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Students' Evaluation of Instructional Materials with 7Es Inquiry-Based, Blended, and Flexible Learning Designs in Science and Research Subjects

[1] Ma. Socorro G. Leong-on, [1] Jose G. Perez, Jr., [1] Ferly V. Penaverde, and [1,2]Rhodora A. Cartagena
[1] College of Pharmacy and Medical Technology, University of San Agustin, Iloilo City, Philippines
[2] College of Liberal Arts, Sciences, and Education, University of San Agustin, Iloilo City, Philippines
[1]mleongon@usa.edu.ph, [1] jperez @usa.edu.ph, [1] fpenaverde@usa.edu.ph,[1,2] rcartagena@usa.edu.ph

Abstract: *Worksheets and a module were created with 7Es inquiry-based, blended, flexible learning designs. There were 8 worksheets for Teaching Elementary Science 1 and Science 2, 4 worksheets for MLS16 and MLS16a, and a module for MLS16A and MLS16Aa. However, these had not yet been evaluated by the users, the students. This study was conducted to evaluate the worksheets and a module in terms of structure, content, processes, and outcomes. Using the descriptive, purposive sampling research design, 78 students completely answered the evaluation of MLS16 and MLS16a, and 93 students in the MLS16A and MLS16Aa module for the second semester 2024-25. While 4 BEEd students answered Sci.1 worksheets, and 3 students evaluated the Sci. 2 worksheets. An evaluation tool with a reliability of 0.96 using Cronbach's alpha was used. The evaluation form was sent to the students via a Google link after the approval of the Academic Supervisors, and the students were asked to agree to the informed consent. The students' evaluation results were presented using the mean and standard deviation and were interpreted as: 0-0.75 unsatisfactory; 0.76-1.5 less satisfactory; 1.51-2.25 satisfactory; 2.26-3.00 very satisfactory. The evaluation of worksheets for Elementary Science 1 and Elementary Science 2 (mean = 3.00, sd = 0.00) was very satisfactory, the highest rating. The 4 worksheets for MLS 16 and MLS16a, (mean = 2.74, sd = 0.07), and a module in MLS16A and MLS16Aa, (mean = 2.76, sd = 0.06), were also rated very satisfactory. The foundation for creating the worksheets and a module that can serve as a supplemental curriculum and be copyrighted was laid out by this study.*

Key Words: *evaluation, worksheets, module*

1. INTRODUCTION:

1.1. Background

Evaluation can be used to create a foundation for future copyright of instructional materials (IM), including worksheets and modules. During the evaluation, the structure (context, organization, and environment), content (presentation of information), processes (human aspects, relationships, interactions, and quality), and outcomes (mastery of content and course evaluation) by the student users are the essential areas to consider (Turner, 2017). Any IM is evaluated to see if it achieves its original objectives (Heaster-Ekholm, 2020). Therefore, it is important to evaluate every IM that is created.

Using worksheets and modules in the classroom has become a common practice. When teaching a subject, worksheets and modules enable the application of constructivist active learning strategies to enhance student learning in the classroom (Burkholder *et al*., 2021). Therefore, it is appropriate for today to create worksheets that encourage inquiry-based, blended, and flexible learning.

Educational framework known as the 7Es (elicit, engage, explore, elaborate, and extend) is used in inquiry-based learning (IBL). According to the study by Suwananphan *et al*. (2017), as cited by Gonzaga-Leong-on (2020), students who used the 7Es inquiry-based learning paradigm learned more effectively. IBL also improves motivation and comprehension of scientific concepts (Silm *et al*., 2017). According to Wolf *et al*. (2008), students perceive an inquiry-

based classroom as a more coherent and stimulating learning environment. A comprehensive educational experience that integrates technology, inquiry, and active learning can also be achieved by combining blended learning with the constructivist-based 7Es paradigm of inquiry-based learning.

Recently, inquiry-based learning has gained popularity, but blended learning has also become increasingly attractive. Blended learning combines in-person classroom instruction with virtual learning activities (Thorne, 2021). Blended learning strategies can be implemented by combining virtual learning environments (VLEs) and information and communications technology (ICT) (Osgerby, 2013). VLEs offer a wide range of materials to expand learning outside of the conventional classroom, such as webinars, e-books, online articles, audio or video lectures, and much more. The explore and explain parts of blended learning worksheets contain connections to videos, audio lectures, and articles.

Active student participation is encouraged via blended learning (Graham, 2020).

Online resources can provide content that is tailored to the requirements of each student, enabling individual study and feedback that is specific to them. This method eliminates geographical restrictions. Blended learning improved students' academic achievement in the experimental class (Tong *et al*., 2022; Graham, 2020). It enhanced students' learning attitudes, self-study skills, and academic achievement. The ability to think analytically and solve problems is promoted via blended learning. Through collaborative learning, the teacher-student dynamic is fostered, shifting from a hierarchical to a cooperative one. Through blended learning, students can acquire the essential digital literacy skills necessary for success in a society heavily dependent on technology (Thorne, 2023). By utilizing digital technology and online platforms to look for and evaluate digital content, students become more proficient with technology. Students can access course materials and complete tasks using blended learning, which allows them to study at their own convenience and pace (Vaughan, 2021).

In flexible learning, students can learn anywhere, at any time. It could entail utilizing, but not limited to, technology (Cassidy 2016). The tasks on the worksheets, such as the explore, elaborate, and extend phases, were created so that students may do them whenever and wherever they choose.

1.2. Rationale

Worksheets and a module were created with inspiration from 7Es inquiry-based, blended, flexible learning designs because of their many benefits for students. For the Bachelor of Elementary Education degree (BEED), these courses cover the lectures for Elementary Science 1 and Elementary Science 2. Worksheets for teaching the Introduction to Research and the Module in Writing Other Sections of Quantitative Research for Medical Laboratory Science were also created. They got a very satisfactory rating, the highest from the experts, and suitable for all student users as to readability. Nonetheless, there were eight (8) worksheets for each Elementary Science 1. Also, eight (8) in Elementary Science 2, four (4) worksheets on Introduction to Research, and a module on Writing Other Sections of Quantitative Research. However, they had not yet been evaluated by the students.

This study was conducted to evaluate the worksheets and a module with 7Es inquiry-based, blended, and flexible learning designs in Science and Research subjects in tertiary education. Specifically, the study was done to evaluate the worksheets and a module in terms of structure (context, organization, and environment), content (presentation of information), processes (human aspects, relationships, interactions, and quality), and outcomes (mastery of content and course evaluation) by the student users.

1.3. OBJECTIVES :

This study was conducted to evaluate the worksheets and a module with 7Es inquiry-based, blended, and flexible learning designs in Science and Research subjects in tertiary education. Specifically, the study was done to evaluate the worksheets and a module in terms of structure (context, organization, and environment), content (presentation of information), processes (human aspects, relationships, interactions, and quality), and outcomes (mastery of content and course evaluation) by the student users.

4. RESEARCH METHODOLOGY:

4.1. Research Design

For this study, a descriptive research design was used. It described the evaluation of the worksheets and a module by the users, the students.

4.2. Ethical Considerations

This study was submitted to the university's Ethics Clearance Committee. Before it was conducted, the Academic Supervisors approved the conduct of the study.

4.3. Locale of the Study

The study was conducted at the 2 departments of a private university in Iloilo City, from March to August 2025.

4.4. Sample Size and Design

Using purposive sampling, 78 students completely answered the evaluation of MLS16, and 93 students in the MLS16A module for the second semester 2024-25 became respondents. While 4 BEEd students answered Sci.1 worksheets, 3 for Sci. 2.

4.5. Evaluation Tool

The evaluation tool developed by Leong-on *et al*. (2022) was used. This was patterned in the study of Ternus (2007), and the Learning Resource Material Development System (LRMDS) of the Department of Education, Philippines, served as the evaluation form used by the students. Using Cronbach's alpha, the evaluation form's reliability was 0.96. The worksheets were evaluated in terms of structure (context, organization, and environment), content (information presentation), processes (human aspects, relationships, interactions, and quality), and outcomes (content mastery and course evaluation).

4.6. Evaluation of the Worksheets Procedure

The worksheets' evaluation form was sent to the students who used the worksheets and the module via a Google link.

4.6. Data Analysis

The students' evaluation results were presented using the mean and standard deviation. The following mean interpretation was used: 0-0.75 unsatisfactory; 0.76-1.5 less satisfactory; 1.51-2.25 satisfactory; 2.26-3.00 very satisfactory.

5. RESULTS:

The students' highest evaluation, very satisfactory, was given to the blended, flexible, inquiry-based 7Es worksheets and a module in terms of structure (context, organization, and environment), content (presentation of information), processes (human aspects, relationships, interactions, and quality), and outcomes (mastery of content and course evaluation) by the student users. The evaluation of the developed eight (8) worksheets for Elementary Science 1 (*mean* = 3.00, *sd* = 0.00), and the eight (8) for Elementary Science 2 (*mean* = 3.00, *sd* = 0.00) were very satisfactory. The four (4) worksheets for MLS 16, Introduction to Research (*mean* = 2.74, *sd* = 0.07), and a module in MLS 16A, Research Writing and Presentation (*mean* = 2.76, *sd* = 0.06), were also very satisfactory (Tables 1– 4).

Table 1

Evaluation of the Elementary Science 1(Teaching Chemistry and Biology) Worksheets

Areas of Evaluation	Mean	SD	Interpretation
Structure – Context/ Organization/ Environment	3.00	0.00	Very Satisfactory
Content - Presentation of Information	3.00	0.00	Very Satisfactory
Processes – Human Aspects, Relationships, Interactions, and Quality	3.00	0.00	Very Satisfactory
Outcomes - Mastery of Content and Course Evaluation	3.00	0.00	Very Satisfactory

Mean = 3.00 *SD* = 0.00 Interpretation: Very Satisfactory

Table 2

Evaluation of the Elementary Science 2 (Physics and Earth and Space) Worksheets

Areas of Evaluation	Mean	SD	Interpretation
Structure – Context/ Organization/ Environment	3.00	0.00	Very Satisfactory
Content - Presentation of Information	3.00	0.00	Very Satisfactory
Processes – Human Aspects, Relationships, Interactions, and Quality	3.00	0.00	Very Satisfactory

Outcomes - Mastery of Content and Course Evaluation	3.00	0.00	Very Satisfactory

Mean = 3.00 *SD* = 0.00 Interpretation: Very Satisfactory

Table 3

Evaluation of the MLS 16 (Introduction to Research) Worksheets

Areas of Evaluation	Mean	SD	Interpretation
Structure – Context/ Organization/ Environment	2.75	0.05	Very Satisfactory
Content - Presentation of Information	2.77	0.04	Very Satisfactory
Processes – Human Aspects, Relationships, Interactions, and Quality	2.76	0.04	Very Satisfactory
Outcomes - Mastery of Content and Course Evaluation	2.68	0.14	Very Satisfactory

Mean = 2.74 *SD* = 0.07 Interpretation: Very Satisfactory

Table 4

Evaluation of the MLS 16A (Research Writing and Presentation) Module

Areas of Evaluation	Mean	SD	Interpetation
Structure – Context/ Organization/ Environment	2.79	0.05	Very Satisfactory
Content - Presentation of Information	2.81	0.04	Very Satisfactory
Processes – Human Aspects, Relationships, Interactions, and Quality	2.75	0.05	Very Satisfactory
Outcomes - Mastery of Content and Course Evaluation	2.69	0.08	Very Satisfactory

Mean = 2.76 *SD* = 0.06 Interpretation: Very Satisfactory

6. DISCUSSION:

The structure (context, organization, and environment) of the worksheets and a module received a very satisfactory, highest rating, from the students. Based on the study by Turner (2017) and LRMDS, Dep Ed, Philippines, as cited by Leong-on *et al*. (2022), the results showed that the students, on the whole, were very satisfied with how the worksheets were segmented. They believe that the worksheets are complete units that vary in length based on the learning objectives and appear to progress to promote learning. The evaluators found that the worksheets' colors are pleasing, easy to read, and easy on the eyes. Reading the worksheet is made easier by the spacing between letters and words. The font is also simple to read. The Illustrations are simple and instantly recognizable. The drawings provide clarification, support the text, and have appropriate labels or subtitles. The graphics are intriguing and beautiful. There is an acceptable depiction of the text, and the design and layout are appealing and pleasing to the eye. There is a seamless mixing of elements, such as text and graphics. The fact that the material was presented in the worksheets in an acceptable frame with little need for scrolling greatly pleased the evaluators. At least three different sorts of assessments are shown in the worksheets. Clear and detailed directions for each assignment are provided. The learning materials and links are extensive, well-written, and active/current. The communication methods with the students are comprehensive via accessibility to online apps, and more than three varieties of instructional media are used in worksheet delivery.

The students rated the content (presentation of information) very satisfactory, too. To them, the faculty adds to the body of knowledge and information presented during asynchronous (doing the elaborate or extend phases of the worksheet) and/or synchronous discussions or interactions with students (elicit, engage, explain, and extend in some worksheets). There are an appropriate number of credible and relevant selected links to add to the learning experience. These are in support of the suggestion of Tomita (2017) that instructional content should be presented in a variety of settings. The measurable, behavioral learning objectives/goals or unit objectives are identified in the introduction to the course. The number of objectives is appropriate for the content and time of the worksheets. The assignments, activities, readings, and/or projects within the worksheet discuss the purpose of the assignment related to learning objectives and

are appropriate and manageable. The information within the worksheet follows principles of grammar and sentence structure and has very minimal typing errors. The expertise in the content area of the developer of the worksheet is evident in the presentation of knowledge and interactions with students.

The students rated the area of processes (human aspects, relationships, interactions, and quality) as very satisfactory. This means that the consultation hours are posted in phone, face-to-face, and virtual times. For the assessment of learning styles (visual, auditory, reading and writing, and kinesthetic), specific information about skills and personality required for completion of the worksheet is presented. There is clear guidelines established for the learner that include learner and teacher responsibilities, communication, and techniques to support the learner.

A very satisfactory rating was also given by the students to the outcomes (mastery of content and worksheet evaluation area). The student's work demonstrates mastery of course content and course objectives. The student's work demonstrates the progression of complexity from knowledge to the level of analyzing, synthesizing, evaluating, and creating for major assignments. The evaluators rated their learning experience as very satisfactory, in general.

Typically, inquiry-based modules receive high ratings, such as "very good." This indicates that the built module satisfies the criteria with little modification (Lumabit *et al*., 2023). Students' critical thinking abilities are also successfully enhanced via inquiry-based modules (Walundari *et al*., 2022). The Blended Inquiry Learning (BIL) methodology, which combines inquiry-based and blended learning, greatly enhanced students' capacity for higher-order thinking skills like analysis, assessment, and creation. Additionally, students' desire and involvement in the learning process are enhanced (Riade *et al*., 2024). Dapat *et al*. (2023), revealed that the module with flexible learning design found that the majority of the preservice teachers perceived the module as aligned with the instructional design frameworks of outcomes-based education, TPACK and UDL, Diversity and Inclusivity, and facilitative learning experiences. This study established the basis for developing copywriting worksheets and a module that can be used as a support curriculum.

8. CONCLUSION:

The inquiry-based 7Es, blended, and flexible, 8 worksheets for Elementary Science 1, 8 worksheets for Elementary Science 2, the 4 worksheets for MLS 16 and MLS16a, Introduction to Research, and a module in MLS16 and MLS 16Aa, Research Writing and Presentation got very satisfactory evaluation. The foundation for creating the worksheets and a module that can serve as a supplemental curriculum was laid out by this study, as well as for their copyright.

9. LIMITATIONS:

These results were true only when the evaluation was conducted among students of BSMLS third year, and BEED fourth year, second semester, 2024-25. It was also limited in the use of the questionnaire by Leong-on (2022) and employed a quantitative descriptive design.

10. RECOMMENDATIONS:

It is recommended to copyright and use the worksheets and the module that can be serve as a support curriculum.

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