addressed by alternative STEM teacher licensure programs, according to Mentzer et al. (Mentzer et al., 2019). Rather, to improve STEM learning outcomes and guarantee that students have the skills necessary for future employment, an emphasis on improving teacher preparation through rigorous training and support is crucial (Ashford-Hanserd, 2022). This is in line with the overarching educational objective of creating a skilled and diverse workforce that can tackle global issues.

Additionally, learning processes have changed as a result of the incorporation of technology in education, making it necessary for students to acquire both traditional and digital competencies. In order to adjust to technology changes in a variety of professions, including healthcare, Wheeler and Chisholm-Burns stress the significance of ongoing professional development (Wheeler & Chisholm-Burns, 2018). Boltsi agrees, pointing out that in order to educate students for the intricacies of contemporary work contexts, educational frameworks must include digital tools and approaches (Boltsi, 2024).

English is emphasized heavily in the Philippine K–12 curriculum since it is essential to educating pupils to meet global competency standards. English language proficiency is becoming more widely acknowledged as a critical component impacting employability on a national and worldwide scale. In today's worldwide economy, when English is widely used as a lingua franca in professional settings, this is especially important. But according to recent studies, the Philippines' standing on the English Proficiency Index (EPI) has declined, which begs the question of how well the country's present educational approaches are developing students' English language proficiency. Because of more than 40 years of American colonial administration, which made English a language of education and a means of social and economic success, the Philippines has long been known for its high level of English proficiency. Because of its historical background, the Philippines is now a major player

in the global labor market, especially in fields where fluency in English is essential, such information technology and business process outsourcing. Recent research, however, shows that Filipinos' ability in English is declining. According to Adeyemo & Sehoole, (2016), the nation no longer holds the top spot in Asia for English proficiency, indicating that present educational methods might not be sufficiently educating students for the demands of the global workforce despite this historical advantage.

English proficiency and academic achievement in a variety of topics are strongly correlated, according to research. Lopez (2023), for example, discovered that K–12 graduates who were more proficient in English also demonstrated greater ability in mathematics, indicating that language proficiency is essential for overall academic performance. This connection emphasizes how crucial it is to give English language instruction top priority in the K–12 curriculum since it improves communication skills and facilitates learning in other subjects.

Furthermore, the K–12 Program's performance depends heavily on the English language skills of its teachers. In order to improve student outcomes, Meniado (2019) highlights the necessity of professional development programs targeted at improving faculty members' English ability. The study supports the notion that a well-prepared teaching profession is crucial for fostering English language abilities by indicating that institutional support for ongoing learning and development can help instructors and students in the long run.

Notwithstanding these realizations, there are still a lot of problems with the drop in English competence. According to Oducado et al. (2020), the development of students' writing and verbal communication abilities depends on the use of English in the classroom; yet, the documented drop in competence raises questions regarding the efficacy of present teaching approaches. The K–12 Program's approach to English language instruction needs to be reevaluated in light of this circumstance in order to make sure that it is adaptable to the changing demands of both the labor market and pupils. It has been suggested that traditional teaching techniques be combined with cutting-edge resources, such interactive modules, to improve the teaching-learning process. Teachers can shift from imparting knowledge to facilitating learning using interactive modules, enabling 21st-century students who are interested in technology to actively participate in their education. By giving students the necessary tools, such as critical thinking, creativity, and flexibility, the K–12 Program has the potential to rejuvenate the Philippine educational system, according to the Department of Education (DepEd). According to research, incorporating technology into the classroom improves motivation and engagement among students (Hernandez, 2020), satisfying the demands of contemporary learners.

Notwithstanding the benefits acknowledged, difficulties still exist. In Philippine classrooms, teacher-centered approaches are still common, which is made worse by students' restricted access to suitable learning resources and pedagogical training. To create relevant learning experiences, teachers need to be proficient in media literacy and

instructional creativity, as Salas and Legaspi (2020) emphasize. Additionally, teachers and students continue to be burdened by the paucity of learning resources under the K–12 Curriculum, with many locations completely without adequate resources (Umil, 2017).

Information and communication technology (ICT)-enabled interactive teaching overcomes these obstacles by making the classroom a more inquisitive and participatory setting. ICT use in English education increases student engagement and makes the learning process more flexible and accessible (Belle & Seerauj, 2021). Research indicates that interactive modules that include multimedia elements like text, images, and videos improve students' comprehension and critical thinking abilities (Ajani & Govender, 2023).

This study's main objective was to develop and validate an interactive English literature learning module for eighth-grade students attending a public school in Mabalacat City, Pampanga, the Philippines. In particular, this study aimed to respond to the following queries: 1) How may the interactive learning module be developed?; 2) how may the interactive module be validated by English experts in terms of: a) Content; b) Adequacy of scope; c) Language and presentation; 3) how may the interactive module be validated by Information Technology experts in terms of : a) Usability; b) Functionality; and c) User interface; 4) how may the pre-test and posttests scores of the control group be described?; 5) How may the pretest and posttest scores of the participants in the experimental group be described?; 6) Is there a significant difference between the pretest and the posttest scores of the participants?

This module aims to increase retention, improve English comprehension, and inspire students to actively engage in the teaching-learning process. This study supports the larger goals of the K–12 Program by addressing the shortcomings of current teaching tactics and resources and advancing creative and successful teaching techniques.

METHOD

The Research and Development (R&D) Design was used in this investigation. R&D is a methodically creative process that yields new information that is utilized to create new materials and modify and enhance ones that already exist. The planning, development, and validation phases were all included in the research and development design. Each step explained how to create an interactive module using specific and thoughtful material selection to create a working one.

The participants of this study were two sections of grade 8 students in a public school in Mabalacat City Division, where the researcher was currently teaching. These were heterogenous sections. These two sections consisted of 39 students per class. The Fishbowl method was used in the selection of the control group and experimental group. The control group was taught in the traditional way of teaching. While the experimental group was taught using the interactive computer-based module. The interactive computer-based English language learning

module for grade 8 was created by the researcher using the ADDIE (Analysis, Design, Development, Implement, Evaluate) Model.

Planning Phase

The module included the selection of the topics in Grade 8 English curriculum guide of the Department of Education K to 12. The selected topics were all the topics covered in the fourth quarter module of the grade 8 English, based on the curriculum guide that the researcher had. The curriculum guide that came from the DepEd, that the teachers were currently using as the basis of all the competencies.

Development Phase

The researcher used an application in developing the module, which was the FlipBuilder. This was an offline application that is transferable to computers, tablets and cellphones. Creating the draft and content of the module, the researcher used books/modules and online references in getting different meanings and ideas that were connected in every topic of the interactive computer-based module. Videos, pictures and audio were also included in developing this module that made it more interactive in the teaching and learning process.

Validation Phase

For this study, five (5) specialists in English teaching and module development were consulted. The module was validated by two English master's teachers, one English literature doctorate, and two secondary junior high school teachers. The content, scope adequacy, and language presentation were all validated in accordance with the K–12 Curriculum. The module was evaluated using the following grading scales: 5-excellent, 4-very satisfactory, 3-satisfactory, 2-fair, and 1-poor. The interactive learning module was assessed by three (3) IT specialists based on its usability, functionality, and user interface. IT personnel from a corporation are the IT specialists who verified the module generated.

To validate the module, the checklist created by Samson (2007) and updated by Laxamana (2012) was used. Three sections comprise the checklist: (1) content; (2) scope adequacy; and (3) language and presentation. The interactive learning module was validated by the English teaching specialists using this chosen evaluation.

The Laxamana (2012) checklist was utilized in the IT experts' validation. The IT specialists used the checklist to assess the interactive learning module's usability, functionality, and user interface. The experimental and control groups' pretest and posttest findings confirmed the designed module's efficacy. Prior to being compared and assessed at the 0.05 level of significance, the experimental and control groups' pretest and posttest results were scored, totaled, and tabulated. The study's data was examined using the statistical methods listed below. The mean was calculated to characterize the pre-test/post-test scores of the students in the experimental and control groups.

To determine whether there was a significant difference between the students' pre-test and post-test scores, the t-test of the difference between means of correlated samples was computed. Pre-test and post-test scores of the interactive learning module and pre-test and post-test scores of the traditional approach were compared using the t-test. The t-test of the difference between means of independent data was solved to ascertain whether there was a significant difference between the students' pre-test scores using the produced module and traditional method and their post-test scores using the interactive learning module and traditional method. The alpha threshold for the t-test, which compares the means of independent and correlated data, was set at 0.05. Microsoft Office Excel was used to process all of the study's findings.

RESULTS

RQ 1: How may the interactive learning module be developed?

The development and validation process of the computer-based learning module in Grade 8 English followed a systematic approach across four phases: Planning, Development, Validation, and Finalization as shown in figure 1.

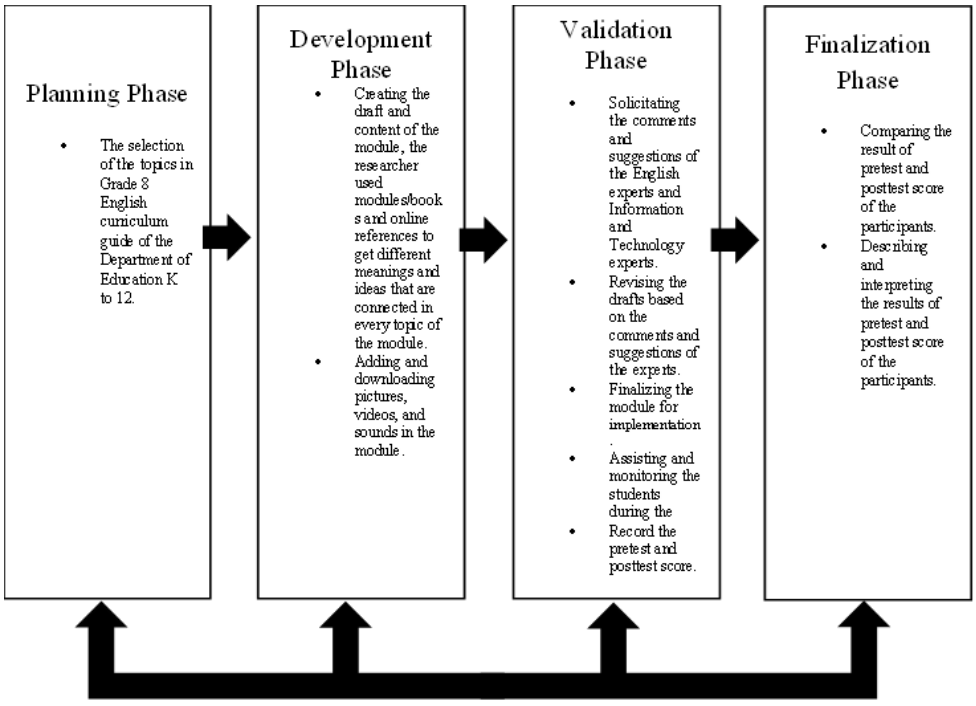

Figure 1. Phases in the Development and Validation of a Computer-Based Learning Module for Grade 8 English

Planning Phase

The researcher identified and selected topics from the Grade 8 English curriculum guide based on the Department of Education K to 12 frameworks. This ensured the module aligned with the prescribed competencies and learning standards.

Development Phase

The researcher employed creativity and resourcefulness in crafting the module by utilizing references such as books, existing modules, and online resources. Multimedia elements—pictures, videos, and audio—were integrated to make the module visually appealing and interactive for users.

Validation Phase

The module underwent validation by English and Information Technology experts. Feedback from IT experts included incorporating a home page hyperlink, pop-up features for certain parts, and revising color schemes and font styles to enhance usability. English experts commended the module's design and its potential to improve teaching-learning interactions. Notable feedback included recommendations to create more interactive modules and expand their use among educators. One expert lauded the module as an "outstanding tool" and praised its innovativeness and ability to inspire better teaching practices. These suggestions were incorporated into the final draft.

Finalization Phase

Pretest and posttest scores of participants were analyzed to evaluate the module's effectiveness. Results showed a significant improvement in posttest scores, indicating the module's success in enhancing students' learning outcomes. Comments from both experts and users highlighted its practical and interactive features, which were well-received.

RQ 2: How may the interactive module be validated by English experts in terms of: 2.1 Content; 2.2) Adequacy of scope; 2.3) Language and presentation

The interactive module was evaluated by English experts across three criteria: content, adequacy of scope, and language and presentation. The results revealed a grand mean score of 5.0, indicating an "Excellent" rating in all areas as shown in Table 1. This demonstrates the module's comprehensive coverage of the Grade 8 English curriculum, ensuring alignment with educational standards and learning objectives. The high scores in content reflect the module's well-structured, relevant, and engaging material, catering to the needs of the target learners. Additionally, the adequacy of scope rating underscores the module's ability to address all essential topics and learning competencies required in the curriculum. Language and presentation were also rated highly, highlighting the clarity, coherence, and accessibility of the module's instructional content. Overall, the evaluation by English experts validates the module as an effective tool for teaching and learning.

Table 1. Validation of the Computer-based Learning Module by the English Experts

Criteria	Mean	Description
A. Content	5	Excellent
B. Adequacy of Scope	5	Excellent
C. Language and Presentation	5	Excellent
Grand Mean	**5**	**Excellent**

RQ 3: How may the interactive module be validated by Information Technology experts in terms of: 3.1 Usability; 3.2 Functionality; and 3.3 User Interface?

The interactive module was validated by IT experts in terms of usability, functionality, and user interface, achieving a grand mean score of 4.78, which translates to an "Excellent" rating as depicted in table 2. Usability received a mean score of 4.56, reflecting the module's user-friendly design that facilitates ease of navigation and interaction. Functionality was rated with a perfect score of 5.0, indicating that all tasks and features worked seamlessly, fulfilling their intended purpose effectively. The user interface earned a score of 4.78, emphasizing the module's visually appealing design and its capacity to enhance user engagement. These findings demonstrate that the module adheres to best practices in educational technology design, ensuring that learners can interact with the platform efficiently and meaningfully.

Table 2. Validation of the Computer-based Learning Module by the IT Experts

Criteria	Mean	Description
A. Usability	4.56	Excellent
B. Functionality	5	Excellent
C. User Interface	4.78	Excellent
		Excellent
Grand Mean	**4.78**	**Excellent**

RQ 4: How may the pretest and posttest scores of the participants in the control group be described?

Based on the data presented in Table 3, the paired t-test results for the pretest and posttest of participants in the control group indicate a significant difference, with a mean paired difference of 14.974, a standard deviation of 5.348, and a p-value of 0.000 ($p < 0.01$). This highly significant result implies a notable change, which may indicate the impact of factors present during the intervention period.

Table 3. T-Test Results of the Pretest and Posttest of the Participants in the Control Group

Variables	Paired Difference		Sig. (2-tailed)	Description
	Mean	Std. Deviation		
Pretest control group vs posttest control group	14.974	5.348	0.000**	highly significant

**significant at 0.01 level of significance
* Significant at 0.05 level of significance

These findings highlight the importance of rigorous statistical analysis in understanding changes over time within a control group, offering a benchmark against which experimental groups can be compared.

RQ 5: How may the pretest and posttest scores of the participants in the experimental group be described?

As shown in Table 4, the paired t-test results for the experimental group also reveal a highly significant difference, with a mean paired difference of 17.949, a standard deviation of 5.652, and a p-value of 0.000 ($p < 0.01$).

Table 4. T-Test Results of the Pretest and Posttest of the Participants in the Experimental Group

Variables	Paired Difference		Sig. (2-tailed)	Description
	Mean	Std. Deviation		
Pretest Experimental group vs Posttest Experimental group	17.949	5.652	0.000**	highly significant

**significant at 0.01 level of significance
* Significant at 0.05 level of significance

The greater mean difference compared to the control group indicates a more pronounced change between the pretest and posttest scores. This suggests that the intervention applied to the experimental group had a significant impact on the participants' outcomes. Overall, the significant results for both groups validate the study's methodological rigor while highlighting the greater impact of the intervention on the experimental group, thereby reinforcing its potential as an effective strategy for achieving desired outcomes.

RQ 6: Is there a significant difference between the pretest and the posttest scores of the participants?

Building on the significant results from the pretest and posttest comparisons, Table 5 highlights the T-test results of the posttest between the control and experimental groups. With a mean difference of 4.128, a standard deviation of 10.636, and a p-value of 0.020 ($p < 0.05$), the findings indicate a statistically significant difference between the two groups. This underscores the superior performance of the experimental group, which utilized the interactive computer-based module, compared to the control group.

Table 5. T-Test Results of the Posttest of the Participants in the Control and the Experimental Group

Variables	Paired Difference		Sig. (2-tailed)	Description
	Mean	Std. Deviation		
Posttest Control group vs Posttest Experimental group	4.128	10.636	0.020*	Significant

**significant at 0.01 level of significance
* Significant at 0.05 level of significance

These findings strengthen the case for adopting interactive computer-based modules as a powerful tool for improving academic achievement and fostering meaningful learning experiences.

DISCUSSION

The findings of the study demonstrate the significant potential of the interactive computer-based module as an effective educational tool for Grade 8 English learners. The validation conducted by English experts yielded an excellent evaluation across all criteria, with a grand mean score of 5.0. This affirms the module's alignment with the Grade 8 curriculum, ensuring its content is comprehensive, well-structured, and conducive to achieving the desired learning competencies. The module's exceptional ratings in language and presentation further highlight its ability to deliver instructional material in a clear, coherent, and engaging manner. These results align with Quimbo's (2023) findings on the efficacy of online learning modules in fostering improved engagement and achievement in English subjects. Moreover, the high scores reflect the module's adherence to best practices in educational content development, providing learners with an interactive and accessible resource for academic success.

The validation by Information Technology (IT) experts further reinforces the module's quality and usability. The "Excellent" ratings in usability, functionality, and user interface, with a grand mean score of 4.78, emphasize the module's seamless design and effectiveness in meeting learners' needs. The high functionality score of 5.0 indicates that the module performs all tasks effectively, supporting its role in enhancing the learning process. Similarly, the strong ratings for usability and user interface highlight the importance of user-friendly and visually engaging designs in educational technology. These findings align with prior studies by Adesote, (2022), which stress the critical role of design and usability in fostering learner engagement and improving outcomes in virtual learning environments.

The comparison of pretest and posttest scores provides further evidence of the module's impact. The pretest results indicated comparable baseline knowledge levels between the control and experimental groups,

ensuring that subsequent differences in performance were attributable to the intervention. The post-test analysis revealed significant improvements in both groups, with the experimental group achieving a greater mean paired difference compared to the control group. This supports the efficacy of the interactive module in enhancing learning outcomes, as the experimental group consistently outperformed the control group.

The paired t-test analysis showed a statistically significant improvement in both the control and experimental groups, but the intervention applied to the experimental group had a more substantial impact. These findings align with the research of Benton et al. (2022), which emphasize the value of experimental designs in isolating the effects of specific variables and evaluating the effectiveness of educational interventions. The superior performance of the experimental group, as reflected in the T-test comparison of posttest scores, highlights the module's ability to promote deeper comprehension, retention, and application of knowledge.

Overall, the study corroborates the potential of interactive computer-based modules as transformative tools in education. By integrating user-friendly designs, comprehensive content, and engaging interfaces, such modules provide learners with effective means of improving academic achievement. The findings suggest that adopting these technologies in classroom settings could foster more meaningful learning experiences and support the attainment of educational goals.

IMPLICATIONS OF THE RESEARCH RESULTS

The study highlights the effectiveness of the developed interactive computer-based learning module in enhancing English language proficiency among students. The module provided an engaging and structured learning experience, improving comprehension, retention, and application of English concepts. Its interactive features allowed students to learn at their own pace, fostering independent learning and critical thinking skills. Compared to traditional instructional methods, the module demonstrated a more dynamic approach that encouraged active participation and deeper conceptual understanding.

The integration of this module into English education offers several pedagogical benefits. It aligns with the learning preferences of 21st-century students, who are more responsive to digital and interactive learning tools. The module supports differentiated instruction, catering to diverse learning styles and abilities. Incorporating multimedia elements, such as text, audio, and interactive exercises, it enhances engagement and motivation, particularly for students who struggle with conventional teaching methods. For educators, this module serves as a valuable tool for refining teaching methodologies. It enables teachers to track student progress, identify areas for improvement, and implement targeted interventions. Additionally, the module promotes consistency in instructional delivery, ensuring that students receive high-quality learning experiences regardless of variations in teaching strategies.

Beyond individual classrooms, the study underscores the broader role of technology in modern education. It demonstrates how interactive learning tools can complement traditional teaching methods, making education more accessible and effective. Schools and institutions can integrate such modules into their curriculum to enhance language instruction, support blended learning environments, and address learning gaps more efficiently.

LIMITATIONS OF THE RESEARCH

While the developed interactive computer-based learning module proved effective in enhancing English language proficiency, several limitations must be acknowledged. First, the study was conducted within a specific educational setting with a particular group of students, which may limit the generalizability of the findings. The module's effectiveness could vary depending on student demographics, proficiency levels, learning environments, and institutional resources. Further research is needed to assess its applicability across different contexts, including various age groups, academic institutions, and cultural backgrounds.

Second, the module's reliance on technology poses potential challenges. Access to digital devices, stable internet connections, and adequate technical support may not be consistent across all educational settings, particularly in underprivileged or remote areas. The module's efficacy depends on the availability of these resources, which could cause implementation disparities. Third, while the module enhances engagement and self-paced learning, it does not replace the role of teachers in providing personalized instruction, feedback, and guidance. Some learners may still require additional support beyond what the module offers, particularly those struggling with foundational English skills or complex linguistic concepts. Lastly, the study focused on short-term learning outcomes. The long-term impact of using the module on language retention, critical thinking, and overall academic performance remains unexplored. Future studies should examine its sustained effectiveness over extended periods and its integration with other teaching strategies for a more comprehensive learning experience.

CONCLUSION

This study successfully developed and validated an interactive English literature learning module for eighth-grade students in a public school in Mabalacat City, Pampanga, Philippines. The module was systematically designed to enhance student engagement, comprehension, and retention of English concepts through interactive and technology-driven learning. Its development followed established instructional design principles, ensuring that it met educational and technological standards. The module's content, adequacy of scope, and language presentation were evaluated by English experts, who deemed it highly acceptable. Their assessment confirmed its accuracy, clarity, and alignment with

pedagogical standards, making it a viable tool for classroom instruction. Additionally, Information Technology experts validated the module's usability, functionality, and user interface, affirming its technical robustness, ease of navigation, and effectiveness in delivering an interactive learning experience.

The module's impact on student learning was demonstrated through a comparative analysis of pretest and posttest scores. The experimental group, which utilized the module, showed significant improvement in performance, while the control group, which followed traditional instruction, exhibited minimal gains. Statistical analysis confirmed a significant difference between the posttest scores of both groups, reinforcing the module's superiority over conventional teaching methods. These findings highlight the module's capacity to enhance knowledge retention, comprehension, and overall student performance. By complementing existing teaching strategies, this interactive learning module offers a scalable and innovative solution to modern educational challenges. It aligns with the objectives of the K–12 Program by addressing limitations in traditional instructional methods and promoting effective, technology-driven teaching approaches. The study affirms that integrating interactive learning tools into English education can foster meaningful learning experiences and significantly improve student outcomes.

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