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Development of Worktext in Biophysics

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Abstract
This study was conducted to develop a worktext in Biophysics for college students. Specifically, it aimed to determine the availability and adequacy of instructional materials in Biophysics; describe the worktext; evaluate the worktext in terms of objectives, format, content, organization, language, and usability; and determine the readability of the worktext. The study used the research and development (R&D) design and the descriptive method of research. The survey respondents were nine Physics faculty members and a university librarian. Six experts in Physics and Biology served as evaluators of the worktext. A survey checklist and the evaluation questionnaire, adopted from Salavaria (2014) were utilized. The development of the worktext was guided by the first three stages (Analysis, Design, and Development) of the ADDIE Model of Instructional Design. The data were analyzed using the mean. Results of the study revealed that 1) there is a need to develop worktexts and other instructional materials in Biophysics, 2) the worktext was described as substantial, clear, simple to understand, stimulating, and loaded with activities, 3) worktext was evaluated as excellent overall and in all criteria; 4) in terms of its readability, the worktext is suitable for college students; and 5) the worktext is highly valid as an instructional material in Biophysics. The worktext is recommended for utilization in the university. The effect of using it on the achievement of students may be measured. Similar studies may be conducted to develop worktexts in other courses using the ADDIE Model.

Keywords: Philippines, Biophysics, worktext, ADDIE Model, tertiary students

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Introduction
The Philippines has put Outcomes-Based Education (OBE) at the forefront of the country's educational reforms. The OBE framework was formally institutionalized in state universities and colleges when the Commission on Higher Education issued Memorandum Order 46 s. 2012, otherwise known as "Policy Standards to Enhance Quality Assurance in Philippine Higher Education through an Outcomes-Based and Typology-Based Quality Assurance. Central to this framework is the emphasis on the outcomes of learning in terms of competencies acquired and developed by students, and how they will apply the knowledge and skills when they leave the institution. It aims to equip students with 21st-century skills and to promote their holistic development and lifelong learning. It intends to transform the learners to become useful citizens, critical and creative thinkers, problem solvers, good decision makers, effective leaders, and excellent communicators.

Implementing OBE requires SUCs to enhance their various curricula and to plan for the desired learning experiences of students. With the end in mind, teachers are expected to set appropriate course-intended outcomes instead of teaching objectives. They have to ensure the alignment of intended learning outcomes stated in the course syllabi with the teaching strategies to yield meaningful student learning and the method to assess the learning. Constructivist or student-centered teaching and learning approaches are appropriate under OBE. Biggs' model of constructive alignment (Biggs, 1996) describes how intended learning outcomes can be aligned with the constructivist teaching strategy and the assessment method.

In the context of OBE, science curricula must aim for the improvement of instruction resulting in students' construction of scientifically accepted knowledge and their development of science process skills. In the field of Physics, however, the challenge of achieving these outcomes continues as research has shown that the subject is "conceptually difficult both to learn and to teach" (Ekici, 2016). It has also been observed by researchers that students pursuing life sciences tend not to appreciate and cope easily with the abstract nature of physics and the use of sophisticated mathematics that goes with it.

In specialized fields such as Biophysics, teaching and learning may be even more difficult because of the multidisciplinary nature of the course and the fact that biological systems are at the molecular level. Biological processes take place due to the behavior and interactions of molecules that make up biological systems. Understanding of such systems can thus be enhanced by injecting a physical perspective. The inclusion of Biophysics in the Bachelor of Science in Biology curriculum will give biology students opportunities to learn physics that is contextualized to biological applications.

The lack of instructional materials that focus on the physics principles applied to biological systems contributes to the difficulty in teaching Biophysics. In general, challenges in science education include the inadequacy of good textbooks and suitable tools and the lack of skilled science teachers who can handle better science courses. Consequently, these challenges contribute to students' low interest and poor performance in science.

Thus, the instructor faces such instructional challenges and carries a great role in creating and facilitating meaningful learning experiences among the students. The instructor is thus expected to employ student-centered teaching methodologies and to use appropriate instructional materials. This is to ensure better learning outcomes in Physics.

In the present situation where a new normal has emerged, instructional delivery has to be modified. Instead of the usual face-to-face modality in conducting classes, blended learning, flexible learning, online learning, and distance learning are being encouraged to be used. Teachers have to utilize instructional materials that can be sent to students, who are expected to accomplish instructional tasks and be equipped with the desired competencies independently and responsibly at their own pace. There is a felt demand for the development of worktexts, workbooks, modules, and other instructional materials.

Given the challenges education is facing nowadays and the importance of developing instructional materials to improve teaching and learning outcomes, the researchers conceptualized a study to produce a worktext in Biophysics, which can be utilized as both a textbook and a workbook. In addition, the development of the worktext in Biophysics contributes to the advancement of Sustainable Development Goal No. 4 which aims to promote and ensure inclusive, equitable, and quality education for all learners.

Overall, these studies contribute valuable insights into the development and validation of instructional materials across various educational contexts, underscoring the importance of alignment with learning objectives, cultural relevance, and ongoing evaluation and training for educators. The development of instructional materials is a multifaceted endeavor with far-reaching implications for achieving SDG 4. By prioritizing equitable access, quality, inclusivity, teacher capacity building, lifelong learning, global citizenship education, and ongoing monitoring and evaluation, instructional materials can serve as catalysts for transformative education that empowers individuals, enriches communities, and contributes to sustainable development on a global scale.

Materials and Methods

Research Design. The study used the research and development (R&D) design and the descriptive method of research. The R&D design refers to a model for the development and validation of educational products and is concerned with the development of product-oriented research used in education (Borg & Gall, as cited by Gustiani, 2019).

Respondents of the Study. Respondents to the survey on the availability and adequacy of instructional materials utilized for instruction consisted of nine faculty members teaching General Physics. The university librarian was also consulted as to the number of available materials in the library. Six experts in the fields of Physics and Biology from five state universities and one private university in the Philippines served as evaluators of the worktext.

Data Gathering Instruments. Two sets of questionnaires were used in the study. The first set is the survey checklist constructed by the researchers to gather data on the availability and adequacy of instructional materials in teaching Biophysics. The following norms for interpretation were used:

Scale	Range	Item Descriptive Rating and Level of Availability and Adequacy
5	4.20 – 5.00	Available and Very Highly Adequate
4	3.40 – 4.19	Available and Highly Adequate
3	2.60 – 3.39	Available and Moderately Adequate
2	1.80 – 2.59	Available but not Adequate
1	1.00 – 1.79	Not Available.

The second set was the questionnaire, adopted from Salavaria (2014), which was used to evaluate the worktext. The quality of the worktext was assessed using the following norms for interpretation:

Scale	Range	Item	Descriptive Rating	Quality of Worktext
5	4.20 – 5.00		Strongly Agree	Excellent
4	3.40 – 4.19		Agree	Very Good
3	2.60 – 3.39		Moderately Agree	Good
2	1.80 – 2.59		Disagree	Fair
1	1.00 – 1.79		Strongly Disagree	Poor

The free online software Tests Document Readability - Readability Calculator (https://www.online-utility.org/english/readability_test_and_improve.jsp) was used to test the readability of the worktext.

Data Gathering Procedure. The data-gathering procedure followed in this study is shown in the flowchart (Figure 2), which is based on the first three stages of the ADDIE Model of Instructional Design.

Analysis Stage. In the Analysis Stage, needs analysis on the Status of Instructional Materials in Biophysics was done. The researchers administered the survey checklist measuring the availability and adequacy of instructional materials in Biophysics to nine faculty members teaching Physics through Google Forms. They also requested a list of textbooks, e-books, and other instructional materials in Biophysics available in the library.

Design Stage. In the Design Stage, the researchers determined the topics and sub-topics to be covered in the module based on the course syllabus of Biophysics. They decided to have seven chapters, namely: Chapter I - Biophysics: Nature and Scope, Chapter II - Biophysical Techniques and Applications, Chapter III - Energy and Life, Chapter IV - Statistical Mechanics, Chapter V - Biomolecules and the Forces Affecting Conformation, Chapter VI - Biophysics of the Cell, Proteins, Nucleic Acids, and Membranes, and Chapter VII - Physiological and Anatomical Biophysics. They planned and organized the parts of the worktext and ensured that the contents would include the desired learning competencies, instructional tasks, lessons with illustrations, assessment tasks, and references and related materials. They also decided on the format and layout of the lessons as well as on the design of the cover page.

Development Stage. In the Development Stage, the researchers had their actual writing of the worktext. After this, they sent the manuscript to six experts in the fields of Physics and Biology for them to assess the quality of the worktext in terms of objectives, format, content, organization, language, and usability. Based on the comments and suggestions of the experts, the researchers revised and improved the worktext. The researchers then subjected the manuscript to a readability test using the Flesch-Kincaid Readability Test. Based on the test results, the researchers revised and finalized the worktext in Biophysics.

Ethical Considerations. The researchers adhered to ethical standards in conducting the research. Before conducting the study, the University Ethics Review Committee reviewed the protocol and found its ethical appropriateness. The committee approved the proposal with Approval Number A-21-104 on August 6, 2021.

Statistical Treatment of Data. The study made use of the mean to determine the availability and adequacy of instructional materials and resources, and to indicate the typical values of the ratings on the assessment of the adequacy of instructional materials in Biophysics, and the experts' ratings on the quality of the worktext.

Results

Availability and Adequacy of Instructional Materials in Biophysics. Table 1 shows the results of the survey on the availability and adequacy of instructional materials in Biophysics. According to the nine faculty members teaching Physics and Biology, e-books and PowerPoint presentations are available and highly adequate as shown by the respective means, $\bar{x}$= 3.78 and $\bar{x}$ = 3.67. Projectors are available and highly adequate ($\bar{x}$= 3.67), and audio-visual presentations are available and moderately adequate ($\bar{x}$=3.11). Other instructional materials including textbooks, worktexts, and modules are available but not adequate as shown by the means ≤ 1.89. The university librarian confirmed that there are seven e-books and six textbooks in Biophysics with one volume each in the university library. The results of the survey indicate that there is a need to develop instructional materials in Biophysics. In this study, the researchers preferred to develop a worktext because of the ease of basing the contents on the course syllabus for lectures and having it evaluated by experts, thereby, ensuring its validity, and acceptability.

Description of the Developed Worktext in Biophysics. The developed worktext in Biophysics with cover photo shown in Figure 3 has seven chapters, namely, Chapter I - Biophysics: Nature and Scope; Chapter II - Biophysical Techniques and Applications; Chapter III - Energy and Life; Chapter IV - Statistical Mechanics; Chapter V - Biomolecules and the Forces Affecting Conformation; Chapter VI - Biophysics of the Cell, Proteins, Nucleic Acids and Membranes; and Chapter VII - Physiological and Anatomical Biophysics. Each chapter consists of a list of learning outcomes, an introduction, a discussion with illustrations and sample problems, a chapter summary, and exercises.

Chapter I explains the nature and scope of the multidisciplinary field of Biophysics. This chapter enables learners to describe the nature and broad scope of biophysics, explain how biophysics as a field developed, learn how the areas of biophysics are interrelated, and differentiate molecular and subcellular biophysics, physiological and anatomical biophysics, and environmental biophysics. The topics covered include a preliminary description of what Biophysics is, its brief history specifying important discoveries, a

presentation of the role of Biophysicists, and a detailed discussion of the scope and branches of Biophysics.

Chapter II includes several biophysical techniques and applications. In this chapter, learners are expected to describe the different techniques and applications under molecular and subcellular biophysics, physiological and anatomical biophysics, and environmental biophysics, explain the importance of each biological technique or application, and discuss applications of biophysics in medicine and other areas. The lessons are about ultracentrifugation, electrophoresis, size exclusion chromatography, spectroscopy (absorption spectroscopy and fluorescence spectroscopy), mass spectrometry, X-ray Crystallography, nuclear magnetic resonance (NMR) spectroscopy, electron microscopy (transmission electron microscopy (TEM) and scanning electron microscopy (SEM)), atomic force microscopy, using optical tweezers, using voltage, current, and patch clamps, and calorimetry.

Chapter III explores the relationship between energy and life. It intends to have learners who can discuss the laws of thermodynamics as applied to biophysical systems, and explain how Gibbs energy determines whether a biophysical process will take place. This chapter discusses the First Law of Thermodynamics, enthalpy, entropy, Gibbs energy, and the Second Law of Thermodynamics.

Chapter IV provides a statistical description of physics that applies to biological systems. It aims to enable learners to explain how the concepts of statistics and probability are applied to describe biophysical systems, give the importance of the Boltzmann distribution, define the partition function and use it to calculate thermodynamic quantities such as average energy, and discuss the random-walk problem and apply it in determining the probability of finding a particle in a particular energy state or location. The lessons presented in this chapter include an introduction to the field of Statistical Mechanics, a review of Statistics and Probability, and a comprehensive discussion of the random walk model of molecules, the energy distribution among molecules, and the Boltzmann Distribution and Partition Function.

Chapter V describes biomolecules and the forces that affect conformation. The learning outcomes intend to have learners who can discuss the forces that influence the conformation of biomolecules, explain the relative strengths of these forces and the conditions under which each force becomes significant, and calculate the value of various forces in biomolecules. Topics under Chapter V include types of chemical bonds, movement in chemical bonds and molecular conformation, forces that affect conformation in biomolecules, hydrogen bonds in water, and hydrophobic and hydrophilic interactions.

Chapter VI discusses the biophysics of the cell, proteins, nucleic acids, and membranes. Learning outcomes are the competencies of identifying the common structures of a typical cell and describing their functions, explaining the concepts of selective permeability of the cell membrane, identifying the building blocks and functions of proteins, and describing the structure and functions of nucleic acids. The lessons are focused on the physics of the cell, membranes, proteins, and nucleic acids.

Chapter VII deals with physiological and anatomical biophysics. This chapter enables learners to explain some basic concepts in physiological and anatomical biophysics, determine the height of a jump given the weight of an animal and the force generated by its legs, calculate the velocity of blood in the aorta, discuss how arteriosclerosis affects blood flow, and describe some aspects of the aerodynamics of hummingbird flight. The lessons cover the topics of the motion of an organism in a fluid, pumping blood, and hummingbird hovering.

The developed worktext is in book form with 100 pages, provided with a preface, a full list of references, and a page “About the Authors.” The topics in the worktext are aligned with the course syllabus for a one-semester course in Biophysics intended for college students pursuing the degree Bachelor of Science in Biology.

Evaluation of the Biophysics Worktext. Tables 2 through 8 show the evaluation results of the developed worktext under six criteria, namely, objectives, format, content, organization, language, and usability.

On Objectives. As shown in Table 2, the evaluators strongly agreed on all items under objectives with means ranging from 4.67 to 5.00. These results indicate that the worktext is clear in its purpose of facilitating students’ learning in Biophysics and supporting the goals of the college and the curriculum. The learning outcomes define clearly what competencies are expected to be developed by the students. In general, the worktext is evaluated as well-written in terms of the nature, purpose, and procedure. Overall, the evaluators rated the worktext as excellent on objectives as indicated by the mean, $\bar{x} = 4.89$.

On Format. Table 3 presents the item mean ratings under the criterion of format. The evaluators strongly agreed on all the items with means ranging from 4.33 to 5.00. The results suggest that the format shows that the instructional design was carefully planned with clear and easy-to-follow instructions, readable font style and size, and visually appealing, stimulating, and well-organized presentation of lessons. In general, the evaluators gave the worktext a rating of excellent ($\bar{x} = 4.71$) on the aspect of format.

On Content. Shown in Table 4 are the item mean ratings under the criterion of content. The evaluators strongly agreed on all the items with means ranging from 4.50 to 5.00. These validate that the worktext covers adequately the topics of Biophysics and provides clear and easy-to-follow instructions. They also agreed strongly that the lessons can promote the development of higher-order skills, develop students' ability to work individually and cater to different learning styles and multiple intelligences. On the overall, the evaluators rated the worktext as excellent ($\bar{x}$ = 4.79) in terms of content.

On Organization. Table 5 presents the ratings given by the evaluators on the criterion of organization. They strongly agreed on all items with means ranging from 4.58 to 5.00. These results indicate that the worktext contains lessons that are logically presented, and the lessons and narratives are well-developed. The worktext contains real-life applications and illustrations that are relevant to the subject matter. Overall, on the criterion of organization, the evaluators rated the worktext as excellent ($\bar{x}$= 4.82).

On Organization. Table 5 presents the ratings given by the evaluators on the criterion of organization. They strongly agreed on all items with means ranging from 4.58 to 5.00. These results indicate that the worktext contains lessons that are logically presented, and the lessons and narratives are well-developed. The worktext contains real-life applications and illustrations that are relevant to the subject matter. Overall, on the criterion of organization, the evaluators rated the worktext as excellent (= $\bar{x}$4.82).

On Language. The results of the evaluation of the worktext concerning language are presented in Table 6. The evaluators strongly agreed on all items with mean ratings that ranged from 4.75 to 4.92. These results show that the worktext lessons have a language structure that is appropriate to the level of comprehension of the target learners. Overall, the worktext is rated excellent ($\bar{x}$= 4.83) on the criterion of language.

On Usability. The results of the evaluation of the worktext on the criterion of usability are given in Table 7. The evaluators strongly agreed on all items with means which range from 4.67 to 5.00. The high ratings suggest that the worktext shows usefulness in promoting an understanding of the different concepts and principles of Biophysics. The worktext lessons are stimulating and interesting, and thus aid in students' development of new knowledge and skills. Overall, the worktext is rated excellent ($\bar{x}$= 4.92) on the aspect of usability.

Overall Evaluation. The means of the ratings given by the evaluators under the six criteria of objectives, format, content, organization, language, and usability are presented in Table 8. The overall mean rating obtained is 4.83 which shows that the quality of the worktext is excellent. This result further shows that the worktext has high validity as instructional material in Biophysics.

The evaluators' excellent rating of the overall quality of the worktext is supported by their comments which they wrote in the evaluation instrument:
"The worktext is well written with very clear instructions and promotes independent learning."
"The content satisfies the curriculum requirement and is logically presented."
"The worktext builds knowledge about what is required for achieving tasks in the course."
"The worktext was carefully crafted and designed to achieve the desired objectives and goals of the learning material."
"It supports the use of authentic assessment to enhance student's learning."
"It is of great help to students."

According to Bugler et al. (2017), a learning material is said to be of quality if it has fulfilled the following criteria: a) A learning material must not contain errors, must be well-written, and must have strong visual appeal. b) It must be aligned to standards and efficiently address standards. c) It must be easy for teachers and students to use and must have a complete set of instructions, materials, activities, assessments, and answers. d) It must spark student interest and be appropriate by skill level and language ability.

The Association of American Publishers (2015) as cited by Garcia (2020) posited that professional standards of quality and consistency should be the baseline for all instructional resources which include some quality benchmarks such as articulated learning goals and objectives, relevant and up-to-date content, and well-designed materials for students and teachers. Hence, with these indicators, the developed worktext can be utilized to supplement the teaching and learning of the Biophysics course.

Readability of the Worktext. The results of the Flesch-Kincaid readability tests of the text are shown in Table 9. These are scores in the Flesch-Kincaid Grade Level and Flesch Reading Ease tests. The Flesch-Kincaid Grade Level score indicates the grade level of an average student who can read the text. The score of 8.83 shows that the worktext with seven chapters can be read by Grade 9 students and thus it is suitable for the reading ability of junior high school students. The Flesch Reading Ease score indicates whether the text is easy to read. The score of 52.70 indicates that the worktext is fairly difficult to read and is appropriate for college students. The target readers of the Biophysics worktext are college students. Based on the results of the Flesch-Kincaid Readability

Tests, the worktext is appropriate to be used by college students.

Discussion

The findings of this study confirm a pressing need for contextualized instructional materials in specialized courses like Biophysics. The result that existing resources are "available but not adequate" aligns with similar findings in other fields, such as Physical Science (Rogayan & Dollete, 2019) and Science, Technology, and Society (Paranada et al., 2023), highlighting a systemic challenge in higher education. This resource gap undermines the effective implementation of Outcomes-Based Education, as it limits the tools available to faculty for fostering deep learning. The development of the Biophysics worktext directly addresses this gap.

The "excellent" overall rating from the panel of experts serves as a strong validation of the worktext's quality and alignment with pedagogical standards. This result is consistent with the outcomes of similar research and development studies where newly developed materials, such as a statistics worktext (Salavaria, 2014) and TLE dressmaking modules (Tugade, 2018), also received high validation ratings. The high score for 'Objectives' ($\bar{x} = 4.94$) is particularly significant, as it indicates a strong alignment between the worktext's stated learning outcomes and its content and assessments, which is a cornerstone of constructive alignment theory.

Regarding readability, the Flesch-Kincaid Grade Level of 15 confirms that the material is appropriately challenging for its intended audience of undergraduate biology majors. While the text is classified as "difficult to read," this is expected for a tertiary-level science course that introduces complex terminology and abstract concepts. The worktext is designed to scaffold student learning, guiding them through this challenging material with structured lessons and activities, which aligns with Vygotsky's Scaffolding Theory. The study, therefore, successfully balances academic rigor with pedagogical support.
In essence, this study provides a validated solution to a clearly identified problem. It contributes not only a tangible instructional product but also reinforces the value of the ADDIE model as a systematic and effective framework for curriculum development. The findings demonstrate that a research-based approach to creating instructional materials can yield high-quality resources that are fit for purpose and ready for implementation.

Conclusions

Based on the findings of this study, the following conclusions are forwarded: Teachers have adequate e-books and PowerPoint Presentations in Biophysics but not adequate textbooks, worktexts, workbooks, modules, manuals, and pamphlets, and thus, there is a need to develop more instructional materials in Biophysics. The worktext developed in this study was guided by the ADDIE model, following three of its five stages – Analysis, Design, and Development; and described as substantial, clear, simple to understand, stimulating, and loaded with activities. The worktext was evaluated as excellent overall and in terms of objectives, format, content, organization, language, and usability. In terms of its readability, the worktext is suitable for college students. The worktext is highly valid as an instructional material in Biophysics.

Declaration

This paper was completed in 2024 when all the authors are still affiliated at the University of Northern Philippines. Hence the authors hereby declare that this is an accomplishment of the funding university, the University of Northern Philippines and not the new affiliation of the author/s.

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Conflict of Interest

The authors declare no conflicts of interest.

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Table 1 Availability and Adequacy of Instructional Materials in Biophysics

Instructional Materials	Mean	Descriptive Rating
1. Worktexts	1.89	Available but not Adequate
2. Modules	1.89	Available but not Adequate
3. Textbooks	1.89	Available but not Adequate
4. E-Books	3.78	Available and Highly Adequate
5. Workbooks	1.89	Available but not Adequate
6. Manuals	2.00	Available but not Adequate
7. PowerPoint Presentations	3.67	Available and Highly Adequate
8. Handouts	2.11	Available but not Adequate
9. Projectors	3.67	Available and

		Highly Adequate
10. Audio-Visual Presentations	3.11	Available and Moderately Adequate
11. Pamphlets	1.89	Available but not Adequate
Overall	**2.53**	**Available but not Adequate**

Table 2 Results of the Evaluation of the Worktext in Terms of Objectives

Item	Mean	Descriptive Rating
1. Define clearly what is to be learned.	4.92	Strongly Agree
2. Support the realization of the general objective.	5.00	Strongly Agree
3. Are attainable within available resources and time.	4.67	Strongly Agree
4. Manifest a coherent structure.	4.75	Strongly Agree
5. State clearly what students should know.	5.00	Strongly Agree
6. Show commitment to the goal of the college.	5.00	Strongly Agree
7. Satisfy the curriculum requirement.	5.00	Strongly Agree
8. Require a high level of cognition.	4.83	Strongly Agree
9. Facilitate the students in developing study attitudes and skills.	4.92	Strongly Agree
10. Address skills or technical procedures needed in the subject.	4.92	Strongly Agree
11. Show the expected amount of work to be done.	4.83	Strongly Agree

Table 3 Results of the Evaluation of the Worktext in Terms of Format

Item	Mean	Descriptive Rating
1. Organizes topics logically.	4.83	Strongly Agree
2. Shows attractive and readable design and quality of print.	4.33	Strongly Agree
3. Contains adequate margins and readable typeface suitable for students' use.	4.50	Strongly Agree

4. Exhibits a visually appealing and stimulating layout.	4.58	Strongly Agree
5. Demonstrates accurate and well-integrated graphics and illustrations into the text.	4.75	Strongly Agree
6. Shows readable font style and size.	5.00	Strongly Agree
7. Has no marks or smudges on the paper.	5.00	Strongly Agree
8. Displays appropriate spacing between letters and illustrations.	4.75	Strongly Agree
9. Exhibits a visually appealing presentation hence, sustains learning.	4.75	Strongly Agree
10. Illustrates carefully planned instructional designs.	5.00	Strongly Agree
11. Combines attractiveness with effectiveness on page layouts.	4.58	Strongly Agree
12. Illustrates appropriate styles and structures.	4.50	Strongly Agree
13. Shows consistency of illustrations and text in the materials.	4.58	Strongly Agree

Table 4 Results of the Evaluation of the Worktext in Terms of Content

Item	Mean	Descriptive Rating
1. Delivers lessons that are accurate, organized, clear, and up-to-date.	4.92	Strongly Agree
2. Gives clear and easy-to-follow instructions.	5.00	Strongly Agree
3. Covers the topics necessary for understanding the subject.	5.00	Strongly Agree
4. Includes references at the end of the lesson.	4.50	Strongly Agree
5. Uses smooth, integrated, comprehensive, relevant, and concrete evidence from sources.	4.67	Strongly Agree
6. Provides a relationship of previous and present ideas.	4.92	Strongly Agree
7. Contains clear lesson introductions and summaries.	4.83	Strongly Agree
8. Promotes the development of higher-order skills.	5.00	Strongly Agree
9. Provides practical applications of the lesson.	4.67	Strongly Agree
10. Presents appropriate activities to the students.	4.50	Strongly Agree
11. Provides activities that cater to multiple	4.67	Strongly Agree

intelligences, interests, and learning styles.		
12. Develops the ability to work individually.	4.83	Strongly Agree

Table 5 Results of the Evaluation of the Worktext in Terms of Organization

Item	Mean	Descriptive Rating
1. Presents ideas and topics logically.	4.83	Strongly Agree
2. Connects ideas with smooth transitions.	4.83	Strongly Agree
3. Contains prompts that elicit quick responses from the students.	4.92	Strongly Agree
4. Presents well-developed ideas and narratives.	5.00	Strongly Agree
5. Provides necessary supporting details and illustrations.	4.75	Strongly Agree
6. Uses real-life examples	4.58	Strongly Agree
7. Makes connections between disciplines.	4.67	Strongly Agree
8. Contains illustrations that are relevant to the subject matter.	5.00	Strongly Agree

Table 6 Results of the Evaluation of the Worktext in Terms of Language

Item	Mean	Descriptive Rating
1. Utilizes words that are free from grammatical errors.	4.75	Strongly Agree
2. Provides instructions/directions that are clear and easy to follow.	4.83	Strongly Agree
3. Uses language structure suitable to the comprehension level of the learners.	4.92	Strongly Agree
4. Uses the English language as the medium of instruction.	4.83	Strongly Agree

Table 7 Evaluation of the Overall Quality of the Worktext in Biophysics

Evaluation Criteria	Mean	Descriptive rating
A. Objectives	4.89	Excellent
B. Format	4.71	Excellent
C. Content	4.79	Excellent
D. Organization	4.82	Excellent
E. Language	4.83	Excellent
F. Usability	4.92	Excellent
Overall	**4.83**	**Excellent**

Table 8 Flesch Kincaid Readability Test Results

Flesh Kincaid Grade Level	Flesch Reading Ease
8.83	52.70

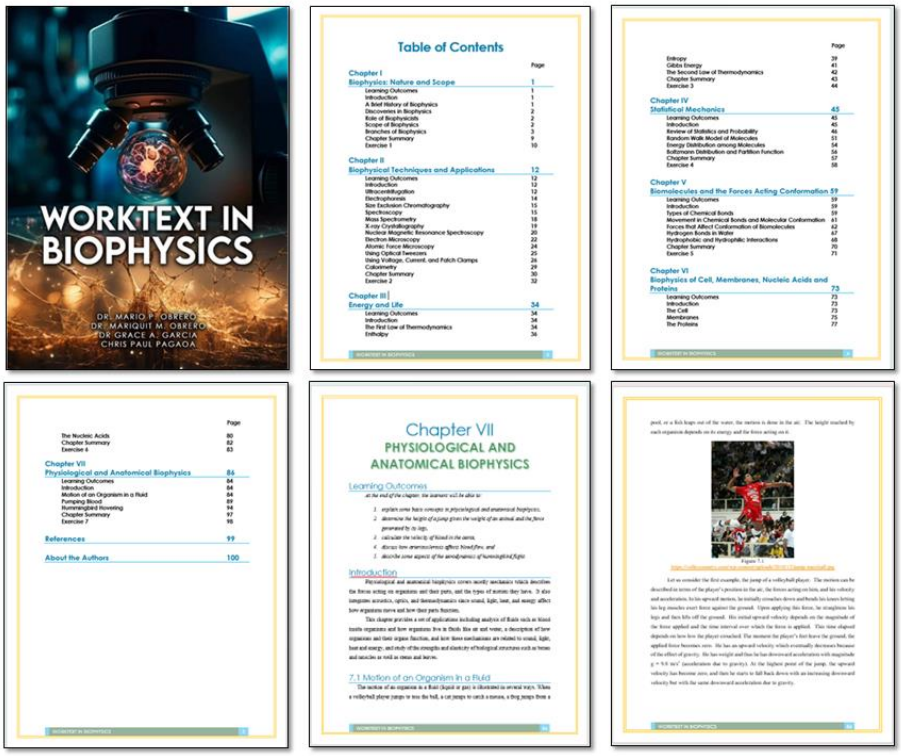

Figure 1 The Developed Worktext in Biophysics