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INTERACTIVE MULTIMEDIA MODULE FOR ENHANCING ANALYTICAL SKILLS IN HOSPITALITY AND TOURISM AMONG GRADE – 7 LEARNERS

Joerich Q. Galanida*[1], Kenny John C. Grustan[2] and Princess Millena S. Dela Peña[3]

[1]Taganito National High School, Claver, Surigao del Norte, Philippines
[2]North Eastern Mindanao State University, Cantilan, Surigao del Sur, Philippines
[3]Parang National High School, Cantilan, Surigao del Sur, Philippines

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ABSTRACT

Teaching analytical skills in hospitality and tourism presents a significant challenge for basic education learners. Traditional instruction often fails to bridge the gap between theory and real-world application. This study designed and evaluated an interactive multimedia module for Grade 7 Technology and Livelihood Education. The researchers used the ADDIE model combined with a quasi-experimental design. The participants included 45 learners and 7 experts. Expert validation results showed that the module is very satisfactory in terms of content and technical functionality. The experimental findings revealed a significant increase in learner performance. The mean scores jumped from 9.58 in the pretest to 20.45 in the posttest. This change represents a shift from 38 percent mastery to 82 percent mastery. The statistical analysis confirmed a large effect size and a high level of significance. This study contributes a validated and offline learning model for technical education. The findings offer a practical solution for schools with limited internet access.

KEYWORDS: TVET, Computer-aided instruction, ADDIE model, Hospitality education, Multimedia learning, technical education

1. INTRODUCTION

The modern hospitality and tourism industry requires workers to possess strong analytical and problem-solving skills (Kusumah Putra et al., 2022). Because of this demand, the Philippine educational system integrated these specific competencies into the basic education framework. The MATATAG curriculum for Grade 7 Technology and Livelihood Education requires learners to examine current issues and trends

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in the hospitality sector (Department of Education, 2023). This specific competency demands more than factual memorization. Learners must develop conceptual discrimination and applied reasoning to succeed in real-world scenarios (Issakov et al., 2023).

Despite these curriculum goals, a critical learning gap exists in the classroom. Recent classroom assessments show that learners obtained a Mean Percentage Score of 38 percent. This score falls significantly below the required mastery level. Classroom observations reveal that students struggle to distinguish core concepts and apply them to practical situations. This conceptual-application gap worsens because teachers still rely heavily on traditional lecture methods. Passive instruction limits student interaction and prevents visual engagement with complex topics (Alali & Al-Barakat, 2024). If educators do not fix this problem, learners will fail to acquire the foundational analytical skills needed for higher vocational training.

To address these instructional limitations, Computer-Aided Instruction provides a highly effective solution. Interactive multimedia environments allow learners to process information actively through scenario-based learning and immediate feedback mechanisms (Buabeng & Vander Bosscher, 2023). Digital learning tools help students visualize abstract industry concepts at their own pace. However, a significant gap exists in the current literature regarding localized digital tools. Most existing digital integration studies focus on advanced engineering or general science subjects (Benong et al., 2024). Researchers have not yet explored validated Computer-Aided Instruction applications specifically designed for junior high school hospitality and tourism under the new MATATAG curriculum.

This study addresses the localized literature gap by designing and evaluating an Interactive Multimedia Computer-Aided Instruction module for Grade 7 learners. The researchers grounded the development process in the ADDIE instructional design model. First, the study aims to develop an interactive learning tool that targets analytical competencies in hospitality and tourism. Second, the research seeks to validate the acceptability of the module through expert review. Finally, the study determines the effectiveness of the digital module in improving student academic performance compared to traditional teaching methods.

2. LITERATURE REVIEW

Challenges in Teaching Analytical Competencies

Teaching analytical skills in Technology and Livelihood Education presents major challenges. Learners must classify and interpret complex industry information. However, traditional instruction relies heavily on memorization. Because of this, students fail to transfer their knowledge to real-world contexts. They struggle to distinguish overlapping concepts like industry issues, challenges, trends, and innovations (Kirman & Kala, 2022). These tasks require higher-order cognitive processing. Passive lecture methods

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still dominate many classrooms. As a result, students cannot develop the analytical thinking required for vocational success (Zuo & Aquino, 2023).

The Role of Computer-Aided Instruction in Technical Education

Computer-Aided Instruction offers a practical solution to these instructional problems. This technology integrates multimedia tools with direct interactivity and immediate feedback. Research shows that interactive environments significantly improve conceptual understanding in vocational training (Chiwetalu, 2023). Learners build stronger problem-solving skills when they engage with authentic scenarios. These digital platforms prevent passive learning. For this reason, educators increasingly use Computer-Aided Instruction to support active knowledge construction in technical subjects (Mahawan & Celedonio, 2023).

Theoretical Framework for Analytical Competence

The design of the HIT-ANALYTIX module relies on three established learning theories. First, the Cognitive Theory of Multimedia Learning guides the visual design. This theory states that learners process visual and auditory information through separate channels (Clark & Mayer, 2024). The module balances these channels to reduce extraneous cognitive load. Second, Constructivist Learning Theory drives the interactive elements. This theory emphasizes that learners must actively construct their own understanding. The module applies this concept by using scenario-based tasks instead of passive reading. Finally, Scaffolding Theory structures the progression of the lessons. The system provides guided support during early tasks. The system then gradually removes this support as students gain competence. Together, these theories ensure the digital tool strengthens analytical reasoning effectively.

3. METHODS

3.1 Research Design

This study employed a developmental and quasi-experimental research design. The developmental phase followed the ADDIE instructional design model. This framework guided the systematic construction of the computer-Aided Instruction module. The evaluation phase utilized a one-group pretest and posttest design. This specific approach allowed the researchers to measure the effectiveness of the digital module in improving student learning outcomes before and after the intervention.

3.2 Research Setting and Participants

The researchers conducted the study at Taganito National High School in the Claver District. The participants were selected using purposive sampling. Table 1 shows the specific distribution of the respondents. The validation phase included seven expert evaluators. Three of these evaluators were Technology and Livelihood Education content experts. The remaining four evaluators were Instructional

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Technology experts. For the experimental phase, the study included 45 Grade 7 learners. All 45 students required immediate instructional intervention because they struggled with the least learned competencies in their curriculum. Because of this urgent need, the entire class participated in the single experimental group and completed both the pretest and the posttest.

Table 1. Distribution of Research Participants

Category	Specific Designation	Number of Participants
Expert Validators	Technology and Livelihood Education Content Experts	3
Expert Validators	Instructional Technology Experts	4
Experimental Subjects	Grade 7 Learners	45
Total		**52**

3.3 Research Instruments

The study utilized two primary data collection instruments. First, the researchers used a validation questionnaire adapted from the LRMDS Non-Print Material Evaluation Tool. This instrument allowed the seven experts to assess the content quality and technical functionality of the digital prototype. Second, the researchers administered a 25-item Learning Achievement Test. This multiple-choice assessment measured student mastery of the target competencies. The researchers established the reliability and validity of this test before the actual experiment. A pilot test yielded a Cronbach alpha coefficient of 0.82. This score indicates good internal consistency. An item analysis showed difficulty indices ranging from 0.30 to 0.75. The discrimination indices ranged from 0.32 to 0.68. These statistical results confirm that the test items effectively distinguished between high-performing and low-performing students.

3.4 Data Collection Procedure

The data collection followed the five distinct phases of the ADDIE model. During the Analysis phase, the researchers identified specific learning gaps using student test scores and classroom observations. The initial data revealed that students struggled to distinguish key industry concepts. During the Design phase, the researchers planned the digital module through detailed storyboards and structured content maps. During the Development phase, the researchers built the interactive module using LUMI software. This

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platform integrated multimedia elements and scaffolded learning tasks directly into the lessons. During the Implementation phase, the 45 learners used the interactive module during their scheduled classes. Finally, during the Evaluation phase, the researchers administered the pretest prior to the digital intervention. The researchers then administered the posttest immediately after the intervention to measure learning gains.

3.5 Data Analysis

The researchers analyzed the quantitative data using standard statistical software such as IBM SPSS version 23. Weighted means were calculated to interpret the expert validation ratings. For the experimental data, the researchers used descriptive statistics to summarize the pretest and posttest scores. A paired samples t-test determined the significant differences in learning performance within the single group. Furthermore, the researchers computed the Cohen's d value to measure the magnitude of the intervention effect size. The significance level for all statistical tests was set at a p-value of less than 0.05.

4. RESULTS

4.1 System Development Results

The researchers applied the ADDIE model to develop the HIT-ANALYTIX Computer-Aided Instruction module. This digital tool addresses specific learning gaps in Grade 7 Technology and Livelihood Education. The module focuses on the hospitality and tourism industry. It integrates multimedia content and scenario-based simulations to build analytical skills.

4.1.1 Analysis phase output

The researchers analyzed student test scores and classroom observations. The initial assessment revealed a Mean Percentage Score of 38 percent. This low score proved that students failed to master the required competencies. Table 2 summarizes the thematic analysis of student interviews. The data showed that students demanded more interactive learning materials. They struggled to understand complex concepts through passive lectures. They also expressed a strong desire for immediate feedback.

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Table 2. Thematic Analysis of Student Needs Assessment

Code	Theme	Illustrative Quotes
Lack of engagement in lecture-based instruction; preference for interactive learning activities	Need for Interactive Content	*"The lesson is boring when it is only discussion. I lose focus easily."*
Confusion in distinguishing key concepts; difficulty in conceptual differentiation	Conceptual Misperception	*"I do not understand the difference between issues, challenges, trends, and innovations."*
Difficulty in applying theoretical concepts to practical contexts; need for guided analysis	Requirement for Directed Analysis	*"I can define the words, but I cannot apply them to real situations."*
Need for immediate response and corrective feedback during learning	Preference for Instant Feedback	*"I want to know if my answer is correct right away."*
Preference for active participation and experiential learning approaches	Learner-Centered Instruction	*"I learn better when I can do activities instead of just listening."*

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4.1.2 Design phase output

The researchers designed the application to reduce extraneous cognitive load. Figure 1 shows the mind map of the interactive book. The content flows through four progressive stages. Figure 2 displays the navigation structure. The design prioritized user-friendly interfaces to help students focus on the learning task instead of the software controls.

Figure 1: Mind map of Interactive book

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4.1.3 Development phase output

The development phase produced a fully functional digital application. The researchers used LUMI software to build the interactive features. Figure 2 shows the conversion of the digital content into standard HTML format. This specific format allows students to use the module offline. Figure 3 illustrates the interactive learning mechanisms. Students engage directly with drag-and-drop activities and embedded quizzes. This interactivity transforms passive viewing into active problem-solving.

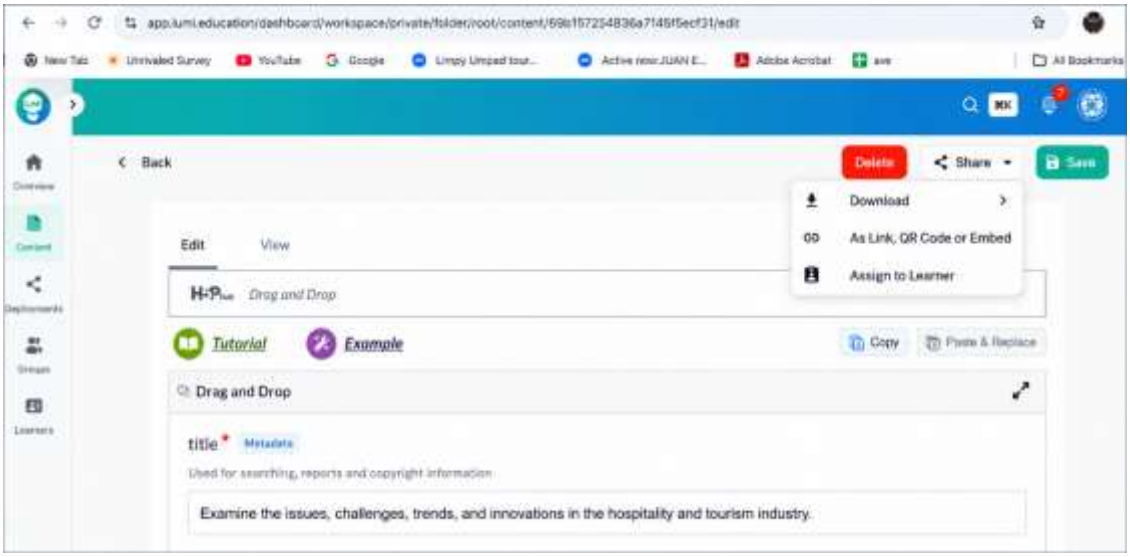

Figure 2. Converting H5P to HTML

Figure 3. Learning interaction mechanisms of the converted app

4.2 Expert Validation Results

The researchers evaluated the digital module using the standard evaluation tool for non-print materials.

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The evaluation measured Content Quality, Instructional Quality, Technical Quality, and Other Findings. A rating between 3.25 and 4.00 corresponds to a Very Satisfactory verbal description.

4.2.1 Content expert validation

Three Technology and Livelihood Education content experts evaluated the module. Table 3 presents their validation scores. The experts gave the module highly positive ratings across all indicators. Content Quality received the highest score with a mean of 3.92. This confirms that the material aligns strongly with the national curriculum. Technical Quality received a slightly lower mean of 3.78. However, all scores fall securely under the Very Satisfactory category.

Table 3. Content Experts Validation Results

Indicator	Average Weighted Mean	Verbal Description
Content Quality	3.92	Very Satisfactory
Instructional Quality	3.85	Very Satisfactory
Technical Quality	3.78	Very Satisfactory
Other Findings	3.88	Very Satisfactory

4.2.2 Instructional technology expert validation

Four instructional technology experts also validated the digital tool. Table 4 details their evaluation results. These experts also awarded Very Satisfactory ratings across all dimensions. Technical Quality received the highest rating from this group with a mean of 3.95. The evaluators highlighted the seamless navigation and offline accessibility of the application. Content Quality received a mean of 3.82. The experts noted that the immediate feedback mechanisms effectively support active learning.

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Table 4. Instructional Technology Experts Validation Results

Indicator	Average Weighted Mean	Verbal Description
Content Quality	3.82	Very Satisfactory
Instructional Quality	3.88	Very Satisfactory
Technical Quality	3.95	Very Satisfactory
Other Findings	3.90	Very Satisfactory

4.3 Effectiveness Evaluation Results

The researchers evaluated the effectiveness of the interactive module using a single group of 45 Grade 7 learners. The students completed an assessment before and after using the application.

4.3.1 Learning performance

The researchers compared the initial and final assessment scores to measure student growth. Table 5 summarizes these results. The learners achieved a pretest mean score of 9.58. This score represents an initial mastery level of approximately 38 percent. After using the interactive application, their posttest mean score increased to 20.45. This final score represents a mastery level of approximately 82 percent. The results indicate a significant upward trend in student achievement across the entire group.

Table 5. Pretest and Posttest Performance of Participants

Test	Mean	Standard Deviation
Pretest	9.58	2.15
Posttest	20.45	2.45

4.3.2 Statistical comparisons

The researchers conducted a paired samples t-test to verify the statistical significance of the improvement. Table 6 presents the statistical comparison. The analysis yielded a t-value of 22.45 with a p-value of less than 0.001. Because of this result, the researchers rejected the null hypothesis. The findings confirm that the digital intervention significantly improved student learning. The researchers also calculated the Cohen d value to determine the magnitude of the impact. The results showed a massive effect size. This confirms

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that the interactive module provided a substantial pedagogical benefit to the learners.

Table 6. Statistical Results for Pretest and Posttest Comparisons

Comparison	t-statistic	p-value	Decision	Statistical Interpretation
Pretest vs Posttest	22.45	< 0.001	Reject Null Hypothesis	Significant difference in performance

5. DISCUSSION

5.1 Development and Validity of the App

The study successfully produced a highly effective Computer-Aided Instruction module for Grade 7 students. Both content and technology experts rated the application as Very Satisfactory. The consistently high validation scores confirm that the tool is pedagogically sound and technically reliable. The application successfully shifted the classroom dynamic from passive lectures to active engagement. This design aligns completely with the Cognitive Theory of Multimedia Learning (Clark & Mayer, 2024). The interactive elements guided student attention and reduced extraneous cognitive load. Recent studies confirm that managing cognitive load through structured digital tools improves overall comprehension in technical subjects (Chiwetalu, 2023).

5.2 Effectiveness in Enhancing Learning Outcomes

The experimental data revealed a highly significant improvement in academic performance. The students achieved an average score gain of 10.87 points. This massive improvement occurred because the digital module forced students to apply their knowledge instead of simply memorizing facts. The interactive tasks helped students distinguish between complex industry concepts clearly (Kirman & Kala, 2022). Furthermore, the immediate feedback system corrected student misconceptions instantly. This mechanism prevented students from practicing errors. Researchers note that immediate digital feedback significantly increases student mastery and retention (Chen & Wang, 2023). The quantitative data perfectly matched the positive qualitative feedback from the learners. These results support existing literature showing that interactive environments boost student performance (Zuo & Aquino, 2023).

5.3 Implications for Technical and Vocational Education

The findings of this study have strong implications for the future of technical and vocational education. The results prove that traditional lecture methods cannot teach abstract analytical skills effectively in the hospitality sector. Passive instruction fails to build the higher-order thinking required for modern industry

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demands (Mahawan & Celedonio, 2023). This research demonstrates that vocational tracks must adopt active visualization tools even at the foundational junior high school level. By mastering these competencies early, students become better prepared for advanced technical training in Senior High School. The developed interactive module also provides a practical solution for schools with limited resources. The offline capability ensures that all institutions can deliver high-quality vocational education without relying on constant internet access. Educational planners should prioritize these offline digital tools to bridge the technological divide in developing regions (Magdadaro, 2024).

6. CONCLUSION

This study confirms that the HIT-ANALYTIX Computer-Aided Instruction module significantly improves the analytical skills of Grade – 7 learners. The researchers used the ADDIE model to ensure the tool was instructional and technically sound. Expert validation scores proved that the application is a reliable resource for the hospitality and tourism curriculum. The experimental results showed a massive increase in student performance. Learners moved from an initial failing level of 38 percent to a high mastery level of 82 percent. Because of this, the study concludes that interactive multimedia is a superior pedagogical strategy compared to traditional lectures. For abstract technical subjects, passive instruction is insufficient. Active learner participation within a digital environment is essential for deep conceptual understanding in technical and vocational education.

7. RECOMMENDATIONS

Based on these findings, several recommendations are proposed for technical education. First, Technology and Livelihood Education teachers should transition from passive digital materials to interactive multimedia design. Educators should use tools like LUMI to create engaging modules for least learned competencies. Second, school administrators and policy makers should formally integrate validated digital applications into the MATATAG curriculum. This integration will help bridge the gap between classroom theory and industry requirements. Third, future researchers should expand on this study by conducting longitudinal research. Such studies can determine if students retain these analytical skills over an entire school year. Additionally, future research should investigate the impact of interactive modules on actual psychomotor skills within the hospitality and tourism sector.

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completion of this research.

Ethical Statement

This study followed the ethical standards of the North Eastern Mindanao State University Research and Development Office. The study received ethical clearance under Protocol Reference Number NEMSU-RDO-2025-04. The researchers obtained informed consent from all participants before the data collection. Participation was voluntary. The researchers protected the confidentiality and anonymity of all respondents. Every procedure complied with institutional research ethics protocols for social science research.

Conflict of Interest Statement

The authors declare no commercial or financial conflicts of interest. No external funding agency influenced the design or reporting of this study. The researchers conducted the analysis and interpretation of results independently.

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