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RESEARCH ARTICLE

Development of Augmented Reality Instructional Material for the Least Learned Topics for Grade 12 Students in Media and Information Literacy Subject

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Abstract

Background: In today's generation, Augmented Reality and Virtual Reality as a big impact on society in several interesting and beneficial ways like engaging entertainment, better buildings, carefully design cars, and lastly enhanced education. **Objectives:** The goal of this study is to develop augmented reality instructional material that will help Grade 12 students easily understand the least learned topics in Media and Information Literacy. **Methods:** This study will implement a mix of developmental and descriptive research designs. To plan and construct efficient learning experiences, instructional designers and training developers employ the ADDIE model. Fifty-five (55) SPXI students took part and learned how AR can be used in MIL. **Findings:** The generated intervention material using AR is acceptable and usable, according to the results. Students can interact with various augmented reality (AR) elements to explore potential responses in a three-dimensional interface, according to a study about the usability of AR. This study simply shows that learning is valuable, enjoyable, and efficient, and can raise students' academic performance. The researchers advise broadening the target population in order to assess the usefulness and acceptability of the developed augmented reality by introducing and implementing it in additional schools that offer Media and Information Literacy courses. **Novelty:** Traditional teaching methods can sometimes be less engaging for students. This research explored a novel approach to presenting lessons using augmented reality (AR) technology. By leveraging smartphones and a dedicated app, students were introduced to an immersive and interactive learning experience.

Keywords: Augmented Reality; Computer Assisted Instructions; Instructional Material; Media and Information Literacy

1 Introduction

In recent years, technology has revolutionized education, offering innovative approaches to engage and enhance the learning experience of students across various academic disciplines. One such cutting-edge technology is Augmented Reality (AR), which overlays digital content onto the real world, providing an immersive and interactive learning environment. Augmented reality is a popular educational technology. Users can interact with virtual objects that are merged into the actual world and appear in the same location in real-time thanks to augmented reality technology [1]. With its potential to bridge the gap between theoretical concepts and practical application, AR holds significant promise for educational development.

Media and Information Literacy (MIL) is an essential subject in the Grade 12 curriculum, aimed at equipping students with critical thinking skills, digital literacy, and the ability to navigate the vast landscape of media and information sources responsibly. However, educators often encounter challenges in teaching certain complex or abstract topics within this subject. These ”least learned” topics pose a dilemma as they hinder students' comprehensive understanding and hinder their overall learning outcomes.

The use of augmented reality (AR) in education is currently popular. Significant findings from the research indicated that students who employed augmented reality (AR) technology might increase their level of motivation and have high levels of confidence and happiness when utilizing AR-based mobile devices for learning [2].

According to some research in the Philippines, both conventional and Computer Assisted Instructions (CAI) teaching techniques considerably raise students' levels of physics proficiency. However, there is no discernible difference between the two approaches' effects on academic attainment when their efficacy is examined. CAI could therefore be utilized as a substitute teaching strategy [3].

Media and information literacy is the process of empowering individuals to successfully seek out, evaluate, use, and produce information in order to achieve their personal, social, professional, and educational goals [4]. Information literacy emphasizes information availability, evaluation, and usage. Key facets of media literacy include comprehending, assessing, and utilizing media as a significant source and distributor of information.

Information literacy and media literacy have been combined by UNESCO as Media Information Literacy (MIL), which is essential for empowering people with critical understanding about media operations, information systems, and their content [5].

Teaching materials are extremely important in education and research. They are tools that instructors employ to assist students understand and remember information. These are some studies on teaching materials. Students' critical thinking skills are improved when scientific teaching materials with 5E integrated by local wisdom are used. Students become more critical in problem solving after studying the 5E in conjunction with local wisdom [6,7].

Augmented Reality (AR) technology is defined by Chen, et al., as a technology that combines virtual data with the physical world. Multimedia, 3D modeling, real-time tracking and registration, intelligent interaction, sensing, and other technical tools are used. Its guiding premise is to simulate the real world before applying computer-generated virtual information such as text, photographs, 3D models, music, and video to it. The two types of information complement one another in this way, resulting in an improvement of the actual world [8–11].

The mentioned studies demonstrated that incorporating Augmented Reality (AR) into learning instructions has led to a substantial improvement in the learning process

for students, resulting in enhanced academic performance.

Several authorsfound that augmented reality can be used as a powerful tool to create interactive learning experiences that enable students to explore scientific concepts in ways that go beyond traditional teaching methods. This suggests that AR has the potential to revolutionize the way science education is approached, making it more engaging and experiential for students.

Likewise, the use of augmented reality for creating educational materials in the domain of language learning, with a specific focus on teaching English. The study conducted by Park, et al. and colleagues indicate that AR could offer a more efficient and effective way to teach English to language learners compared to traditional methods. This suggests a promising avenue for improving language education through innovative technology integration.

The senior high school subject, Media and Information Literacy, equips students with the skills necessary to successfully seek out, assess, use, and create information in order to further their personal, social, professional, and academic objectives. The researchers plan to create educational materials on this topic as a result. A teaching aid that is intended to aid, support, enhance, or advance teaching and learning activities. Augmented reality will greatly contribute to this study. It is a technology that combines the real world with digital information. Multimedia, 3D modeling, real-time tracking and registration, intelligent interaction, and sensing are further technological instruments.

This study aims to develop an augmented reality study to develop augmented reality instructional material that will help Grade 12 students easily understand the least learned topics in media and information literacy. Specifically, this paper is aimed at answering the following research questions:

1. What are the least learned topics under Media and Information Literacy?
2. What are the features of developed the proposed instructional material with AR?
3. What is the level of acceptance and usability of the developed instructional material with AR?

Figure 1 presents the study's conceptual framework of the study using ADDIE. During analysis phase, data will be gathered from grade 12 students in HUMSS and STEM strands. Gender and section information will be collected. Their performance in first quarter tests will be used to identify the least learned Media and Information Literacy (MIL) lessons. Item analysis will then be employed to rank these lessons based on exam results, helping pinpoint the most challenging topics. This analysis aims to provide insights for improving teaching and learning strategies. Learning objectives, content, and the tools to be employed are required during the design step, when researchers must envision the design of the suggested intervention material that was developed from the analysis stage. To visualize how the project will appear once it has been completed, storyboarding or the blueprint is also necessary. To make the educational content unique, media and AR are also required. The creation of educational materials with augmented reality features for improvement and a better learning experience is the next phase, wherein the app to use and apply AR is EyeJack, an app capable in the curation and distribution of augmented art. With this app, instructional designers can add augmented reality to their designs. After the development, the next phase is the implementation. Finally, in the evaluation phase, the students will assess the acceptability and usability of the AR-developed educational content using a survey questionnaire.

Conceptual Framework

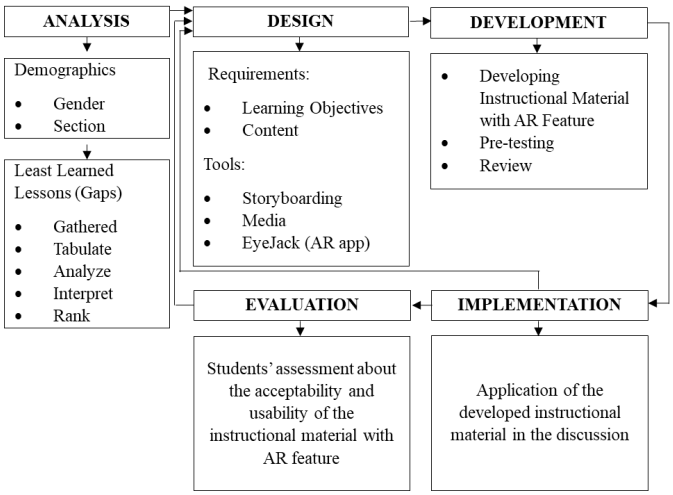

Fig 1. Conceptual Framework of the Study

2 Material and Methods

2.1 Research Method

This study will implement a mix of developmental and descriptive research designs. Under developmental design, the ADDIE model is employed because the project is developing instructional material in learning. To plan and construct efficient learning experiences, instructional designers and training developers employ the ADDIE model. The ADDIE approach is sufficiently general that it may be used to produce any kind of learning experience for any audience, from producing corporate training programs for an ERP software upgrade to developing K–12 teaching sessions on cellular biology. ADDIE stands as one of the most prevalent learning models due to its significance in offering a well-established approach for creating coherent and impactful training programs. Its importance lies in its demonstrated efficacy for facilitating human learning. Being widely adopted and recognized, ADDIE serves as a foundational framework for various other learning models. Moreover, its attribute of easy measurability in terms of time and cost adds to its value in instructional design and development processes[12]. Hence, the reasons why this approach was being used in this study.

After the development and implementation, the descriptive research design will take place during the evaluation phase. The researchers prepared a survey questionnaire to be answered by the respondents to gauge the project's acceptance and usefulness.

Table 1. Likert Scale with Verbal Interpretation

Levels	Verbal Interpretation	Range of Values
5	Strongly Agree	4.50 – 5.00
4	Agree	3.50 – 4.49
3	Neutral	2.50 – 3.49
2	Disagree	1.50 – 2.49
1	Strongly Disagree	1.00 – 1.49

Table 1 shows a Likert scale and mean results calculations will be used to examine and interpret the data. Survey responses are categorized into options like "strongly agree," "agree," "neutral," "disagree," and "strongly disagree," each assigned a corresponding numerical value (e.g., 1 for "strongly disagree," 2 for "disagree"). All data gathered in the survey will be encoded, analyzed, and interpreted using IBM SPSS, a statistical tool for research.

2.2 Sampling Method

Convenience Sampling is used in the study. It is a non-probability sampling technique, which is less objective than probability techniques. It is a type of sampling in which the researcher uses sampling in which the participants are selected by the researcher, referred to the researcher, or self-select to participate in a study rather than being provided for by the sampling to provide for each member of a target population to participate in a study[13]. The researcher chose the respondents for this study because they are the only students in St. Pius X Institute, Inc., the locale of the study, who are currently enrolled in a MIL course this semester.

2.3 Research Material and Design Process

The initial step involves the identification of the study's setting, which is St. Pius X Institute, Inc., along with the current participants who are enrolled in the MIL course. Once the participants are identified, a collection of demographic data will be undertaken, encompassing various aspects such as class sections, academic strands, and their performance results from the first quarter exams. The rationale behind obtaining these exam results is to pinpoint the topics within the subject that have been least comprehensively grasped. This will be achieved through the utilization of indices such as item difficulty and discrimination.

It is crucial to recognize that the analysis of these exam results serves as a valuable resource for instructors. It offers them insights into the specific competencies where their students exhibit shortcomings before transitioning into the subsequent academic quarter. However, it is worth noting that the practice of submitting reports detailing both the most and least absorbed subject matters is a requirement typically found in public schools and some private institutions. Remarkably, St. Pius X Institute, Inc., despite being a private school, also aligns with this practice and provides such reports.

Subsequently, the subsequent phase entails the amalgamation of the collected data to provide a coherent depiction of the actual performance scores achieved by the students in this subject. Following this consolidation phase, the design aspect of the study will be executed. Crafting instructional materials is a well-accustomed practice for educators, with PowerPoint being

a prevalent tool frequently utilized. However, the emergence of a novel tool, Canva, during the pandemic, has added a new dimension to this process. Canva, an online graphic design platform, offers a user-friendly interface for constructing lesson presentations.

Nonetheless, the innovation proposed by this study lies in the incorporation of Augmented Reality (AR), a realm unfamiliar to many educators. The approach encompasses the creation of a lesson presentation accompanied by a smartphone application capable of generating the AR component of the developed instructional material. In the context of this study, the chosen tool is EyeJack, primarily due to its free accessibility. Alongside this, the development of lesson objectives and content forms an integral part of this design phase.

Moving forward, the subsequent phase involves the creation of the proposed instructional material, encompassing all essential components. This comprehensive stage involves assembling the lesson that pertains to the least learned topics within the MIL subject. The requisite components encompass lesson objectives, instructional content, and essential resources such as meticulously curated images and videos that are edited utilizing Adobe Premiere Pro. Additionally, the integration of the EyeJack app, a crucial tool chosen for its applicability and cost-free nature, forms a pivotal part of this developmental stage.

The initial step in this developmental phase necessitates a meticulous analysis of the lesson to be conveyed and the associated competencies to be targeted. Subsequently, a structured lesson construction process ensues. This commences with a meticulous formulation of the lesson objectives, followed by the composition of the core lesson content and culminating in the delineation of a relevant activity for learners.

Following this, the acquisition and refinement of the images and videos requisite for effective lesson delivery transpires. This involves careful selection, editing, and enhancement of multimedia resources to align seamlessly with the lesson's educational objectives.

Ultimately, the incorporation of the AR component through the EyeJack app marks the culmination of this developmental process. This augmented reality feature is designed to elevate the instructional material's interactivity and engagement, thus enhancing the overall learning experience.

The generated instructional material with augmented reality has the following features: it presents the materials, a sample video demonstration, and a discussion on how to correctly shoot the various technical codes. This teaching aid will really make it easier for the student to understand the lesson. Additionally, this will assist teachers in reducing their efforts and lesson-related discussion.

2.3.1. Main Screen

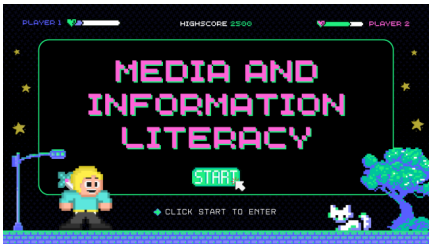

Fig 2. The project's opening page lists the subject name, Media and Information Literacy, and includes a button to start navigating to the main page.

Fig 3. The user can choose the section of the class he wishes to watch from this start page. There are various buttons on it, including Objectives, Lesson Proper, Activity, and Technical Codes AR.

2.3.2 Lesson Objectives

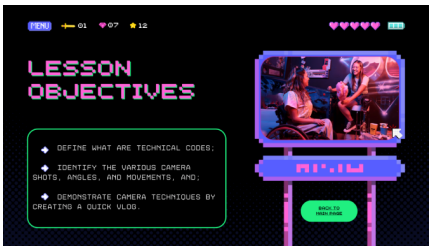

Fig 4. The lesson objectives contain the goals of the lesson under the technical codes.

2.3.3 Lesson Discussion

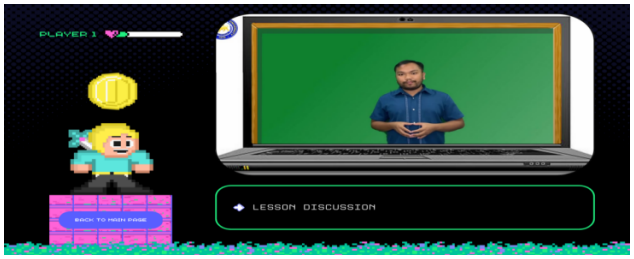

Fig 5. The lesson discussion includes a video lecture and demonstration of camera movements, camera angles, and camera shots. The teachers and students will both find it easier to follow the lesson.

2.3.4 Lesson Activity

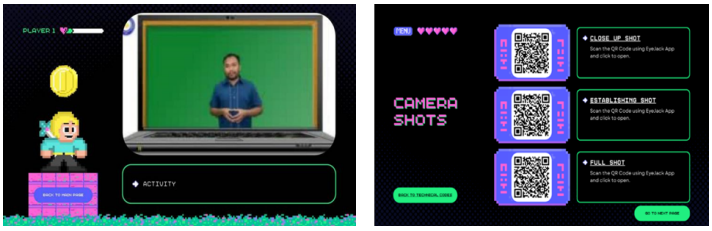

Fig 6. The instructional material also includes a task to deepen the knowledge of the students about the lesson.

The educational materials also include augmented reality, which gives pupils the chance to use cutting-edge technology and get inspired and motivated to learn new things. Use the EyeJack app to scan the QR code on printed materials that list the name of the camera shot, angles, and movements. The augmented reality movie presentation will be displayed.

Following the completion of the instructional material's development, the subsequent step involves conducting a pre-testing phase. This essential step is undertaken to identify and rectify any encountered errors or issues that users might come across. The purpose of this pre-testing phase is to engage in a systematic process of trial and error, allowing for refinement before the final deployment of the developed study within an actual classroom setting.

The significance of pre-testing lies in its ability to pinpoint any potential glitches, ambiguities, or challenges that learners or educators might face while interacting with the instructional material. By subjecting the material to this trial phase, any imperfections can be identified and addressed before the material is fully rolled out for educational use.

In essence, pre-testing functions as a quality assurance measure, ensuring that the instructional material is polished and optimized for effective learning. This iterative process of testing, identifying issues, making improvements, and retesting serves to enhance the overall functionality, usability, and educational value of the developed study. Ultimately, pre-testing plays a

pivotal role in guaranteeing a successful and seamless experience for both educators and learners during the subsequent deployment phase.

After the pre-testing phase, the next step involves the implementation of the developed instructional material in an authentic classroom environment. Educators will integrate the newly created instructional material, augmented with AR technology, into their teaching of the MIL subject. This marks the practical application of the material that has been meticulously developed and refined.

During this implementation phase, teachers will utilize the instructional material as a part of their teaching strategy, leveraging the augmented reality features to enhance the learning experience for students. The material will be presented, interacted with, and integrated into the curriculum within the actual classroom setting.

Lastly, an evaluation process ensues. This assessment focuses on gauging the usability and acceptability of the developed instructional material in the classroom context. The respondents of the study will provide feedback on their experiences with the material, offering insights into its effectiveness, user-friendliness, and overall value in enhancing the learning process.

The evaluation phase is crucial as it helps ascertain whether the developed instructional material, augmented with AR technology, effectively serves its intended purpose within the educational context. Feedback collected during this phase informs any necessary refinements or adjustments that might be needed before the material is adopted more widely or incorporated into future curricula. In essence, this evaluation phase serves as a critical checkpoint to ensure that the material aligns with educational objectives and meets the expectations of both educators and learners.

2.4 Participants

This section presents all the participants in this study including their sections, strands, gender, and the total population.

Table 2. Respondents of the Study

Sections	Strands	Gender	Total Population
St. Albert	HUMSS	Male	11
		Female	14
St Augustine	STEM	Male	13
		Female	17
Total			**55**

As presented in Table 2, a total of 55 students divided into two sections, St. Albert and St. Augustine, registered in Media and Information Literacy for the first semester of the 2022–2023 academic year at St. Pius X Institute, Inc. (SPXI) in Cuyapo, Nueva Ecija, are the participants in this study. This university was selected since MIL is accessible this semester. The primary sources of information for this initial investigation will be the students who participated in this study.

2.5 Data Gathering Procedure

After calculating the actual number of respondents as shown in Table 1, the first thing to do is to get the least learned lessons in MIL by using item analysis. Item analysis processes are a collection of statistical techniques that testing professionals use to evaluate and amend items, estimate the features of probable test forms, and reach conclusions about the caliber of the individual items and test forms. It is also possible to use item difficulty and discrimination indices to look for potential defects that can call for item correction before usage in test form assembly[14].

The creation of the suggested intervention material with AR follows the gathering, examination, and interpretation of the findings of the least-learned lessons. The lesson's content and learning objectives were carefully chosen at this point with relevant images and videos to be incorporated for the study. The augmented reality component was introduced using the EyeJack app, which enables students to use their cellphones to scan the images and experience the power of augmented reality. Before using the project for improvement, pre-testing and review were also necessary. Finally, following the project's implementation, a descriptive analysis utilizing a Likert scale will be conducted.

2.6 Data Collection Tools

To gather data several tools are required to accomplish the results. The first step in data collection involved using the participants' first-quarter exam results. The purpose of this was to identify which topics or areas of the course were the least learned or understood by the students. This information is crucial because it helps focus the study on areas that require improvement.

The identification of these topics was likely based on the performance of students on specific exam questions or sections related to those topics. The item difficulty index helps determine how challenging or easy specific exam questions related to the identified topics were. It is calculated based on the percentage of students who answered these questions correctly. While the discrimination index assesses the ability of these questions to differentiate between high-performing and low-performing students regarding the identified topics.

After calculating these indices, the results were thoroughly analyzed and interpreted. This analysis likely involved looking at the difficulty levels of questions related to the least learned topics and assessing how well these questions could distinguish between students who had mastered the material and those who hadn't. These findings provide valuable insights into the specific challenges students faced in the least learned topics.

The next phase, following the identification of the least learned topics, involved the creation of instructional materials that incorporated augmented reality (AR). This development process followed the systematic framework of the ADDIE model, which encompasses five key stages: Analysis, Design, Development, Implementation, and Evaluation. The project began with the Analysis stage, where the specific needs and requirements were thoroughly assessed. This phase was followed by the Design stage, where the instructional materials and AR elements were conceptualized and planned out in detail.

Once the design was established, the project moved into the Development stage. During this phase, the actual instructional materials and AR components were created and brought to life based on the earlier design specifications. This stage often involves content creation, AR technology integration, and the development of interactive elements to enhance the learning experience.

Subsequently, the project progressed to the Implementation stage, where the instructional materials with AR were introduced into the classroom or educational environment. Before the full-scale deployment of the project, a crucial step was the Pilot Testing phase. Pilot testing involves a smaller-scale trial run of the materials and AR components to identify any potential issues, gather feedback, and make necessary refinements.

Finally, after successful pilot testing and any required adjustments, the project proceeded to the Evaluation stage. Here, the effectiveness of the instructional materials and the impact of the AR integration were assessed. Data collected during this stage can include feedback from students, observations, and performance metrics to determine whether the project met its intended objectives and whether improvements are needed.

The development of instructional materials integrated with AR followed a structured process based on the ADDIE model, from initial analysis to final evaluation. The inclusion of a pilot testing phase allowed for refinement and optimization before the full implementation of the project. This systematic approach helps ensure the effectiveness and quality of the educational materials and AR components.

The second part of data collection involved designing survey questionnaires. These surveys aimed to gather feedback from participants about the study itself. The surveys were categorized into two dimensions: acceptability and usability. The acceptability evaluation assessed how the study was received by the participants in terms of its acceptability, possibly in the context of its relevance and appropriateness. On the other hand, usability evaluation examined how practical and user-friendly the study was when implemented in an actual classroom setting.

The survey responses were collected and then interpreted using a Likert Scale, which is a common tool for measuring attitudes or perceptions. Likert Scale responses help quantify participants' opinions, indicating the level of agreement or disagreement with specific statements. The interpretation of these responses likely provided insights into how the participants perceived the study's acceptability and usability.

In summary, the data collection process involved a combination of quantitative data from exam results and qualitative data from survey questionnaires to gain a comprehensive understanding of the study's impact on students' learning experiences. The analysis and interpretation of these data points are essential for making informed decisions and improvements in the educational context.

2.6.1 Identification of Least Learned Topics

To thoroughly evaluate and make sense of the results from the first-quarter exam, it's recommended to calculate both the difficulty and discrimination indices for each question. This step allows us to pinpoint which topics were the easiest and hardest for students. The main objective of this analysis is to identify the areas of the course where students struggled the most (the "least learned topics"). Once these weak points are identified, the intention is to take specific measures to enhance the teaching and learning experience in those areas, aiming to improve student performance and comprehension with the utilization of the proposed study.

The item difficulty index under Table 3 displays the level of difficulty for each item or question in a particular exam, for instance in this study, the learners' quarter exams. It indicates how well participants performed on each individual item. The

Table 3. Item Difficulty Index

Percentage Range	Difficulty Index	Verbal Interpretation	Action
76%-100%	0.76-1.00	Very Easy	Discard
26%-75%	0.26-0.75	Average	Retain
0%-25%	0-0.25 or below	Very Difficult	Discard

index is often calculated as the percentage of respondents who answered the item correctly. Questions that have a very high percentage range (indicating they were answered correctly by almost all respondents) might not effectively discriminate between learners' knowledge levels and could be considered too simple. On the other hand, questions with a very low percentage range (indicating that only a small percentage of respondents answered them correctly) might be excessively challenging and could be seen as unfair or not aligned with the learning objectives. Hence, questions that fall within an average percentage range are typically considered the most appropriate for assessment. These questions challenge learners adequately without being too easy or overly difficult. They provide a more accurate measure of learners' comprehension and performance across the entire spectrum of knowledge levels. So, keeping questions within this balanced range ensures that the assessment effectively evaluates learners' understanding while maintaining fairness and reliability.

Table 4. Discrimination Index

Discrimination Index	Verbal Interpretation	Action
0.46-1.00	Positive discrimination	Retain
-0.50-0.045	Could not discriminate	Revise
-1.00-0.51	Negative discrimination	Discard

Table 4 presents the discrimination index table wherein to determine the discrimination index, subtract the difficulty index of the low scorers from the difficulty index of the high scorers divided by half of the total examinees. If the difficulty index for the highest scorers is 0.67 and the difficulty index for the lowest scorers is 0.2, the discrimination index is 0.47, showing positive discrimination, and the item is retained. When high-performing students have more correct answers than low-performing students for a given question item, a positive discrimination indexes expected. The negative discrimination index, however, is the opposite, the lower-performing students have more correct answers than the high-performing students.

2.6.2 Acceptability Evaluation

In assessing the developed instructional with AR, the gathered responses from the respondents were processed using IBM SPSS. To quantify the internal consistency of a test or scale, Lee Cronbach created the alpha statistic in 1951; it is represented as a number between 0 and 1. Internal consistency refers to how closely all the test items assess the same notion or construct and is thus related to how closely the test items are related to one another. Before a test is used for research or examination purposes, internal consistency should be assessed to assure validity[15].

This section presents the outcomes of the reliability assessment conducted using Cronbach's alpha for the questions in the acceptability evaluation survey.

Table 5. Acceptability Evaluation Reliability Statistics

Cronbach's Alpha	Items
.509	5

Table 5 shows that Cronbach's Alpha result is equivalent to 0.509, which is between 0 and 1. The fact that Cronbach's Alpha is 0.509 suggests that the questions included in the survey or questionnaire are moderately reliable and consistent in measuring the intended construct or concept. While it may not be as high as the ideal value of 0.7 or higher, a value of 0.509 still indicates a reasonable level of internal consistency, especially depending on the context and purpose of the survey.

2.6.3 Usability Evaluation

In this section, the results of the reliability evaluation were carried out using Cronbach's alpha for the queries within the usability evaluation survey.

Table 6 displays the findings of Cronbach's Alpha test on the innovative project's usability. It demonstrates that 0.417 is in the range of 0 and 1. With a Cronbach's Alpha of 0.417, it indicates that the questions pertaining to usability within the assessment

Table 6. Usability Evaluation Reliability Statistics

Cronbach's Alpha	Items
.417	5

demonstrate a moderate degree of internal consistency. Although this value doesn't quite meet the ideal threshold of 0.7, it does imply that the questions maintain a reasonable level of reliability and consistency when assessing the usability aspect of the innovative project.

2.7 Data Analysis

The following statistical procedures were used to interpret the data gathered from the respondents of the study including the demographics, MIL lessons that were the least learned throughout the first three months of the current school year, and their responses in the evaluation of the developed instructional material with AR. Each item in a most essential learning competency is described, together with computed difficulty index, the associated interpretation, and the action required. The discrimination index is also described, along with the action required. Additionally, it demonstrates that all the interpretations in each question were extremely challenging, but their discrimination index values had revised results. This indicates that the questions were too challenging for the students to understand and should be changed. For instance, when difficulty and discrimination index both have the same result as discard, that specific item should be deleted from the exams because both high- and low-performing students present unsatisfactory answers.

The administered quarter exam's item analysis, which will identify the most and least learned topics, will be based on the difficulty and discrimination indexes. The learners' previous exams were used to perform the item analysis by getting the upper and lower 27% of all examinees and order the scores from highest to lowest. Based on ranks, the top 27% scored the highest, and the bottom 27% scored the least. In this study, 27% of the 55 students is equal to 14.58 which means 7 high scores and 7 low scores students are required. Next, get the total number of students who correctly answered an item divided by the total number of examinees and multiply by 100 for the percentage result to find the item difficulty index. For instance, in the high scorers where there are 7 students, if there were 4 total correct answers in a certain item, the difficulty index would be 0.57, which is considered average, thus, it is 57% acceptable to retain the question. If the interpretation is very easy, it implies that the question is completely simple; if it is average, the item is accepted and retained; otherwise, if it is difficult, it is highly challenging for the examinees to respond to. The same process is applied for the lower scorers to get the difficulty index of an item.

Additionally, the discrimination index assesses the ability of a question to discriminate between high-performing students and low-performing students. In other words, it helps determine whether a question effectively distinguishes between students who have mastered the material and those who have not. Questions with a high discrimination index are considered effective in this regard. For instance, to illustrate the calculation of the discrimination index for question number 5, you would take the difficulty index for low-scoring students (0.43) and subtract it from the difficulty index for high-scoring students (0.71). This result is then divided by the average number of students who attempted the question, which is 7. In mathematical terms, the discrimination index (DI) is calculated as follows: $DI = (D\_high - D\_low) / N\_avg$.

Ultimately, a survey questionnaire will be employed to assess the perspectives of respondents regarding the project's performance. The reliability of the questionnaires will be scrutinized using Cronbach's Alpha. These questionnaires have been categorized into two scales: one for acceptability and the other for usability. The mean values of the gathered responses will be computed and interpreted using a five-point Likert scale, as illustrated in Table 1. All data collected underwent input and analysis through IBM SPSS. It's crucial to calculate Cronbach's Alpha for each of these scales. Consequently, the test results for Tables 5 and 6 yielded values of .509 and .417, respectively, which fall within the range of 0 to 1, indicating a high degree of reliability and consistency.

With all the results at hand after the development of the study, in various studies, the potential of augmented reality (AR) to enhance education has been explored. According to a study conducted by Lee, et al. study discovered that AR may be utilized to increase student engagement and comprehension of mathematical subjects. They discovered that pupils who used augmented reality (AR) were more interested in the lecture and understood the mathematical concepts better than those who did not. Other studies have investigated the usage of augmented reality in creating educational resources. For instance, a study by Kim, et al. looked at the application of augmented reality to the creation of science education teaching materials. They discovered that, in contrast to conventional approaches, augmented reality (AR) may be utilized to develop interactive learning experiences that let students investigate scientific ideas. Studies have also investigated the usage of augmented reality for creating language learning teaching materials. The use of AR for creating educational materials for English language learners was investigated in a study by Park, et al. They discovered that compared to conventional approaches, adopting AR could teach pupils English more

quickly and effectively.

3 Discussions

The information acquired from SPXI Grade 12 students was used to conduct this study. In order to identify the MIL lessons that were least successfully retained, as well as to discuss the merits of the suggested augmented reality (AR) educational materials and their applicability and acceptance of the following evaluation.

3.1 Least Learned Lessons in MIL

This section presents a detailed overview of the analysis carried out on the exam results of Grade 12 students in the MIL program, emphasizing the topics within the subject that students struggled with the most during the first quarter.

Table 7. Least Learned Lessons in MIL 1st Quarter

1st Quarter Most Essential Learning Competencies	Item #	Diff. Index	Interpretation	Action	Dis. Index	Action
Describe how communication is influenced by media and information	5	0.08	Very Difficult	Discard	0.04	Revise
Identify the similarities and differences between and among media literacy, information literacy, and technology literacy	42	0.06	Very Difficult	Discard	0.04	Revise
Discuss responsible use of media and information.	21	0.04	Very Difficult	Discard	0.04	Revise
Explain how the evolution of media from traditional to new media shaped the values and norms of people and society	19	0.08	Very Difficult	Discard	0.04	Revise
Compare and contrast how one issue or news is presented through the different types of media (print, broadcast, online).	2	0.05	Very Difficult	Discard	0.02	Revise
Contrast indigenous media to the more common sources of information such as libraries, the internet, etc.	37	0.09	Very Difficult	Discard	0.02	Revise
Present an issue in varied ways to disseminate information using the codes, conventions, and language of media	15	0.03	Very Difficult	Discard	0.02	Revise
Cite practical situations when applying knowledge in intellectual property, copyright, and fair use guidelines	10	0.05	Very Difficult	Discard	0.02	Revise
Create a campaign ad to combat the digital divide, addiction, and bullying	38	0.07	Very Difficult	Discard	0.06	Revise

Table 7 presents the item analysis results of the 1st quarter exam of the students. It shows that the issue of disseminating information using the codes, conventions, and language of the media has the lowest difficulty index, which has a score of 0.3, according to the findings. Because so few students from both the high- and low-performing groups have correctly answered the question, it indicates that the students regard it to be the most challenging.

3.2 Acceptability and Usability Findings Results and Interpretation

This section presents and discusses the feedback and evaluation provided by respondents who interacted with the AR-based instructional material. It sheds light on whether the material was accepted and found usable, helping researchers and educators understand the practicality and effectiveness of incorporating AR technology into the learning environment.

Table 8 shows the acceptability of the developed project result is agreed upon because the total sub mean is equal to 4.04, which means that it can make the lesson easy to understand, more interesting, practical, realistic, and appealing, improve students' mastery of the lesson because it is on point and concise, and gives essential learning. Based on a study using an experimental approach, it is possible to hypothesize that using AR board games as teaching aids may appeal to some students.

Table 8. Acceptability Evaluation Result of the Developed Instructional Material with AR

Criteria	Mean	Verbal Interpretation
The developed instructional material made the lesson easy to understand.	4.03	Agree
The developed instructional material makes learning more interesting, practical, realistic, and appealing.	4.05	Agree
The developed instructional material improved students' understanding of concepts and led to high academic achievements.	4.11	Agree
The developed instructional material makes the lessons get to the point and concise.	3.96	Agree
The developed instructional material gives essential knowledge that students will encounter, learn, and use in a lesson.	4.03	Agree
Total Sub Mean	4.04	Agree

Additionally, using AR board games enables players to jump right into the action, resulting in more efficient learning. The learning incentive is much different when AR is combined with board games for health education. Adding augmented reality to board games can help students become more motivated to learn. These findings support earlier research showing that augmented reality might increase learning motivation[16]. Also, reinforced by a different study, in which 84.8% of students said that the AR learning module inspired them to learn about medications, and 81% said that AR is successful at presenting information about medicines in a way that is suitable for learning[17]. Though this study is related to Media and Information Literacy, the findings of this investigation supported these conclusions.

Table 9. Usability Evaluation Result of the Developed Instructional Material with AR

Criteria	Mean	Verbal Interpretation
The developed instructional material is useful in the teaching-learning process.	4.24	Agree
The developed instructional material makes the students active during class discussions.	4.16	Agree
The instructional material makes learning fun while learning.	4.18	Agree
The use of instructional material is much more effective than traditional teaching methods.	4.20	Agree
The instructional material can enhance the academic performance of students.	4.55	Agree
Total Sub Mean	4.27	Agree

Table 9 demonstrates the value of the AR-developed project as a teaching intervention with the students' least-learned lessons. The overall sub-mean is 4.27, which is obviously quite acceptable. According to the findings of study student motivation was found to be at a high level (M>3.67) after the AR teaching material was used, even though student motivation was initially at a moderate level (3.672.34). The statistical inference results reject the null hypothesis that there is a significant difference (p=0.05) in student motivation before and after the use of AR teaching materials in the Basics of Electricity and Electronics. According to the findings of the study, the use of Augmented Reality teaching materials resulted in a 42.9 percent increase. Furthermore, the attention construct has the highest percentage increase for each motivation construct, followed by the satisfaction, relevance, and confidence constructs[8]. These findings are in line with previous research Sáez-López, et al. found that experiencing in-depth experience after using the augmented reality application improved student learning performance in terms of motivation and confidence[18].

Another study about the usability of AR, it shows that students can engage with various augmented reality (AR) elements to investigate potential reactions in a three-dimensional interface, comprehend the shape and structure of atoms and molecules, and view pertinent explanations in their native language, which is Arabic. An eighth-grade class of 12- to 13-year-old Palestinian students in a primary school tested the mobile AR application. The study infers from the analysis of the findings that these female students had a favorable attitude toward using this augmented reality application in their learning process. Furthermore, study that backs up this claim concerns EduPARK, a game-like software with augmented reality that has a good usability and instructional value for elementary school students[19]. Simply said, this study demonstrates that learning is worthwhile, entertaining, and effective, and can improve students' academic achievement.

4 Conclusion

The study demonstrates that the problem of spreading information using the codes, conventions, and language of the media has the lowest difficulty index, with a score of 0.3. The fact that so few students from both the high-performing and low-performing groups have provided the right response to the question suggests that the students find it to be the most difficult. The total sub-mean of the developed project result, which is equal to 4.04, indicates that it can make the lesson more understandable, interesting, practical, realistic, and appealing. It can also help students better understand the lesson because it is clear and concise and provides essential learning. The study illustrates the worth of the AR-developed project as a teaching intervention using the lessons that the students had the least success with. 4.27 is the total sub-mean, which is obviously very acceptable. Students can interact with various augmented reality (AR) elements to explore potential responses in a three-dimensional interface, according to a study about the usability of AR. This study simply shows that learning is valuable, enjoyable, and efficient, and can raise students' academic performance.

In conclusion, while the study offers valuable insights and innovative approaches to enhancing MIL education, its limitations underscore the need for careful consideration when applying its findings to other contexts or when evaluating its long-term effectiveness.

The proponents propose several recommendations for further exploration and implementation. Expand the Target Population to enhance the generalizability and applicability of the developed augmented reality instructional material, the researchers suggest extending the study to include a wider range of schools that offer Media and Information Literacy courses. By implementing the material in different educational settings, the effectiveness and acceptability of augmented reality as a teaching tool can be better assessed.

Replicating the study in different schools allows for validation of the results obtained. By observing whether similar benefits and improvements are seen in various settings, the robustness of the findings can be confirmed. To better understand the lasting impact of the augmented reality instructional material, researchers could conduct longitudinal studies that assess students' progress and performance over an extended period. This would provide insights into whether the improved learning experience translates into sustained improvements in students' understanding and skills.

Given that augmented reality might be unfamiliar to many educators, providing training and support for teachers in effectively utilizing this technology in the classroom is crucial. Workshops or resources could be developed to aid teachers in integrating augmented reality into their teaching methods. Feedback from teachers and students who use the augmented reality instructional material should be gathered continuously. This feedback can inform iterative improvements to the material, ensuring it remains up-to-date, relevant, and aligned with the evolving needs of the students and the subject.

Addressing the dependency on specific technology (such as the EyeJack app and smartphones) is important. Exploring ways to make the augmented reality experience more accessible, including considering alternative devices or apps, would widen the potential audience. Conducting comparative studies that evaluate the efficacy of augmented reality against other instructional methods or tools would provide a better understanding of its unique contributions and advantages. While the study focuses on the Media and Information Literacy subject, exploring how augmented reality could enhance learning experiences in other subjects could yield valuable insights.

In conclusion, the introduction of augmented reality into the classroom setting appears to offer positive enhancements to both teaching and learning experiences. However, expanding the scope of the study, considering long-term impacts, and addressing practical challenges are important steps in ensuring the successful integration of augmented reality technology in educational contexts.

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