

Design, Development, and Evaluation of a Module in Writing Sections of a Quantitative Health Research Paper for Flexible Learning

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Abstract: *The COVID-19 pandemic brought challenges to Higher Education Institutions (HEIs). One, in particular, is the lack of a designed, developed, and evaluated module on writing some sections of a quantitative health research papers for the Bachelor of Science in Medical Laboratory Science for flexible learning in a private university in Iloilo City, Philippines. Thus, this study was conducted to design, develop, and evaluate a module on writing some sections of a quantitative health research paper. Using descriptive research, the design phase involved exploring the model to be used and writing the objectives. While the development phase involved the writing of the activities in each part of the chosen model to attain the objectives. In the evaluation phase, the developed Module in Writing Sections of Health Research Paper for Flexible Learning was evaluated by the experts. The developed evaluation form with a reliability of 0.96 in the google form was used. The module was also subjected to readability testing using Text Readability Consensus Calculator. The design of the developed module followed the 7Es Model containing activities that can be done synchronously or asynchronously. The expert evaluators gave the highest rating, very satisfactory (mean = 2.65 sd = 0.31), to the developed module. The Text Readability Consensus Calculator result showed that the module is for grade level 7, reading level was standard average, and for ages 11-13 years old (sixth and seventh graders). This study could serve as a basis for the implementation and evaluation by the students of the developed module. It can also be used as a supporting curriculum in teaching quantitative health research for flexible learning.*

Key Words: *descriptive research, health research paper, flexible learning, 7Es Model, module development.*

1. INTRODUCTION:

Higher Education Institutions (HEIs) are not exempted from facing challenges in the new normal brought by the COVID-19 pandemic. As a result, a new pedagogy has emerged, requiring the development of social distance teaching and learning methods [1]. In the Philippines, the Commission on Higher Education (CHED) [2] released Memorandum Order Number 4, series of 2020. It contained the general guidelines on the implementation of flexible learning, due to this pandemic. The memorandum stipulated the urgent need to look for teaching modalities that will shift from traditional to flexible teaching and learning options. One of the studies that support the call for CHED was done by Dayagbil *et al.*, (2021) [3]. Their study concluded that Higher Education Institutions (HEIs) must migrate to flexible teaching and learning modes, recalibrate the curriculum, and capacitate faculty. The HEIs also needed to improve infrastructure, implement a strategic plan, and analyze all components of the plan to assure teaching and learning continuity.

Many educators indeed found COVID-19 to be a significant obstacle [4]. This also holds in teaching the course Medical Laboratory Science (MLS)16Aa, Research Paper Writing and Presentation (Laboratory), among Bachelor of Science in Medical Laboratory Science students. One difficulty is the lack of instructional materials like modules that can be used for flexible learning. Modules were viewed positively by the majority of students, implying that features of the modules that were important to students related to critical elements of constructivist pedagogies like in Biology [5]. Tiernan *et al.*, (2021)[4] even found out that a developed module was successful in preparing student teachers to teach online. The module provided them with the tools and confidence necessary for success. The positive side of this

pandemic is the creation of more worldwide classrooms that will be available, as well as the sharing of online modules with international partner universities [6].

1.1. THE NEED FOR THE STUDY

Due to the demand brought by the pandemic, and the fact that no module was designed, developed, and evaluated in writing some sections of health research paper among the Bachelor of Science in Medical Laboratory Science for flexible learning in a private university in Iloilo City, Philippines, therefore, this study was conducted.

1.2. OBJECTIVES:

Generally, this study was conducted to design, develop, and evaluate a module on writing some sections of a quantitative health research paper. Specifically, the study aimed to describe the design, development, and evaluation of experts and the readability of the module.

1.3. SIGNIFICANCE:

The designed, developed, and evaluated module as a product of the study can be implemented as a supporting curriculum in teaching writing health research papers among students.

2. METHODOLOGY:

2.1. RESEARCH DESIGN:

This study followed the descriptive design. It described the design, development, and evaluation of the module. The evaluation included the results of the evaluation by the field experts and the module's readability.

2.2. LOCALE OF THE STUDY:

The study was conducted at a Medical Laboratory Science Department of a private university in Iloilo City, Philippines.

2.3. INSTRUMENT:

The evaluation form, the questionnaire, that was used by the experts was developed from the study of Ternus (2007)[7] and the Learning Resource Material Development System (LRMDS) of the Department of Education, Philippines. The reliability of the evaluation form was 0.96 using Cronbach's alpha. The Text Readability Consensus Calculator [8] was used. It has 7 popular readability formulas to calculate the average grade level, reading age, and text difficulty of the text module.

2.4. DATA COLLECTION:

2.4.1. DESIGN:

This phase included the selection of the design to be followed in the development of the module. This was also the phase when the objectives of the module were stipulated based on the syllabus of Medical Laboratory Science (MLS)16Aa. Based on the exploration, it was decided to use the 7Es (elicit, engage, explore, explain, elaborate, evaluate and extend) model. The writing of the sections of a research paper can go with inquiry-based learning, a constructivist approach.

2.4.2. DEVELOPMENT:

The development of the module included the writing of every part of the 7Es format. Written in the elicit part, was a way of checking the background knowledge of the student or user of the module. While in the engage part, the user of the module was motivated which led to the module content on writing the sections of the health research paper. Both elicit and engage can be done synchronously or asynchronously. In the explore part, the activities or tasks performed by the student/user in collaboration with their group mates (research group) were written. The explain part of the module involved the writing of the rules, principles, and concepts. These can help clarify misconceptions. In the elaborate section, new activities were presented which will call for the application of the knowledge and skills gained by the students from the explore and explain parts. In the last part, the students were called upon to solve a real-life problem that made them apply the knowledge and skills they learned from the previous parts.

2.4.3. EVALUATION OF THE MODULE:

The evaluation of the module was carried out by sending the evaluation form of the developed module through a google link, to three (3) experts in the field. Two (2) of whom have expertise in the 7Es design and the other one was a statistician who developed a module on the 7Es format. A health researcher served as another evaluator.

For the readability of the module, the Text Readability Consensus Calculator was used.

2.5. DATA ANALYSIS PROCEDURE:

The mean and standard deviation were used to present the result of the evaluation of the experts.

3. RESULTS AND DISCUSSIONS:

3.1. DESIGN :

The design of the module in writing sections of the Social Health Research Paper for Flexing Learning followed the 7Es (elicit, engage, explore, explain, elaborate, evaluate and extend) model, a constructivist design. It is a constructivist design because the students need to connect their new knowledge to their previous experiences [9]. The knowledge to be learned is structured into subjects, tasks, and performance objectives in the Design phase are written in this part. The design also specifies what a learner will be able to do as a result of the instruction [10]. Thus, one of the objectives of the module was to write the results, discussion, conclusions, recommendations, acknowledgment, and abstract parts of the research paper based on the guidelines discussed in the lecture class (APA Format, 7th edition). The other objective was to present/defend thoroughly the output to the research instructor. In the study of Libata *et al.*, (2021)[11], the findings revealed that the 7E-Inquiry was successful. The integrated module is more effective than standard scientific teaching methods. A meta-analysis study also confirmed that the 7Es learning cycle has a positive effect on students' achievement [12]. Thus, several studies have proven that the 7Es model is effective in teaching concepts [13],[14].

3.2. DEVELOPMENT:

The development of the module followed the 7Es format. The elicit part contained questions to check the background knowledge of the students. They are asked what to include in the results, discussions, and other sections focusing on the content.

In the engagement part, the students are motivated leading to the module content on writing the sections of the health research paper. There are asked if they know that well-written Results, Discussion, Summary of the Findings, Conclusions, Recommendations, Acknowledgments, and Abstract Sections can bring their study to the top-quality journals indexed in Scopus, ISI, and Web of Science. They were also asked if they knew that there are techniques they need to follow so that they can make those sections well-written. Both elicit and engage can be done synchronously or asynchronously.

The explore part, had the activities or tasks to be performed by the student/user in collaboration with their group mates. They are instructed to watch the different videos on how to write the sections of the research paper. Students are also asked to judge if the given sample of results, tables, and figures are correctly written or constructed. They are also instructed to write the contents of the discussion, conclusion, and recommendation. These activities can be done asynchronously.

In the explain part of the module, the rules, principles, and concepts were presented. The suggested contents of the Results section of a research paper based on APA, 7th edition are provided. Some examples of the results of studies from good journals are also given. The guidelines for constructing tables and figures are provided as well as their proper locations. In the discussions, a summary of findings, conclusions, recommendations, acknowledgment, and abstract parts, the contents of the paragraphs are given based on a good journal and the required contents of APA, 7th edition. Some phrases that can be used in writing the parts of the discussions and other sections together with concrete examples of those sections from journals are provided too. This part can be delivered both during synchronous or asynchronous classes. This is the part where the students clarify their misconceptions.

In the elaborate section, new activities were presented which called for the knowledge, and skills gained by the students in the explore and explain parts to be put to use. Students can do these tasks asynchronously. Rubrics were given as their basis for writing the sections of the research paper.

The written sections of the research paper by the student are evaluated by the teachers in the evaluate part of the module. This task can be done asynchronously. The evaluation is based on the rubrics given ahead.

The last part, extend, called on the student to solve a real-life problem to make use of their knowledge and skills in the previous parts. Students are instructed to present/defend their research to their advisers or research instructors. This part is done by groups synchronously.

The Develop phase is where the intended content and media are developed[10]. Therefore, those described contents were written. The development of the module followed the work of Libata *et al.*, (2021)[15] and Leong-on (2020)[16]. It can be seen also that the tasks of the students can be done synchronously and asynchronously which favors flexible learning. Flexible learning is a method that enables learning for any audience, at any time, and in any location. It might involve using technology but not exclusively [17]. The developed module in writing sections of health research

can be uploaded in the NEO LMS, thus students can access and download it. They can use such module anytime and anywhere.

3.3. EVALUATION

3.3.1. EXPERTS' EVALUATION :

The results showed that the developed module was generally very satisfactory (mean = 2.65; sd = 0.31) (Table 1).

Table 1. Evaluation of the Module

Area of Evaluation	Mean	SD	Interpretation
Structure (Context, Organization, and Environment)	2.76	0.05	very satisfactory
Content (Presentation of Information)	2.67	0.42	very satisfactory
Processes, Human Aspects, Relationships, Interactions, and Quality ()	2.26	0.56	satisfactory
Outcomes (Mastery of Content and Course Evaluation)	2.89	0.19	very satisfactory

mean = 2.65 sd = 0.31 interpretation: very satisfactory

Note: Means were interpreted as follow: 0-0.75 poor; 0.76-1.5 less satisfactory; 1.51-2.25 satisfactory
 2.26-3.00 very satisfactory

As to the structure, the expert evaluators found that the manual was very satisfactory. It means that they were generally very satisfied with the course segmenting, color, spacing, font, illustrations, and design and layout. Other items that were included are scrolling within the course or documents, assignment navigation, a variety of assessments, and learning resources. Also included is the use of a variety of instructional media.

The content of the module was rated very satisfactory too. The evaluators were very satisfied in terms of discussion (synchronous and asynchronous), course and unit learning objectives, and course assignments, readings, activities, and/or projects. They were also very satisfied with the writing style (syntax, grammar, punctuation, and flow) and knowledge. These support Tomita's (2017)[18] conclusion that instructional content should be presented in a variety of settings.

In the area of processes, human aspects, relationships, interactions, and quality, the evaluators rated the manual satisfactory. They are generally satisfied with the access to faculty (consultation hours) and assessment of learning styles (visual, auditory, reading and writing, and kinesthetic). This can be explained by the fact that the evaluators were satisfied since they have visual and read-and-write learning preferences [19]. They also showed satisfaction with teacher and learner responsibilities and guidelines for learning. To enhance this area, consultation time for the students should be written in the module.

In terms of outcomes, the evaluators felt very satisfied with student work reflecting mastery of course objectives and student work reflecting analyzing, synthesizing, evaluating, and creating. They found their modular learning to be quite good overall, which can be attributed to the evaluators' motivation and engagement [20]. The developed module as a product of this study got the highest rating, very satisfactory, from the experts like the module in technical writing [21].

3.3.2. READABILITY:

Results showed that the readability of the module was standard average, 11-13 years old (Sixth and Seventh Graders) (Table 2). Hence, the module is suitable for third-year college, 21-22 years old. The readability evaluation of the module was also carried out. Evaluation is carried out to see whether the product is effective in achieving its initial objectives [10].

However, the implementation and evaluation of the module by the students are not yet done. Implementation is the transmission of the learning resource to its intended audience. In the final process, the evaluation of the module by the students will examine whether the product is successful in reaching its initial objectives. The product of this study is a module, having a 7Es format, and got a very satisfactory evaluation from the experts. It is also appropriate to the level of the third-year Medical Laboratory Science students. Such a module is a supporting curriculum in teaching writing sections of health research.

Table 2. Readability of the Module in Writing Sections of a Quantitative Health Research Paper for Flexible Learning

Areas of Evaluation	Score/Level
Grade Level	7
Reading Level	Standard Average
Reader's Age	11-13 years old (Sixth and Seventh Graders)

4. CONCLUSIONS:

This study could serve as the basis for the implementation and evaluation by the students of the 7Es designed and developed Module in Writing Sections of Quantitative Health Research Paper for Flexible Learning among Medical Laboratory Science students.

5. RECOMMENDATION:

The developed module needs to be implemented and evaluated by the Medical Laboratory Science students in their MLS16Aa class.

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