

Developing “Genesis” Instructional Material in Learning the Different Theories on the Origin of Life

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Abstract: The utilization of technologies in learning has been exercised by educators in order to make classroom discussions more engaging and enhance learning among students. In this regard, developing instructional materials that integrate technologies on the different sets of learning tasks is essentially important. This paper deals with the development of an instructional material called “Genesis” in learning the theories on the origin of life and Biology unifying theories. This instructional material was developed to capture the student’s 21st century learning skills in Biology.

Keywords: Genesis, Instructional material, Biology, learning, 21st century skills, Learning task

1. Introduction

Nowadays, the student mastery of 21st century skills is essentially necessary and considered as the most critical outcome in the learning process [1][2]. The 21st century learning skills that promote innovation include creativity, critical thinking, communication, collaboration, intelligent risk-taking, lifelong learning, curiosity and inquiry, problem-solving, and many more [3][4][5]. Among these learning and innovation skills, most Educational institutions have identified the most essential 21st century learning skills (*i.e.*, the 4 C’s of 21st century learning) as depicted in Figure 1 [6][7].

- *Creativity:* Students can get creative as science by its nature is a creative human endeavor. The students can creatively perform the assigned tasks or activities in science subjects (*e.g.*, Biology).
- *Critical Thinking:* Critical thinking is essential in learning or performing scientific processes. In learning science, the students can enhance their abilities in logical thinking and reasoning about the concepts that they have learned and they can apply them to their everyday lives.
- *Communication:* Effective communication is significant to scientific research practices. Scientific processes are being communicated by students as they report the results of their experiments or activities. These can be presented in written, oral, mathematical, graphical, or visual representations of ideas and observations.

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- **Collaboration:** Learning science is inherently a collaborative process. Collaboration is essential in performing science activities or experiments in the classroom, in the laboratory, and in the field. Students must be engaged in collaborating with their peers, teachers, and other persons to learn new ideas and to refine and revise their prior knowledge.



Figure 1. 21st Century Skills 4 C's

In this regard, various technologies have been utilized by educators to enhance their learning environment and make it more engaging, collaborative, and interactive and ensure the students' mastery of the 21st century learning and innovation skills [8]. Technologies may include both hardware-related and software-related technologies capable of mitigating the students' engagement and motivation towards learning [9][10]. These technologies have been brought about by continuous advancements in the telecommunications industry where learning resources have become accessible anytime, and anywhere (*i.e.*, realized by miniaturization, wireless and mobile, and the Internet) [11].

In addition, educational paradigms were also enhanced to be aligned with the changing learning environments being integrated with technologies [12][13]. Learning has become accessible anytime and anywhere, and not being limited in the four corners of the classroom only. Various learning methodologies have been adopted by educational institutions such as computer-aided learning (CAL) [14], Internet in the classroom, blended learning (*i.e.*, combined online learning with traditional face-to-face (F2F) classroom-based methods) [15], distance learning, web-based learning (WBL) [16], e-learning [17], flipped learning [18], and more.

Moreover, curriculum and instructional strategies must be developed in accordance with the aim of mastering the 21st century learning and innovation skills and integrating the innovative, research-proven teaching strategies, modern learning technologies (*e.g.*, making use of the Internet, sophisticated educational software, advanced telecommunication technologies, and social networking services (SNS) such as Facebook, Instagram, LinkedIn, Twitter, Viber, YouTube, *etc.*), and real-world resources and contexts [19][20].

This paper aims to design an instructional material called “Genesis” to learn the theories on the origin of life as well as to learn the unifying theories of Biology. The learning tasks are identified in order to create a book on the trivia of life. When the students are through with this instructional material, they

are expected to learn the theories on how life begins and the unique features of life. This instructional material is designed for learning one of the lessons in the subject Introduction to Biological Sciences.

The remainder of this paper is organized as follows: Section 2 outlines the lesson guide in learning the theories on the origin of life; Section 3 discusses the overview of the designed instructional material; the identified learning tasks were highlighted in Section 4; and Section 5 concludes the study.

2. Lesson Guide in Learning the Theories on the Origin of Life

This section provides the outline of the lesson in learning the theory of life as one of the lessons in learning Biology. This will be the basis for designing the learning tasks and lesson activities in the instructional material.

- I. Topic: Theories on the Origin of Life and Unifying Theories of Biology
- II. Goal: Communicate the origin of life and unifying theories of Biology in a Trivia of Life Book creation to capture students' 21st century learning and innovations skills (*i.e.*, critical thinking, collaboration, communication, and creativity) along with mastery of the content topic.
- III. Pre-Activity: Pre-Test
- IV. Review the Theories on the Origin of Life and the Unifying Theories of Biology
- V. Pre-Task Discussion
- VI. Activity or Learning Task: “*Genesis*” is a trivia creation about facts on the origin of life and its unique features.
- VII. Role of Students: Writers/Researchers
- VIII. Setting: Ambiguous World of Life
- IX. Product: “*Trivia of Life*” Book
- X. Display of Products on the Display Corner for Critiquing and Evaluation Using a Rubric
- XI. 2-Minute Product Presentation for Each Group Using the Guide Questions as Reference for Spontaneity of Presentation
- XII. Teacher’s Synthesis of the Activity
- XIII. Students Self and Peer Assessment of their Task Performance Using a Rubric
- XIV. Post-Activity: Post-Test

3. Genesis Instructional Material: Overview

The designed instructional material called “*Genesis*” is a learning task regarding the theories on the origin of life and unifying theories of Biology. As a learning task, it aims to help students become familiar with the different theories on the origin of life and the unifying theories of Biology. Further, it aims to develop the students' 21st century learning and innovation skills along with mastery of the content topic as they perform the identified tasks in the instructional material.

The learning task (*i.e.*, the Genesis instructional material) is designed to introduce students to the different theories on the origin of life in a momentary time when the Earth was still devoid of life till the time that the first form of life arose. It also introduces students to the different unifying theories of Biology serving as an anchor on what governs life's existence on earth [21][22].

Time Required/Time Frame: 1 week for two (2) class sessions of 1 hour or 1 hour and thirty-minutes class session

K-12 Track: Academic

K-12 Academic Strand: Science, Technology, Engineering, and Mathematics (STEM)

Specialization Subject/s: General Biology 1 and 2

Grade Level: Grade 12

21st Century Skills: 21st Century Learning and Innovation Skills (*i.e.*, critical thinking, collaboration, communication, and creativity).

Expected Outcome: Enhanced/developed 21st century learning and innovation skills (*i.e.*, critical thinking, collaboration, communication, and creativity) along with mastery of the content topic theories on the origin of life and the unifying theories of Biology.

Keywords: theory, assumption, origin

The essential prior and background information that students must be familiar with before taking the lessons in this instructional material are as follows [21][22][23]:

- In the beginning, Earth is devoid of life forms. After millions of years, life arose and there were various speculations on how the first form of life arose.
- Life on Earth arose millions of years ago and as time goes by, life has become abundant and diversified. Earth is considered the only planet in the solar system wherein life can exist because of its environmental conditions.
- Each organism is considered unique from one another and is able to survive in its own environment.
- The unifying theories of Biology were referred to as the highlight topic for learning Biology that explains the unique features of life on Earth.

This instructional material aims to (1) understand and appreciate the origin of life and its unique features, and to (2) collaboratively engage in creative communication among peers regarding how life arose a million years ago on Earth.

4. Proposed “Genesis” Instructional Material Learning Tasks

This section outlines the learning tasks for the designed instructional material called “*Genesis*” in learning the theories on the origin of life. The learning task will be for the students to create a book on the “*Trivia of Life*”. The students in the class will be imagining that they are Biological writers or researchers of the ambiguous world of life and that they are tasked to create a documentary on the presumptions that were made by early scientists (*i.e.*, Biologists) about the origin of life. They will be required to create a documentary book on the *Trivia of Life* that highlights the different theories regarding the origin of life and Biology unifying theories.

The students’ output will be the printed and soft copies of the documentary book called “*Trivia of Life*”. For their materials, they can make use of Biology or any science books, Internet resources, pictures, drawing books, paper glue, scissors, personal computers (PCs), laptop, tablets, smartphones, projectors,

papers, and pens. The assigned task must be performed by the students within one (1) week. Both printed and soft copies will be presented to the class on or before the assigned due date of submission.

4.1 Mechanics

The following are the mechanics on how the Genesis Instructional Material learning task can be performed by the students:

1. The students in the class will be divided into groups consisting of 5 members or more depending on the class size.
2. Students will research or investigate using different resources (*e.g.*, the library and the Internet) regarding the different theories on the origin of life and the unifying theories of Biology.
3. Students will use the gathered facts and information to create a book “*Trivia of Life*” which highlights the theories on the origin of life. They can also search for information from the Internet sources on how to create a trivia book using MS Office programs such as MS Word or MS PowerPoint. They will be required to present both the printed and soft copies of the trivia book.
4. In working with the assigned learning task (*i.e.*, the “*Trivia of Life*” book), each group member will be rating his/her group members (*i.e.*, peers) of the 21st century learning and innovation skills that they have displayed during the task performance using a given rubric.
5. Students will submit and display their output (*i.e.*, *Trivia of Life*) on the allocated display corner of the classroom for output assessment using a rubric by other groups on or before the assigned deadline of submission and prepare for a 2-minute oral output presentation.
6. Students will be rated on their 21st century learning and innovation skills comprised of critical thinking, collaboration, communication, and creativity through their performance of the task given using a rubric.
7. The learning task can be presented as a motivational activity, as part of the lesson proper, or as an assessment.

The following question will be the student’s guide in the creation of the book “*Trivia of Life*” as well as the basis for their oral presentations:

- Identify the different assumptions regarding the origin of life.
- Determine the different proponents of these assumptions.
- Identify the various evidence and proofs that were used to explain these assumptions.
- Identify the different theories that describe the unique features of life.
- Determine the different proponents of these theories.

4.2 Task Sheet

The task sheet will be distributed to the students prior to or during the activity depending on the kind of task to be performed as depicted in Figure 2. The following describes the directions on performing the assigned task, that is, the creation of the documentary book “*Trivia of Life*” highlighting the theories on the origin of life and its unique features.

1. Research or investigate using different resources (*e.g.*, the library and the Internet) regarding the different theories on the origin of life and the unifying theories of Biology.

2. Students will utilize the gathered information in creating the book “*Trivia of Life*” that highlights the different theories on the origin of life and its unique features. They can also search the Internet on how to create their “*Trivia of Life*” book using programs such as MS Word or MS PowerPoint. They will be required to submit both printed and soft copies of the trivia book.
3. Each student will be rating their groupmates based on the shown 21st century learning and innovation skills while performing the assigned task (i.e., book on the “*Trivia of Life*”) using a given rubric.
4. Students must submit and display their output (i.e., “*Trivia of Life*” book) on the designated display area within the classroom for the assessment using a rubric by other groups from the class which will be done on or before the assigned deadline of submission. The students must also prepare for a 2-minute oral presentation of their output.
5. Students must show their 21st century learning and innovation skills (i.e., critical thinking, collaboration, communication, and creativity) as they will be rated according to their performance of the given task using a rubric.

Learning Task: Create a Trivia of Life Book	
Learning Objectives:	
<ol style="list-style-type: none"> 1. To understand and appreciate life’s origin and its unique features. 2. To collaboratively showcase a creative communication of how life arose on earth millions of years ago. 	
Students’ Output: Trivia of Life Book	
Time Required/Frame	
Creation Time:	Product Display and Oral Presentation:
1 week	30 minutes
Mode of Activity: Assigned Task	
Students’ Task	Materials
<p>Imagine that you are Biological writers/researchers of the ambiguous world of life assigned to make a documentary of the assumptions made by early scientists and Biologists about the origin of life. Create a Trivia of Life Book of your documentary showcasing the different theories on the origin of life and the unifying theories of Biology.</p>	<p>Biology or any science books, internet resources, pictures, drawing book, paper glue, scissors, laptop, projector, paper and pen</p>

Figure 2. Genesis Instructional Material Task Sheet

5. Conclusion and Future Works

The development of instructional materials is essentially necessary when preparing for lessons in learning Biology. Technology enhancing classroom activities can create a more engaging, collaborative, and interactive learning environment, especially in learning sciences. This paper has presented a design of an instructional material called “*Genesis*” that highlights the learning of the theories on the origin of life and its unique features as one of the lessons in Introduction to Biological Sciences. The students are expected to be familiar with the different theories that constitute the origin of life by creating a documentary book “*Trivia of Life*”. This instructional material is expected to enhance the students’ mastery of the 21st century learning and innovation skills to become critical thinkers, interactive, collaborative, and can creatively communicate for resiliency in the class, school, society, work, or career and life in the 21st century context of society.

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