Development and Validation of E-Module for Empowerment Technologies (E-MET)

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***Abstract*—** This study aimed to develop and validate the e-module for Empowerment Technologies for Grade 11 students of Guruyan National High school. It used the ADDIE development model to develop an e-module for Empowerment Technologies and descriptive survey method to validate the e-module. The developed e-module for Empowerment Technologies may be used by the teachers and students to increase the knowledge, skills, and attitudes in the subject. The e-module may be used to motivate and encourage learners to take their time using it. It may be used to motivate and encourage learners to take their time using it. The teachers may effectively use the developed e-module for the subject so that the performance level of the students may be increased from very satisfactory to excellent. The performance level of the students may be sustained in the selected topics in the subject by the constant use of the developed e-module; the validity of the developed e-module may be elevated to very highly acceptable with the regular review and revision of the content, format and language, presentation, and ease of use.

***Keywords*—** development; validation, e-module, empowerment technologies.

I. INTRODUCTION

Empowerment Technologies provides an understanding of the use of modern devices that can be utilized as a tool for innovation, digital experience, and even as a career profession. Developing an e-module for the school needs amount of time and patience since you need to exert effort in different ways so that learners and teachers can benefit from it. The purpose of developing e-learning materials for students becomes more productive as time moves along. The technology becomes simpler, smaller, and interactive to use.

As for the teaching aspect, Information and Communication Technology represents a challenge for teachers who have been doing so for a while. Introducing new technologies in the classroom means changing the way they have been performing their job for years. The advantages, however, are numerous, and this change is no longer optional. Teachers must deal with shorter attention spans, an itch in their students' pockets caused by their smartphones, and face the fact that e-learning, rapid learning, social learning, and so on, are far more efficient than their traditional counterpart (Lebbe, 2017). Creative people are valuable resources in the rapid process of technological change, which has wrapped up this global world in recent years. Creativity is considered an essential human need to make something new.

The development of the e-learning tools must be in the knowledge, interests, understanding, abilities, needs, and experiences of students. These e-learning materials are effective in providing good quality education at a higher level. Aside from the textbook, the use of e-learning tools is important for expressive and meaningful teaching. Well-designed and tested e-learning tools can be very effective in training, which particularly requires lab activities and hands-on experience (Sung et al., 2014). In the present world, e-learning has emerged as an effective, efficient, and convenient option for lifelong learning. One way to improve the qualities of education is to make use of efficient technology in an institution. This will open more opportunities for the teachers and students as well. Online interactions would lessen time constraints, and it will be much easier to conduct assessments and generate reports since the necessary information does not have to be manually handled. All these would result in a flexible and considerably smoother learning environment, and this would facilitate better results, and accreditations too (Linways Team, 2018).

The researcher strived to create an e-module to help learners to acquire the needed learning competencies which were not observable today since face-to-face instruction or classes was not a good thing to be implemented because of the current pandemic. Developing an e-module was one of the best strategies to consider in aiding learning gaps brought by the pandemic. Today, students can have their own time studying because an e-module for Empowerment Technologies was developed for Senior High School students of Guruyan National High School was made accessible online.

II. METHODS

This study utilized the ADDIE (Analysis, Design, Development, Implementation, and Evaluation)

development model to develop an e-module for Empowerment Technologies and descriptive survey method to determine the validity of e-module employed by the teacher in teaching Empowerment Technologies for the school year 2019 – 2020. The stages of developing an e-module:

1. Analysis. In this phase, the focus is on learners. The analysis phase defines the needs of student per learning competency aligned with the curriculum guide for Senior High School under Empowerment Technologies subject.
2. Design. In the design phase, the focus is on learning objectives, content, subject matter analysis, activities, assessment instruments used and media selection. Design defines as the planning of what must be the blueprint of the e-module.
3. Development. The development stage starts the production and testing of the methodology being used in the study. In this stage, developer make use of the data collected from the two previous stages and use this information to devise an e-module that will focus on the four topics selected on Empowerment Technologies. Development is the process of realizing the blueprint.
4. Implementation. The implementation stage reflects the continuous modification of the program to make sure maximum efficiency and positive results are obtained. The development stage is all about putting it into action.
5. Evaluation. The evaluation stage is a process to see whether the learning system being built is successful and in accordance with the initial stage and or provide value to the learning process.

As for the validation of the e-module, the validators came from public secondary school in Juban Cluster who taught ICT-related subjects. Five (5) from Biriran National High School, four (4) from Guruyan National High School, two (2) from Lajong National High School, four (4) from Olimpio A. Guarin, Jr. National High School, and ten (10) from Juban National High School and the Grade 11 students of Guruyan National High School who undertake the subject in Empowerment Technologies.

The data were derived from ICT teachers as they answered out the descriptive survey questionnaire and from the students who undergone assessment for pre and post-tests. The gathered data were collated, tallied, and organized for statistical treatment using weighted mean for the teacher-made pre and post-tests and t-test for independent sample.

III. RESULT AND DISCUSSION

The study determined to develop and validate the e-module for Empowerment Technologies for Grade 11 Senior High School students of Guruyan National High School. The presentation and analysis of the data are the following: 1) development of e-module for empowerment technologies; 2) performance level of the students along a) Infographic, b) Image manipulation, c) Online Graphic software, and d) Image hosting sites; 3) difference between the performance level of the respondents in the pre-test and post-test; 4) validity of the e-module along a) content, b) format and language, c) presentation, and d) ease of use.

1. Development of e-module for Empowerment Technologies

The ADDIE Development Model was used to develop an e-Module for Empowerment Technologies. It has the features of (a) Cover Page; (b) Table of Contents; c: Overview which included the Module Content, Learning Competencies and the four topics, Lesson 1: Infographics; Lesson 2: Image Manipulation; Lesson 3: Online Graphic Software, and Lesson 4: Image Hosting Sites which included sub-parts per topic: (a) What I Need to Know, which dealt on what topic that learners should get; (b) What Are My Goals?, which talked about the learning objectives; (c) What I Know, which included the pre-test; (d) What's New, which gave the content of the topic, (e)What Is It, which included learning activities, (f) What I Have Learned, which dealt on the learning outcomes as for evaluation, (g) Assessment, which gave you the post-test, and lastly, (h) References, which summarized the sources of information of the topic. The developed e-module can be accessed through the following link:

https://drive.google.com/file/d/1XurFZjJgpSEn3vCJsqBqySltqi7dgAPb/view?usp=sharing

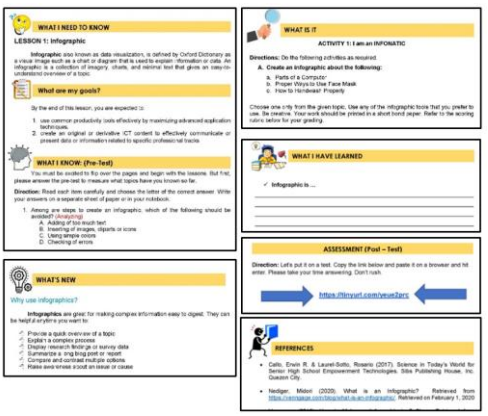

Figure 1: *Infographics*

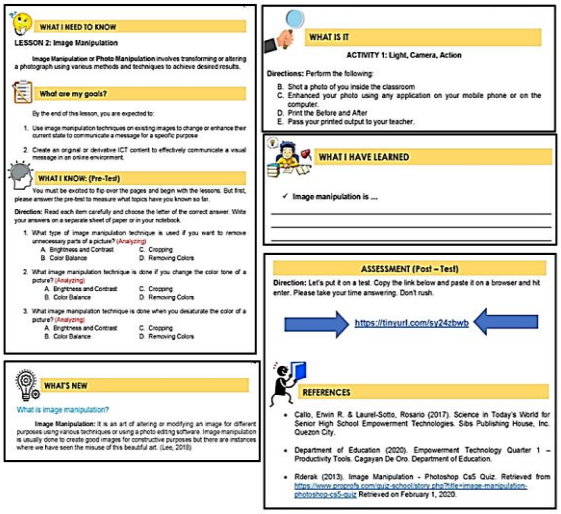

Figure 2: *Image Manipulation*

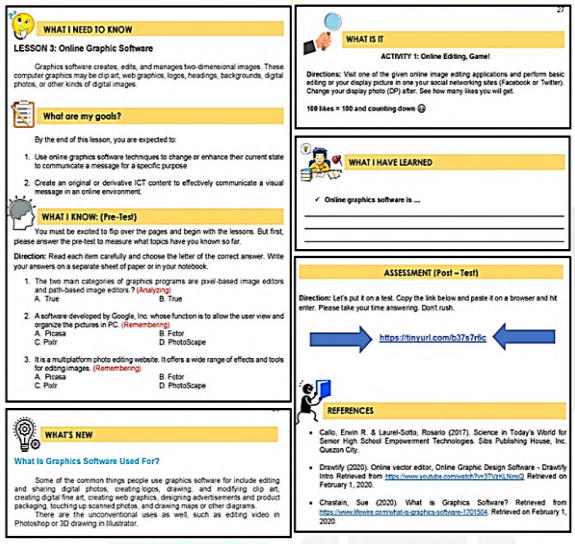

Figure 3: *Online Graphic Software*

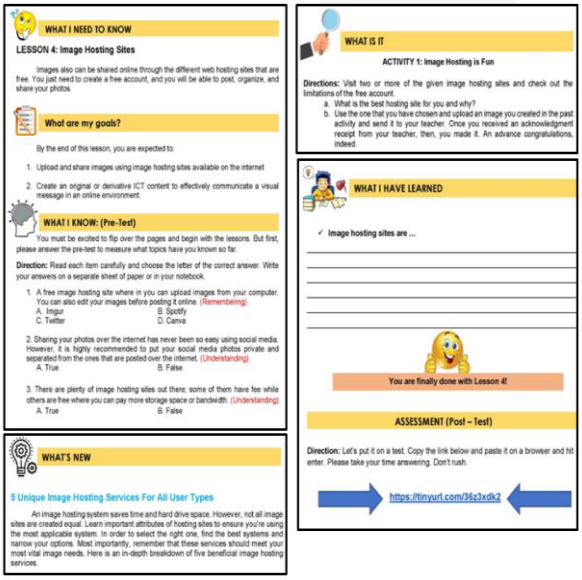

Figure 4: *Image Hosting Sites*

2. Performance level of the students along the Infographic, Image manipulation, Online graphic software, and Image hosting sites

Pre-test. Table 1 contains the pre-test performance of the students in Infographic, Image manipulation, Online graphic software, and Image hosting site.

Table 1: *Pre-test Performance Level of the Students*

Topics	PL	Interpretation
Infographic	39.0	Did not meet the expectation
Image manipulation	44.4	Did not meet the expectation
Online graphic software	41.4	Did not meet the expectation
Image hosting site	41.8	Did not meet the expectation
Average	41.65	Did not meet the expectation

From the table, it was revealed that the performance level of the students in the pre-test is 39.0 in Infographic, 44.4 in Image manipulation, 41.4 in Online graphic software, and 41.8 in Image hosting site. All the topics included in the pre-test have the performance level of the students interpreted as did not meet the expectation.

The idea of this result is simply because the offerings under the subject Technology and Livelihood Education (TLE) for Junior High School were mainly exploratory during the Grade 7 and 8, and on its Grade 9 and 10, students were able to choose their specialization under the subject.

The TLE specializations offered were Agricultural Crop Production, Cookery, and Dressmaking. They were only taught few topics about ICT, majority only in terminologies and computer basics, but not on the technical aspects such as on editing or on the use of these software or applications.

According to Kelly (2019), pre-tests can be used diagnostically to determine if there are any gaps in understanding from previous units taught.

Most pre-tests use elements of review and new material to get a comprehensive picture of student knowledge within a given area. They can be used in this way to assess whether students have retained knowledge from prior lessons.

Post-test. Table 2 includes the post-test performance of the students in Infographic, Image manipulation, Online graphic software, and Image hosting site.

Table 2: *Post-test Performance Level of the Students*

Topics	PL	Interpretation
Infographic	85.6	Very Satisfactory
Image manipulation	87.0	Very satisfactory
Online graphic software	86.0	Very satisfactory
Image hosting site	83.6	Satisfactory
Average	85.55	Very satisfactory

It can be inferred from the data that the post-test performance level of the students is 85.6 in Infographic, 87.0 in Image manipulation, and 86.0 in Online graphic software which are interpreted as very satisfactory. However, the students performed satisfactorily in Image hosting site with performance level of 83.0. On the average, the students have a very satisfactory post-test performance with 85.55 rating. The post-test performance level of the students along with infographic, image manipulation, and online graphic software were very satisfactory while on image hosting site was satisfactory because some of them were new to the topic and still developing and exploring on the different image hosting sites available on the internet and they have limited ideas on the topic. The over-all average was very satisfactory because students believed that they were able to understand the topic well because it showed steps or instructions clearly and the topics are well-presented.

According to Hornbuckle (2022) unlike pre-tests, post-tests are graded assessments. Post-tests show whether a student gained the knowledge required to successfully complete the course. And, they reveal how much each student's knowledge grew and how much students improved during the course.

3. Difference between the performance level of the respondents in the pre-test and post-test

Table 3 presents the statistical bases and statistical analyses of the difference between the pre-test and post-test performance level of the students along the selected topics.

Table 3: *Difference between the pre-test and post-test performance level of the students*

Statistical Bases	Statistical Analyses			
	Info-graphic	Image manipulation	Online graphic software	Image hosting site
Degrees of freedom	27	27	27	27
Level of significance	0.05	0.05	0.05	0.05
t-critical value	2.052	2.052	2.052	2.052
t-computed value	1.8961	2.1816	2.0246	2.0811
Decision on Ho	Accept	Reject	Accept	Reject
Conclusion	NS	S	NS	S

Legend: S-Significant NS-Not Significant

The data reveal that relative to Infographic and Online graphic software, the t-computed values of 1.8961 and 2.0246, respectively, are less than the t-critical value of 2.052 with degrees of freedom at 0.05 level of significance. Hence, the acceptance of the null hypothesis which means that there is no significant difference between the pre-test and post-test performance level of the students along the identified topics. It can be implied that the performance level of the students is similar before and after using the e-module in Infographic and Online graphic software. This can be attributed to the complexity of the said topics and perhaps the students have already prior knowledge with these.

In relation to Image manipulation and Image hosting site, the t-computed values of 2.1816 and 2.0811, respectively, are greater than the t-critical value of 2.052 at 0.05 level of significance with degrees of freedom of 27. Therefore, the hypotheses which stated in null form are rejected. It means that there is a significant difference between the pre-test and post-test performance of the students along the identified topics. It would imply that the e-module used as an intervention has affected the performance level of the students. The utilization of this has increased the knowledge and skill of the students along Image manipulation and Image hosting site. It can be observed that the e-module is effective in improving the performance of the students in these topics in Empowerment Technologies.

According to Bell (2010), pre-test–post-test designs are employed in both experimental and quasi-experimental research and can be used with or without control groups. For example, quasi-experimental pre-test–post-test designs may or may not include control groups, whereas experimental pre-test–post-test designs must include control groups. Furthermore, despite the versatility of the pre-test–post-test designs, in general, they still have limitations, including threats to internal validity. Although such threats are of particular concern for quasi-experimental pre-test–post-test designs, experimental pre-test–post-test designs also contain threats to internal validity.

4. The validity of the e-module along Content, Format and language, Presentation, and Ease of use

This portion covers the validity of the e-module along content, format and language, presentation, and ease of use. The weighted mean was used for the data analysis.

Content. Table 4 contains the weighted mean and description of the validity of the e-module along content.

Table 4: *Validity of the e-module along Content*

Indicators	**Weighted Mean**	**Description**
The topics are clear and easy to understand	4.60	Very Highly Acceptable
The contents are sensitive to the culture of the learner	4.04	Highly Acceptable
Topics are relevant to the daily activities of the learner	4.20	Highly Acceptable
The contents match the learning competencies of K to 12 Curriculum	4.16	Highly Acceptable
Examples are easy to understand for adult learner	4.12	Highly Acceptable
Overall Weighted Mean	4.22	Highly Acceptable

It can be inferred from the table that the e-module in terms of content was generally very acceptable with an overall weighted mean is 4.22. The topics in the e-module are very clear and easy to understand with weighted mean of 4.60 that is described as very acceptable which is the highest. On the other hand, the sensitivity of the contents of the e-module to the culture of the learner got the lowest weighted mean of 4.04 but still interpreted as very acceptable.

According to Modulemakaking.com (2019), consider using a combination of resources that you curate and resources that you create. Students enjoy seeing materials created by their professors even if the materials are not as polished. Professor-created content helps make the course feel warmer and less "canned." If you are asking students to read articles, review websites or view videos, give students guiding questions and specific instructions about what to focus on. Engage them in active learning by telling them what to look for, what questions to be asking themselves and what to be writing down as they go through the materials.

Format and Language. Table 5includes the weighted mean and description of the validity of the e-module along format and language.

Table 5: *Validity of the e-module along Format and Language*

Indicators	**Weighted Mean**	**Description**
The words use matches to the language of out of school youth and adults	4.88	Very Highly Acceptable
The use of words is arranged to prevent misinterpretation	4.80	Very Highly Acceptable
The jargon and terminology used are familiar to the learner	4.32	Highly Acceptable
The language promotes culture sensitivity and good values	4.12	Highly Acceptable
Sentences are easy to understand and well-structured	4.52	Very Highly Acceptable
Overall Weighted Mean	4.53	Very Highly Acceptable

As to the format and language of the e-module, the words used are highly acceptable that match to the language of out-of-school youth and adults with weighted mean of 4.88 which is the highest. Also, the use of words in the e-module is arranged to prevent misinterpretation and the sentences are easy to understand and well-structured are highly acceptable with weighted means of 4.80 and 4.52, respectively.

Generally, the format and language of e-module is highly acceptable by the students with an overall weighted mean of 4.53.

According to Acuram (2015), modules allow the learners to go through the material at their own pace. They may be used for self-instruction or to complement instruction. Knowing how to write learning material in module format is an important skill that trainers should develop.

According to Newonlinelearning.com (2022), learning designs are translated into the language of the classroom, allowing autonomous and asynchronous access by individual learners or groups of learners. This content may consist of a wide variety of sources, including original material written by teachers, links to web-based material, embedded multimedia content, scans of excerpts from conventional print texts, etc. Presentation. Table 6 presents the weighted mean and description of the validity of the e-module along presentation.

Table 6: *Validity of the e-module along Presentation*

Indicators	**Weighted Mean**	**Description**
Pictures and drawings are both familiar to the learner	4.88	Very Highly Acceptable
The pictures and drawing used matches the topics in the module	4.72	Very Highly Acceptable
The contents are presented in logical manner	4.12	Highly Acceptable
The font size is readable specially to adult learner	4.16	Highly Acceptable
Pictures and drawing are easy to view specially to adult learners	4.08	Highly Acceptable
Overall Weighted Mean	4.39	Highly Acceptable

The data reveal that generally the presentation of e-module is very acceptable by the students with an overall weighted mean of 4.39. Likewise, the pictures and drawings of the e-module are both familiar to the learner which are highly acceptable with the highest weighted mean of 4.88. Also, the pictures and drawings used match the topics in the e-module are highly acceptable by the students with weighted mean of 4.72. However, the pictures and drawing in e-module are easy to view specially to adult learners got the lowest weighted mean of 4.08 which is still very acceptable.

According to Gagto, et.al (2021), a good organization and presentation of a module is a key consideration so that a reader comprehends and understands the lessons presented. Ease of Use. Table 7 contains the weighted mean and description of the validity of the e-module along ease of use.

Table 7: *Validity of the e-module along Ease of Use*

Indicators	**Weighted Mean**	**Description**
The e-module provides convenience to learners	4.84	Very Highly Acceptable
Instructions are easy to understand	4.12	Highly Acceptable
The e-module provides learner with comfy access	4.48	Highly Acceptable
The e-module is free from buffering	4.12	Highly Acceptable
Learners can easily navigate the e-module	4.56	Very Highly Acceptable
Overall Weighted Mean	4.42	Highly Acceptable

From the table, it can be asserted that in relation to ease of use, the students highly accepted the provision of e-module for its convenience with the highest weighted mean of 4.84.

According to Thomas (2021), viewing your program through an “ease of use” lens can help identify where your efforts can become more streamlined and efficient.

Access can be increased, and barriers can be removed, especially when technology plays a role in making all of this happen.

IV. CONCLUSION

Based on the findings of the study, the researcher arrived at the following conclusions: (1) The e-module was developed for Empowerment Technologies. (2) The students did not meet the expectation in their performance level on Infographic, Image manipulation, Online graphic software, and Image hosting site. However, they performed very satisfactorily in the post-test with the e-module utilized in the said topics. (3) The performance level of the students in the pre-test and post-test significantly differ in Image manipulation and Image hosting site but not in Infographic and Online graphic software. (4) The format and language of the e-

module is highly acceptable while the content, presentation, and ease of use are very acceptable by the validators.

V. RECOMMENDATIONS

In the light of foregoing conclusions, the following recommendations were offered: (1) The developed e-module for Empowerment Technologies may be used by the teachers and students to increase the knowledge, skills, and attitudes in the subject. The e-module may be used to motivate and encourage learners to take their time using it. (2 The teachers may effectively use the developed e-module for the subject so that the performance level of the students be increased from very satisfactory to excellent. 3 The performance level of the students may be sustained in the selected topics in the subject by the constant use of the developed e-module since they can access the e-module anytime as long as it is not restricted for them to take advance reading using the platform. (4) The validity of the developed e-module may be elevated to very highly acceptable with the regular review and revision of the content, format and language, presentation, and ease of use. (5) Further study may be conducted which will include other topics in the subject and more students to be involved.

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