Development and Evaluation of E-Learning Module in 3D Homes Designing

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ABSTRACT: The primary purpose of this research is to develop an e-learning module for 3D Home Designing and assess the value of the instructional materials to the student's user. The pandemic forces our educational system to change to remote instruction, and the construction of the electronic module is crucial because there are no existing materials that focus primarily on 3D home design. Fifty (50) students enrolled in CAD courses tested the E-learning program. The mean and standard deviation were calculated using descriptive quantitative statistics in this investigation. The content of the e-learning program was evaluated using a survey questionnaire. In addition, the questionnaire requested input on the e-module. Following that, adjustments were made. The E-module is a helpful instrument in teaching 3D Homes Designing that encourages self-directed learning and direct application of knowledge.

Keywords: 3D Homes Designing, E-Learning Module, Module in 3D

ABSTRAK: *Tujuan utama penelitian ini untuk mengembangkan modul e-learning untuk Design Home 3D, dan menilai mengevaluasi ahan ajar yang diberikan kepada siswa. Pandemi memaksa sistem pendidikan kita beralih ke pembelajaran jarak jauh, dan pembangunan modul elektronik sangat penting karena tidak ada materi yang ada yang berfokus terutama pada Design Home 3D. Lima puluh siswa yang terdaftar dalam kursus CAD menguji program E-learning. Mean dan standar deviasi dihitung menggunakan statistik deskriptif kuantitatif dalam penyelidikan ini. Isi program e-learning dievaluasi menggunakan kuesioner survei. Selain itu, kuesioner meminta masukan pada e-modul. Setelah itu dilakukan penyesuaian. E-modul adalah instrumen yang membantu dalam mengajar Desain Rumah 3D yang mendorong pembelajaran mandiri dan penerapan pengetahuan secara langsung. Kata kunci: Perancangan Rumah 3D, Modul E-Learning, Modul 3D.*

INTRODUCTION

The current educational system in the Philippines has been steadily incorporating electronic learning, often known as E-Learning, as part of its overall development. The International Congress on eLearning was held in the Philippines in 2013, with the highlights being the exchange of research, innovation, experiences, and best practices in eLearning among the participants. E-Learning can take the shape of an electronic module that students can access quickly using their laptops and computers to complete their assignments. Throughout education, it has been widely employed as a learning resource or as a medium of instruction. Educators have designed e-Learning modules for use in a variety of courses to support and develop students' abilities. On the other hand, there are cases where a specific subject does not have it. Students rely only on the lectures and demonstrations of their teachers. The instructional materials, according to

Serevina et al. (2018), are a crucial part of the learning process. A module is an example of teaching materials. Teaching materials are designed to carry the message of learning from the teacher to the students in order to stimulate students' thoughts, feelings, interests, and readiness to learn. The module is printed as part of the teaching materials. Many schools are closed in this epidemic era, according to Trilestari & Almunawaroh (2021). School-based teaching and learning are being replaced by online learning. Some schools use e-learning, while others rely on social media platforms such as WhatsApp, Google Classroom, Google Meet, Zoom, or even YouTube. Textbooks are commonly used by teachers in the classroom. When teaching and learning activities are converted to online learning, some teachers have difficulty preparing their own source material. According to Nurhasnah et al. (2020), one of the causes of students' low learning independence is a lack of instructional materials that can promote students' learning freedom. The use of repetitive instructional materials and procedures causes pupils to get lazy and bored during studying, affecting their ability to learn independently. According to Singh et al. (2011), the development of E-modules during this epidemic is important in the teaching and learning process.

Under the statements made above, students of the Bachelor of Science in Technology Teacher Education major in Drafting Technology at Mindanao State University Iligan Institute of Technology who have undergone 3D Homes Designing course have discovered that there is no e-module in 3D Homes available for them. As part of their architectural course, the researcher noticed an absence of e-modules that functioned as learning resources for the practical application of 3D homes Designing. How is it possible that the fact that these students are solely reliant on the lecture and demonstration of the professor, and nothing else, would already be sufficient to enable them to develop mastery and understanding? Three-dimensional homes (also known as 3D homes) have been designed due to the vast modernization of the twenty-first century, thanks to the efforts of inventors and specialists. This application is well-known in architectural design, particularly in the field of Drafting Technology, for example. It provides a supportive environment for the construction and design of residential structures, whether one-story, two-story or multi-story. It is a convenient method of creating residential dwellings since it is a complete package that includes structural design, interior design, landscaping, and the calculation of the overall material cost.

The researcher came up with the idea for this research to give additional learning material for 3D home design students by developing an electronic module. This e-module could serve as a means of motivating and enhancing students' interest in design. It can be used as a reference and guide for students and teachers in various situations. The study is limited to the second-year students from the College of Education BSTTE-Drafting Technology of Mindanao State University – Iligan Institute of Technology who had enrolled in a course that focused on 3D Home Designing. This research aims to produce an electronic module that will give enough expertise in the application of 3D homes. Students

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will also learn how to use 3D Homes Software for architectural design through completing and conciseness this e-step-by-step module's methods and techniques.

Yet, this study aims to develop an E-module that provides adequate knowledge in 3D Home designing and promotes interactive learning. Since there were lacking interactive learning materials for the students in 3D Homes Designing, an e-module is highly needed. This E-module will be evaluated by the 2nd year students and third-year BSTTE major in Drafting Technology Students in Mindanao State University - Iligan Institute of Technology in the course architectural designing.

Scope and Limitation of the Study

This research would limited to 2nd and 3rd-year students of the Bachelor of Science and Technology Teacher Education major in Drafting Technology at Mindanao State University – Iligan Institute of Technology's Department of Technology Teacher Education College of Education. Furthermore, the researcher rely solely on the data or information acquired during their evaluation of the module of the aforementioned batch of pupils. The researcher created a customized questionnaire to perform the survey to reach the required data.

RESEARCH METHODOLOGY

The development and validation of the E-module in 3D Homes Designing utilizes the Research and Development (R& D). Studies have shown that R & D has been found to be useful in conducting studies that involve the production of teacher supplementary materials such as laboratory manuals, workbooks, modules and other instructional materials. The five (5) stages in the preparation of instructional materials were used, namely: a) Assessment Stage, b) Design Stage, c) Development Stage, c) Validation Stage, and d) Revision Stage. *See Figure 1 below.*

In Assessment stage, the researcher gathered information on the needs of the students towards learning 3D Homes Designing. The data was gathered through observations, feedbacks and interviews with the students who have already taken the course. This is the stage where the problem were identified and defined. The needs to be developed and validated for the module in 3D Homes Designing were the main objective in the assessment. The formulation of the goals and objectives would be relevant to answer the needs of the students in teaching and learning 3D Homes Designing. Furthermore, Design stage includes writing the outline of the module and identifying the module parts. At this level, the researcher assessed a possible tool in the development of the E-module. The tool includes the using of Photoshop and Corel Draw in lay outing the cover and content design; and using Windows Publisher or free access in the Google site in publishing the materials online.

Assessment Stage
- Gathering of information through observations and interviews with the students
- Identify the learning problem, goals and objectives
- Learning environment, constraints, delivery options and timeline

Design Stage
- Writing the Outline of Module
    - Identifying the Module Parts

Development Stage
- Writing of Lesson
- Writing of Activities /Exercises

Validation Stage

Pilot to the Try-out Group

Revision Stage
- Refinement of Module based on evaluators' comments and suggestions and students' feedbacks

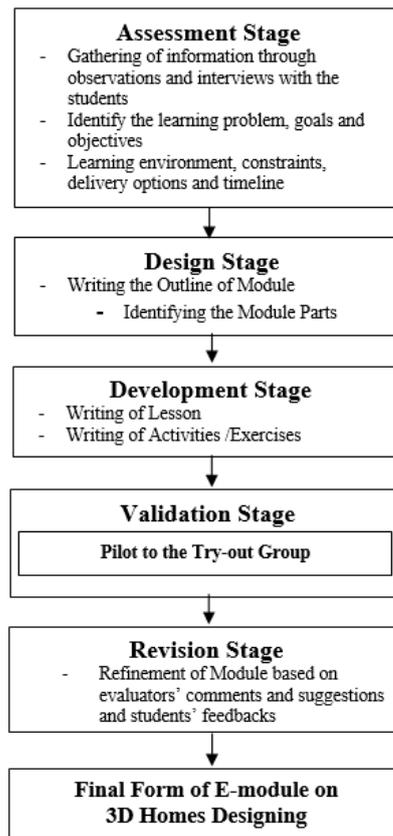**Final Form of E-module on 3D Homes Designing**

Figure 1.   Conceptual Model 1 shows the Instructional Design Model in assessing, designing, developing, validating and revising the E-Module on 3D Homes Designing.

Development stage included the writing of lessons and writing of activities/exercises. The construction of the content of the E-module was done with the use of the course syllabus in 3D Home Designing as guide. The flow in the content of the module was based on the identified parts. Meanwhile, the developed E-module in 3D Home Designing was validated in the CAD subject composed of 2 sections for a total of 50 students. This study was participated in by fifty (50) Drafting Technology students who are purposively selected using Purposive Sampling . The selection was based on students experience and mastery in the field of Computer Aided Drafting and Designing (CADD) in the Department of Industrial Technology Education, College of Education, MSU-IIT. The group of students were considered homogeneous because of their outstanding performance in CAD subjects. The selection was done through the record of the CAD teacher in the department. Only those with flat 1.0 and 1.25 grade in CAD subject was selected to be part of this study. Self-assessment questions and practical activity in the E-module was required to ensure accuracy of the student's evaluation. The quantitative ratings and the qualitative comments and suggestions of the try-out group were considered carefully in the refinement of the E-module. The material was considered valid if more respondents answered

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"strongly agree" which is interpreted as provisions satisfied very adequately, meaning the module needs no revision.

RESULTS AND DISCUSSION

The data were gathered from fifty (50) Drafting Technology students wherein they were purposively selected to evaluate the electronic instructional materials developed in 3D Home Designing.

The Developed E-module

This e-module was designed to aid students in understanding and to enhance their skills in using 3D Home Designing. This e-module was in the form of a website that could be easily viewed by the user while not connected to the internet (offline), or it could be copied to the user's computer by using a flash drive. Because the 3D Homes application is already embedded in the website, anyone who chooses to utilize the e-module would have no difficulty gaining access to the 3D Homes application. The researcher also posted a video on their website to walk people through downloading and installing the application.

The e-module is divided into three sections: the home page, download, and lessons. The introduction, motivation, and conclusion are all contained on the main tab. The names of the researchers and the author of the customized module may be located at the bottom of the home tab, near the bottom of the page. The installer for the 3D Homes application and instructions on downloading and installing it was available on the download tab. With the pointer hovering on the lessons tab, lessons 1 and 2 will appear on the screen. Lesson 1 is titled "The What in 3D Homes Designing," and most of its material is devoted to the tools and commands, as well as their functions. Lesson 2, "The How in Learning 3D Homes," covered the specifics of how to use the various toolbars, such as the building toolbars, the interior toolbars, the landscape toolbars, the terrain toolbars, and the zoom and navigation tools, amongst other things. Every session concludes with an activity: try it yourself, followed by a self-assessment to determine the level of student understanding. The e-module is depicted in the following screenshots. Because it is more pleasing to the sight, the researcher choose a sky blue background with gradient effects as their background color. It was vital for us to make the home page, download page, and lessons page stand out from the rest by using a light blue hue. This will help users notice them more quickly, especially when they are exploring the content of the e-module. Furthermore, the web application is also a responsive website, which means that it can be seen on any device's browser without compromising the application's design.

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Figure 2. Introduction of E-module in 3D Home Designing

This figure shows the front page of the E-module the home, download, and lessons tabs. It also shows the overview and some sort of pictures in house designs for student's motivation. According to Pombo et al. (2012), the E- module encouraged the development of new abilities during the course, such as ICT skills, which have an impact on classroom practice and boost their professional growth in both the personal and professional domains. Sari et al. (2019) also mentioned that computer-based learning materials are an example of ICT as a source of information. E-modules are one type of teaching material that can make learning more exciting and participatory. The e-module is a learning package required for the learning of a specific subject that allows students to learn autonomously and is packed with video, audio, simulation, quizzes, and so on.

Figure 3. Introduction of the E-module

Figure 3 is still part of the front page of the e-module which displays the different house designs created.

Table 1. Summary of the Evaluation on the Responses of the Respondents as to the Foreword/Instruction to the Teachers and Students

Criteria	Mean	Degree of Responses	Quality Description
The Foreword/ Instruction to the Teachers and Students			
1. Does it tell the need of the eLearning module in classroom instructions?	4.56	Strongly Agree (SA)	Very Good Perceptions
2. Does it give the importance to the user?	4.56	Strongly Agree(SA)	Very Good Perceptions
3. Does it provide clear instructions to teachers and students on how to use the eLearning module?	4.62	Strongly Agree(SA)	Very Good Perceptions
Overall Mean	4.58	Strongly Agree(SA)	Very Good Perceptions

Table 1 shows the findings of the "Foreword/Instruction to the Teachers and Students" survey, which was conducted. In the results, it was discovered that the Foreword/Instruction to the Teachers and Students informs teachers and students about the importance of the eLearning module in classroom instructions, with a mean of 4.56 and an interpretation of Strongly Agree; that the Foreword/Instruction to the Teachers and Students emphasizes the importance of the user's, with a mean of 4.56 and an interpretation of Strongly Agree; that the Foreword/Instruction to the Teachers and Students provides clear. In this case, the average mean is 4.58, which indicates that the respondent strongly agrees. Thus, the Preface/Education to the Teachers and Students should explain the value of e-learning in the instruction, emphasize the importance of the user, and provide clear information.

According to Kanuka (2006), the learning activities you utilize in your classroom should allow students to build the skills they need to demonstrate their mastery of the content being taught. To have a clear purpose for their learning efforts, well-defined and stated learning objectives must be established. These objectives should also lead the selection of instructional activities and the development of evaluation systems. Lim (2016) also stated that educators began to describe teaching as "an aggregation of organized strategic approaches designed to achieve a desired learning outcome" based on a large number of studies on how children learn. It consists of well-planned assignments that link the entire act of the teacher to learning. Learning is the ultimate objective, and teaching is a personal endeavor.

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Table 2. Summary of the evaluation on the responses of the experts as to the Teaching and Learning Activities of the E-Module

Criteria	Mean	Degree of Responses	Quality Description
Teaching and Learning Activities			
1. Do the instructions for each exercise provide a clear direction for the students to follow?	5.00	Strongly Agree	Very Effective
2. Are the activities related to the skills being developed?	4.86	Strongly Agree	Very Effective
3. Are the activities practical and feasible for the students to perform?	5.00	Strongly Agree	Very Effective
4. Do the exercises encourage the students to become actively involved in each learning task?	4.86	Strongly Agree	Very Effective
5. Are the student's activities appropriate for different learning styles?	4.86	Strongly Agree	Very Effective
6. Do the activities suit the general intellectual level of students in the class?	5.00	Strongly Agree	Very Effective
7. Do the learning materials provide learners' readiness for self-directed learning?	4.86	Strongly Agree	Very Effective
8. Do the activities allow immediate feedback and corrective process?	5.00	Strongly Agree	Very Effective
9. Do the activities seek to relate new learning to previous learning?	4.86	Strongly Agree	Very Effective
10. Are the activities designed to be challenging to the learners?	5.00	Strongly Agree	Very Effective
Overall Mean	4.93	Strongly Agree	Very Effective

Results presented revealed that teaching and learning activities in the module needs no revision. This finding supported the study of Pomales-Garcia et al. (2009) that learning with well-planned activities and experiences in a well-

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engineered program, would result to an effective instructional approach. Similar to B.F Skinner's theory on Programmed Learning as cited by Mc. Donald et al. (2005) that learning from programmed instruction usually include a carefully designed course with predefined sequence of units. Pappas (2019) referenced the "Keller's ARCS Model of Motivation - eLearning Industry". This Model of Motivation is founded on the premise that there are four important factors in the learning process that can promote and sustain learners' motivation. These four factors comprise the model's acronym ARCS, which stands for Attention, Relevance, Confidence, and Satisfaction (ARCS). The researcher argues that a well-designed E-module can increase student users' motivation to complete the module's activities. According to Logan et al. (2021), an e-learning module will help students to be more engaged with the information and actively participating in their own learning.

Table 3. Summary of the Evaluation on the Responses of the Respondents as to the Evaluation Procedure

Criteria	Mean	Degree of Responses	Quality Description
Evaluation Procedure			
1. Does the evaluation make use of a variety of techniques such as:			
a. Problem Situation	4.35	Strongly Agree(SA)	Very Good
b. Paper test, Lab Exercises and Assignments	4.35	Strongly Agree(SA)	Very Good
Overall Mean	4.35	Strongly Agree(SA)	Very Good

Table 3 presents the evaluation results of the respondents' responses concerning the evaluation technique. The e-module uses a problem circumstance that has a mean of 4.35 points on the scale. The problem situation received a mean of 4.35 and a degree of agreement of strongly agree, indicating that it delivered excellent perceptions of the problem situation, just as it did with the paper test, lab exercises, and assignments. As a result, with an overall mean of 4.35, the e-Module is indeed helpful as a technique for evaluating candidates. According to Morgulis et al. (2012), interaction and feedback are critical components in supporting learning in e-learning modules, and immediate feedback is critical for the learning process. According to Astalini et al. (2019), e-assessment reduces assessment time because the assessment is not performed manually. Adaptive e-assessment is typically defined as an optional component in adaptive learning in particular. Thus, the usage of assessment significantly supports the learning aim

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that students are expected to grasp the basic knowledge of optics as well as develop and apply them to study higher understanding physics after attending the lecture.

Table 4. Summary of All Responses in Evaluating the E-module

Title of the E-module	Mean	Degree of Responses	Quality Description
The Title/Cover page	4.56	Strongly Agree(SA)	Very Good
The Foreword/ Instruction to the Teachers and Students	4.58	Strongly Agree(SA)	Very Good
Objectives	4.52	Strongly Agree(SA)	Very Good
Scope/Content	4.58	Strongly Agree(SA)	Very Good
Teaching-Learning Activities	4.54	Strongly Agree(SA)	Very Good
Other Characteristics	4.48	Strongly Agree(SA)	Very Good
Evaluation Procedure	4.35	Strongly Agree(SA)	Very Good
Overall Mean	4.52	Strongly Agree(SA)	Very Good

Table 4 contains a summary of all of the replies received during the evaluation of the e-module. In total, it has a mean of (4.52), a degree of responses of strongly agree, and a view of being very good. According to the criteria, the foreword/instruction to teachers and students and the breadth and substance received the highest mean (4.58), indicating a high degree of agreement and highly positive opinions. The evaluation technique received the lowest mean score, 4.35, with a very agree degree of reaction and very positive participants' perceptions. The findings revealed that the E-module in 3D Home Designing is a highly effective instructional material used in teaching Computer Aided and Designing (CADD). With the incorporation of technology into the classroom, the e-module has proven to be a very successful instructional tool in the teaching-learning cycle. Similar study conducted by Abing et al. (2017), Boniao et al. (2014), and Salva (2015) shown the effectiveness of the E-module in Teaching and Learning Architectural Home Designing.

CONCLUSIONS

In addition to being genuine, the electronic learning module (e-module) was also well-developed. It possesses favourable properties and can be recommended as a teaching resource for Bachelor of Science in Technology

Teacher Education students specializing in Drafting Technology, among other things. The following evidence gathered as a result of the research helped support and maintain the stated conclusion. When it came to the aims of the 3D Homes Designing E- module and the substance of the module, as well as the characteristics of the module, the prologue and instructions, and the teaching-learning activities, the respondents said they strongly agreed with excellent perceptions. A helpful instrument in teaching 3D Homes Designing, the newly developed E-module encourages self-directed learning and direct application of knowledge. The material of the generated e-module is trustworthy because it has been modified from the module "3D Homes Designing" by Dr. Michael Art N. Napoles (2013).

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