

Integration of Digital E-Learning Resource in Fostering Students' Engagement and Performance in General Biology 1

Rica Jane E. Copian

ricajane.copian@lspu.edu.ph

Laguna State Polytechnic University Sta. Cruz Laguna 4009 PHILIPPINES

Abstract

This study determined the relationship between the components and characteristics of the integration of Digital E-Learning Resources in fostering student engagement and performance in General Biology 1. Specifically, this study aimed to measure the level of digital E-Learning Resource components, characteristics, student engagement, and performance in terms of formative and summative tests. It also aimed to test the significant difference in students' performance in the formative and summative tests with the use of digital E-Learning Resources and the significant relationship between the components and characteristics of digital E-Learning resources on students' engagement.

Accordingly, the study used the descriptive method, and the researcher utilized purposive sampling. The researcher gathered data from the respondents from the two (2) sections of Science, Technology, Mathematics, and Engineering (STEM) Grade 11 at Laguna State Polytechnic University Santa Cruz Senior High School Department (LSPU-SCC SHS Department) and twenty-five (25) Science Teachers, rendering a total of sixty (60) responses. The main instruments used in this research were self-made questionnaires. Relevant information were gathered through the integration of Digital E-Learning Resources, and the students' responses were taken during face-to-face classes and using Google Forms..

The data analyzed revealed that the level of components and characteristics of Digital E-Learning resources were all evaluated to a "Very Great extent". Moreover, the level of student engagement was interpreted to a "Very Great Extent." The study also revealed that in terms of students' performance in the formative assessment, they yielded a "Satisfactory," result while for the summative assessment, the result was "Very Satisfactory." There is a significant difference found on student's performance in the formative and summative assessment with the use of digital E-Learning Resource in teaching. Lastly, a significant relationship was found between the components and characteristics of digital E-learning resources and the students' engagement

Moreover, in view of the aforementioned findings, the following conclusions were drawn: There is a significant difference on the students' performance in formative and summative assessment in the use of digital E-Learning Resource. This means that digital learning resources are tools used by students and educators to enhance the learning experience and performance. Furthermore, there is no significant relationship between the components and characteristics of Digital E-Learning Resource on student engagement were rejected. It shows that utilizing digital E-learning resource has demonstrated its ability to offer a comprehensive approach in education, thus it is important to consider the factors affecting student's involvement in learning process.

Hence, the following are hereby recommended: It was highly suggested that teachers may consider the integration of Digital E-Learning Resources not only in General Biology classes but also in different subjects, considering that Digital E-Learning Resource is centered on teaching pedagogy. In addition, students' abilities and capabilities must be considered when planning and developing learning resources to anchor learning to students' interests fully.

Keywords: Digital E-Learning; integration; E-Learning Resource

1. Introduction

Technology is much more like a lifestyle than just an instrument for Generation Z, as noted by Seemiller & Grace in (2018). It helps teachers greatly but also drives them to act. Educators need to embrace various digital learning tools and integrate these into their classrooms. By doing so, they create educational content that enhances the learning process. Also, the different needs of students make teachers adjust and find new ways to teach and use learning materials they are familiar with. Teachers of generation Z students need enriched learning-teaching materials more than ever to draw their attention to the lesson in the classroom.

Children learn about digital tools and online content from an early age, so they cannot imagine life without smartphones or the internet. The ways Generation Z gets information, how they like to learn, what catches their attention, their abilities, and what drives them are different compared to older generations. Educational films, cartoon videos, electronic books and stories, digital contests, systems for managing learning online, virtual lab experiments and various other materials and apps are forms of digital tools that have proven to help students learn better.

Moreover, teachers at all levels must provide stimulation and support to enhance students' academic achievement. The Department of Education has made various teaching resources available to establish a foundation for learning. One such resource includes educational materials given to students aimed at helping them acquire new knowledge in subjects like science. Therefore, integrating digital E-Learning Resources is necessary to improve student performance and engagement. In the Philippine educational system, intervention materials are highly regarded as tools for enhancing learners' outcomes. Teachers use these materials as guides to engage students more effectively and foster a deeper understanding (Dy, 2019).

In addition, Castro and Tumibay (2019) emphasized that innovative instructional material is designed to teach concepts and skills. This material is provided to students during the teaching-learning process, helping them master competency-based skills. It highlighted the content enhancement and learning strategies for teachers, offering a multifaceted approach to support students in becoming successful and independent learners.

As previously mentioned, guaranteeing students' acquisition of vital knowledge and skills for academic success constituted the primary objective of creative instruction and digital material distribution. This motivated the researcher to conduct a study on innovative digital E-learning resources in biology education; undeniably, these results will enhance students' comprehension of concepts.

1.1 Statement of the Problem

Specifically it sought to answer the following questions:

1. What is the level of Digital E-Learning Resource components in terms of:
 - 1.1 Objectives;
 - 1.2 Content;
 - 1.3 Activities;
 - 1.4 Assessment ; and
 - 1.5 Values?
2. What is the level of Digital E-Learning Resource characteristics in terms of
 - 2.1 Accessibility;
 - 2.2 Appropriateness;
 - 2.3 Authenticity ;
 - 2.4 Aesthetic Value; and

2. 5 Functionality?
3. What is the level of student's engagement in terms of:
 - 3.1 Class Participation;
 - 3.2 Socialization;
 - 3.3 Focus; and
 - 3.3 Interest?
4. What is the level of students' performance in terms of:
 - 4.1 Formative; and
 - 4.2 Summative?
5. Is there a significant difference in student's performance in formative and summative assessment in the use of digital E-Learning Resource?
6. Is there a significant relationship between the components and characteristics of digital E- learning resource to student's engagement?

2. Methodology

This study utilized the descriptive research method. As Voxco (2021) mentioned descriptive research is enabling an interpretation of theoretical meaning within findings and hypothesis development for future investigations; specifically, it designed a questionnaire using the Likert Scale as a descriptive tool.

This approach facilitated information gathering from the respondents without imposing any difficulty on them while answering questions pertinent to the exploration of digital learning resources as innovative materials in general biology classes.

3. Results and Discussion

This chapter outlines and discusses the various results obtained from the analysis of the collected data. The subsequent tables and discussions will further detail the components and characteristics of digital E-learning resources, as well as student engagement and performance.

Level of Components of Digital E-Learning Resource

This study's Digital E-Learning Resource components refer to objectives, content, activities, assessments, and values.

The following tables reveal the level of digital E-learning resource components as perceived by the students, showing the statement, mean, standard deviation, and verbal interpretation

Level of components of Digital E-learning resources in terms of Objectives.

Table 1 Digital E- Learning Resource components in term of Objectives

STATEMENTS	MEAN	SD	REMARKS
1. provide measurable and observable circumstances that are aligned with the course's learning outcomes.	4.76	0.44	Strongly Agree
2. describe the degree to which students will perform.	4.72	0.46	Strongly Agree
3. achievable and include explicit and transferable learning objectives that empower students.	4.48	0.65	Strongly Agree
4. consist of three learning areas, which are	4.84	0.37	Strongly Agree

<i>knowledge, skills, and attitude.</i>			
5. <i>are action-oriented and focused on the most essential learning needs of the class.</i>	4.80	0.41	Strongly Agree
Weighted Mean	4.72		
SD	0.37		
Verbal Interpretation	Very Great Extent		

From the statements below, the teachers Strongly Agree that the digital E-learning resource contains objectives encompassing three key learning domains: knowledge, skills, and attitudes ($M=4.84$, $SD=0.31$). Furthermore, they also acknowledge that their objectives are "achievable and include explicit and transferable learning objectives that empower students" and received the lowest mean score from the responses with ($M=4.48$, $SD=0.65$).

The weighted mean score of 4.72 and the standard deviation of 0.37 were evaluated of Very Great extent among the respondents. This illustrates the extent to which the digital e-learning resource fulfills its objectives. Objectives enable learners to understand the purpose of their studies and track their progress toward achieving mastery. It's evident that objectives offer a straightforward and concise way to outline desired accomplishments. They can assist in keeping students concentrated, driven, and progressing toward their goals. .

Digital E-learning resource components in terms of Content.

Table 2 Digital E- Learning Resource component in terms of Content

STATEMENTS	MEAN	SD	REMARKS
1. <i>meaningful information regarding the topic is directly provided.</i>	4.88	0.33	Strongly Agree
2. <i>instrument's length and level of complexity are appropriate for the user.</i>	4.28	0.61	Strongly Agree
3. <i>the organization of information is clear and also uses understandable and specific language.</i>	4.44	0.65	Strongly Agree
4. <i>information is informative, precise, and enough for every lesson that is being discussed</i>	4.64	0.64	Strongly Agree
5. <i>appropriate to gain essential learning competencies.</i>	4.80	0.41	Strongly Agree
Weighted Mean	4.61		
SD	0.43		
Verbal Interpretation	Very Great Extent		

From the statements below, the teachers Strongly Agreed that digital e-learning resources with "meaningful information regarding the topic is directly provided" received the highest mean score ($M=4.88$, $SD=0.33$). On the other hand, teachers also Strongly Agreed that digital e-learning resources with "instrument's length and level of complexity are appropriate for the user" received the lowest mean score of responses with ($M=4.28$, $SD=0.61$) yet also remarked as Strongly Agree.

The level of digital e-learning resource component in terms of content attained a weighted mean score of 4.61 and a standard deviation of 0.43, which was evaluated of Very Great extent among the respondents. Based on the results it helped the students obtain information more systematically and practically. Therefore, a set of planned learning experiences allows students to comprehend specific learning goals; digital content can be promptly revised to align with the latest knowledge and trends, guaranteeing that learners are provided with the most up-to-date information.

Table 3 Digital E- Learning Resource components in term of Activities

STATEMENTS	MEAN	SD	REMARKS
1. contained challenging activities that use creativity, intelligence, and ability.	4.76	0.60	Strongly Agree
2. were adequate for the learner's interest.	4.48	0.65	Strongly Agree
3. used localized or alternative products, materials, and equipment available in the students' house.	4.64	0.49	Strongly Agree
4. tools generate data that are relevant to the course's desired learning outcomes.	4.76	0.60	Strongly Agree
5. improved the students' sense of responsibility for their learning.	4.76	0.44	Strongly Agree
Weighted Mean	4.68		
SD	0.46		
Verbal Interpretation	Very Great Extent		

Based on the given data, the teachers Strongly Agreed that digital e-learning resources “contained challenging activities that use creativity, intelligence, and ability, tools to generate data that are relevant to the course’s desired learning outcomes and improved the students’ sense of responsibility for learning” received the highest mean score ($M=4.76$ $SD=0.60$, $SD=0.44$). On the other hand, teachers also Strongly Agreed that digital e-learning resources “were adequate for the learner's interest” which received the lowest mean score of responses with ($M=4.48$, $SD=0.65$) yet was also remarked as Strongly Agree. .

The level of digital e-learning resource components in terms of activities attained a weighted mean score of 4.68 and a standard deviation of 0.46 and was evaluated Very Great among the respondents. With the results above, engaging in educational tasks or activities promotes self-directed learning and enables students to proceed at their own pace. In addition, it allows both learners and teachers to track learning progress. Similarly, learning activities can be tailored to suit various learning preferences, such as writing, social interaction, or hands-on experimentation. Educators have a range of activities to choose from to effectively cater to different learning styles.

Table 4 Digital E- Learning Resource component in terms of Assessment

STATEMENTS	MEAN	SD	REMARKS
1. applicable to achieve the learning objectives in the offered course.	4.40	0.65	Strongly Agree
2. provided a clear and specific instructions.	4.76	0.44	Strongly Agree
3. engaged students with different learning styles.	4.84	0.37	Strongly Agree
4. provided evaluation that uses critical thinking skill.	4.72	0.61	Strongly Agree
5. provided performance tasks that develop the learners full potential	4.60	0.50	Strongly Agree
Weighted Mean	4.66		
SD	0.36		
Verbal Interpretation	Very Great Extent		

Table 4 illustrates the level of digital e-learning resource component in terms of assessment.

Based on the given data, the teachers Strongly Agreed that digital e-learning resources engaged students with different learning styles received the highest mean score ($M=4.84$ $SD=0.37$). On the other hand, teachers also Strongly Agreed that digital e-learning resources are relevant for achieving the educational goals of the course provided received the lowest mean score of responses with ($M=4.40$, $SD=0.65$), yet was

also remarked Strongly Agree.

The level of digital e-learning resource of component in terms of assessment attained a weighted mean score of 4.66 and a standard deviation of 0.36 and was Very Great Extent among the respondents. With the given results through assessments, teachers can quickly determine the learners' strengths and weaknesses, provide necessary feedback, and improve their teaching strategies.

Table 5 Digital E- Learning Resource component in terms of Values

STATEMENTS	MEAN	SD	REMARKS
1. deeper understanding of learning.	4.68	0.63	Strongly Agree
2. easy to access in tangible skills	4.72	0.46	Strongly Agree
3. a necessary information that will be helpful in a real-life situation are evident.	4.96	0.20	Strongly Agree
4. students' ability to exercise their hidden skills	4.64	0.64	Strongly Agree
5. promote every student's learning style	4.92	0.28	Strongly Agree
Weighted Mean	4.78		
SD	0.31		
Verbal Interpretation	Very Great Extent		

Table 5 shows the level of digital e-learning resource component in terms of values.

From the statements above, the teachers Strongly Agreed that digital e-learning resources a necessary information that will be helpful in a real-life situation are evident received as the highest mean score ($M=4.96$ $SD=0.20$). On the other hand, teachers also strongly agreed that digital e-learning resources students' capacity to utilize their latent talents. received the lowest mean score of responses with ($M=4.64$, $SD=0.64$) but was still rated as Strongly Agree.

The level of digital e-learning resource components in terms of values attained a weighted mean score of 4.78 and a standard deviation of 0.31 and was Very Great among the respondents, A good values education enlightens students on the significance of positive values, aiding them in developing strong moral character, understanding of the consequences of their actions, and and being committed to doing what is right.

Level of Digital E-Learning Resource Characteristics

In this study, the characteristics of the digital E-Learning resource refer to accessibility, appropriateness, authenticity, aesthetic value and functionality.

The following tables reveal the digital E-Learning resource characteristics as perceived by the science teachers which show the statement, mean, standard deviation and verbal interpretation.

Table 6 Digital E- Learning Resource characteristics in terms of Accessibility

STATEMENTS	MEAN	SD	REMARKS
1. user has control over the digital e-learning resource.	4.80	0.41	Strongly Agree
2. has the capacity to share with other social media sites such as Facebook, Messenger etc.	4.84	0.37	Strongly Agree
3. has a convenient file size that is downloadable	4.76	0.44	Strongly Agree
4. user can use the digital e-learning resource for educational content and purposes	4.84	0.37	Strongly Agree
5. can manipulate the digital learning resource that befits it needs	4.72	0.46	Strongly Agree
Weighted Mean	4.79		
SD	0.36		
Verbal Interpretation	Very Great Extent		

Table 6. Illustrates the Digital E-learning Resource characteristics in terms of Accessibility.

Based on the data, the teachers strongly agreed that digital e-learning resources “have the capacity to share with other social media sites such as Facebook, Messenger, etc.; and user can use the digital e-learning resource for educational content and purposes” received the highest mean score ($M=4.84$, $SD=0.37$). On the other hand, teachers also strongly agreed that digital e-learning resources “can manipulate the digital learning resource that befits its needs” received the lowest mean score of responses with ($M=4.72$, $SD=0.46$) but were still rated as Strongly Agree.

The level of accessibility of digital e-learning resource characteristics attained a weighted mean score of 4.79 and a standard deviation of 0.36, which was evaluated of Very Great extent among the respondents. Regarding the mentioned result, making materials accessible means ensuring that students can easily access the information in the digital learning resource. These modifications will also benefit all students who have different learning needs, regardless of their abilities. The results revealed that accessible materials should be enhanced or improved to suit different types of learner variability

Table 7 Digital E- Learning Resource Characteristics in terms of Appropriateness

STATEMENTS	MEAN	SD	REMARKS
1. ensures that the learners have a baseline knowledge regarding the subjects.	4.64	0.64	Strongly Agree
2. provided interesting learning activities based on the target learning objectives and outcomes in each lesson.	4.76	0.60	Strongly Agree
3. appropriate in sharpening students' critical thinking skills, which are fundamental to developing analytic reasoning.	4.84	0.37	Strongly Agree
4. assessed the level of knowledge, skills, and interest of the learners	4.84	0.37	Strongly Agree
5. provides information that caters to the needs of the students.	4.80	0.41	Strongly Agree
Weighted Mean	4.78	Very Great Extent	
SD	0.41		
Verbal Interpretation			

Table 7 appears to present data on the level of Digital E-learning resource characteristics in terms of appropriateness.

Based on the data, the teachers strongly agreed that digital e-learning resources are appropriate in sharpening students' critical thinking skills, which are fundamental to developing analytic reasoning and assessed the level of knowledge, skills, and interest of the learners. This aspect received the highest average mean ($M=4.84$) with ($SD=0.37$). Conversely, teachers also Strongly Agreed that digital e-learning resources “ensures that the learners have a baseline knowledge regarding the subjects” received the lowest mean score of responses with ($M=4.64$, $SD=0.64$) but still rated as Strongly Agree

The level of appropriateness of digital e-learning resource characteristics attained a weighted mean score of 4.78 and a standard deviation of 0.41 and was evaluated to a Very Great extent among the respondents. Based on the result, appropriateness is applied to modify resources and learning resources should be selected with consideration of their suitability and compatibility.

Table 8 Digital E- Learning Resource Characteristics in terms of Authenticity

STATEMENTS	MEAN	SD	REMARKS
1. allowed innovation through learning tasks.	4.72	0.46	Strongly Agree
2. can assess the student's ability efficiently and effectively.	4.84	0.37	Strongly Agree
3. provided a unique set of activities.	4.84	0.37	Strongly Agree
4. executed varieties of instructions.	4.72	0.46	Strongly Agree
5. integrated assessment into real-life scenarios.	4.80	0.41	Strongly Agree
Weighted Mean	4.78		
SD	0.28		
Verbal Interpretation	Very Great Extent		

Based on the data, the teachers Strongly Agreed that digital e-learning resources "can assess the student's ability efficiently and effectively and provide a unique set of activities" received the highest mean score of ($M=4.84$, $SD=0.37$). On the other hand, teachers also Strongly Agreed that digital e-learning resources "allowed innovation through learning tasks and executed varieties of instructions" and received the lowest mean score of responses ($M=4.72$, $SD=0.46$), yet was also remarked as Strongly Agree.

The level of authenticity of digital e-learning resource characteristics attained a weighted mean score of 4.78 and a standard deviation of 0.28 and was evaluated Very High among the respondents. In line with the results, authentic materials can be utilized to add more interest for the learner.

Table 9 Digital E- Learning Resource Characteristics in terms of Aesthetic Value

STATEMENTS	MEAN	SD	REMARKS
1. shows different visuals and designs that can catch the attention of the students.	4.72	0.46	Strongly Agree
2. consists of information that is enjoyable and fun for student's learning	4.84	0.37	Strongly Agree
3. cultivate the beauty of learning using fine context and activities.	4.84	0.55	Strongly Agree
4. uses materials that are catchy and appropriate to the learning resource.	4.68	0.63	Strongly Agree
5. expresses the nature of learning through providing exciting inputs.	4.68	0.63	Strongly Agree
Weighted Mean	4.75		
SD	0.47		
Verbal Interpretation	Very Great Extent		

Based on the data, the teachers Strongly Agreed that digital e-learning resources "consists of information that is enjoyable and fun for student's learning and cultivates the beauty of learning using fine context and activities" and received the highest mean score of ($M=4.84$, $SD=0.37$, $SD=0.55$). On the other hand, teachers also Strongly Agreed that digital e-learning resources "use materials that are catchy and appropriate to the learning resource and expresses the nature of learning through providing exciting inputs" which received the lowest mean score of responses with ($M=4.68$, $SD=0.63$) yet was also remarked as Strongly Agree.

The level of digital e-learning resource characteristics in terms of aesthetic value attained a weighted mean score of 4.75 and a standard deviation of 0.47, and the level was evaluated of Very Great extent among the respondents. In conclusion, using fonts that were easy to read are key to good presentation, this will have a positive outcome in engagement and retention of the subject matter.

Table 10 Digital E- Learning Resource Characteristics in terms of Functionality

STATEMENTS	MEAN	SD	REMARKS
1. digital E-learning resource is an innovative material used to reinforce students' learning.	4.72	0.61	Strongly Agree
2. used to maximize student learning beneficial in enhancing their 21 st century skills	4.76	0.60	Strongly Agree
3. an essential tool in helping the students understand a series of concepts worth remembering	4.72	0.61	Strongly Agree
4. the content of the digital resource may be used as a tool in helping the learners understand a series of concepts worth remembering	4.80	0.58	Strongly Agree
5. expresses the nature of learning through providing exciting inputs	4.80	0.58	Strongly Agree
Weighted Mean	4.76		
SD	0.57		
Verbal Interpretation	Very Great Extent		

Table 10 presents the level of digital e-learning resource characteristics in terms of functionality.

Based on the data, the teachers Strongly Agreed that digital e-learning resources such as “the content of the digital resource may be used as a tool in helping the learners understand a series of concepts worth remembering expresses the nature of learning through providing exciting inputs” received the highest mean score of (M=4.80, SD=0.58).

On the other hand, teachers also Strongly Agreed that digital e-learning resources such as “digital E-learning resource is an innovative material used to reinforce students' learning and an essential tool in helping the students understand a series of concepts worth remembering.” received the lowest mean score of responses with (M=4.72, SD=0.61) yet was also remarked as Strongly Agree.

The level of digital e-learning resource characteristics in terms of functionality attained a weighted mean score of 4.76 and a standard deviation of 0.57, and the level was evaluated to a Very Great extent among the respondents. Based on the results, digital learning resources should provide users with access to large amounts of information wherever they are. Whenever they need it, it is a user-friendly interface.

Level of Student Engagement

In this study, student engagement refers to class participation, socialization, focus, and interest. The following tables revealed the level of student engagement as perceived by them. The tables show the statement, mean, standard deviation, and the corresponding verbal interpretation.

Table 11 Level of student's engagement in terms of Class Participation

STATEMENTS	MEAN	SD	REMARKS
1. I talk to other students in a kind way	3.87	0.85	Agree
2. I like to meet new people and get engaged in social activities in the class.	4.40	0.74	Strongly Agree
3. When my teacher and classmates talk, I always listen	4.90	0.35	Strongly Agree
4. I am polite and respectful to all people in the class	4.70	0.46	Strongly Agree
5. I like working with my classmates because I also learn from them.	3.82	0.93	Agree
Weighted Mean	4.34		
SD	0.45		

Verbal Interpretation	Very Great Extent
------------------------------	-------------------

Based on the data, the students Strongly Agreed that with the use of digital E-learning materials "When the teacher and their classmates talk, they always listen," received the highest mean score ($M=4.90$, $SD=0.35$). On the other hand, teachers also Strongly Agreed that using digital e-learning resources, students "like working with their classmates because they also learn from them" received the lowest mean score of responses with ($M=3.82$, $SD=0.93$) yet also remarked as Agree.

The level of student's engagement in terms of class participation attained a weighted mean score of 4.34 and a standard deviation of 0.45 and was Very Great Extent among the respondents. Based on the results, class participation is one of the important aspects in learning and it is also a valuable tool in order for the teacher to assess if learning takes place.

Table 12 *Level of student's engagement in terms of Socialization*

STATEMENTS	MEAN	SD	REMARKS
1. I talk to the other students kindly.	4.77	0.43	Strongly Agree
2. I like to meet new people, and get engaged in social activities in the class.	4.47	0.72	Strongly Agree
3. When my teacher and classmates talk, I always listen.	4.70	0.56	Strongly Agree
4. I am polite and respectful to all the people in class.	4.83	0.38	Strongly Agree
5. I like working with my classmates because I also learn from them.	4.65	0.61	Strongly Agree
Weighted Mean	4.68		
SD	0.35		
Verbal Interpretation	Very Great Extent		

Table 12 illustrates the level of student's engagement in terms of socialization.

Based on the data, the students Strongly Agreed that by using digital e-learning resources, "students become polite and respectful to all the people in the class." which received the highest mean score of ($M=4.83$, $SD=0.38$). On the other hand, teachers also Strongly Agreed that with the use of digital e-learning resources, "students like to meet new people and get engaged in social activities in the class," which received the lowest mean score of responses with ($M=4.47$, $SD=0.72$) yet was also remarked as Strongly Agree. The level of student engagement in terms of socialization attained a weighted mean score of 4.68 and a standard deviation of 0.35, which was evaluated of Very Great extent among the respondents. This means that engagement in the classroom starts when the student is socially active, nice, and talking politely to other classmates.

Table 13 *Level of Students Engagement in terms of Focus*

STATEMENTS	MEAN	SD	REMARKS
1. I can preserve more information when utilizing digital resource rather than reading my notes alone	4.42	0.70	Strongly Agree
2. I can simply understand the lesson because of the digital resource	4.45	0.70	Strongly Agree
3. The digital e-learning resource are very convenient since I can use it online.	4.73	0.52	Strongly Agree
4. the visual from the digital e-learning resource helps to improve my attention capacity.	4.58	0.65	Strongly Agree

5. The digital E-learning resource are easy to use.	4.83	0.38	Strongly Agree
Weighted Mean	4.60		
SD	0.38		
Verbal Interpretation	Very Great Extent		

Based on the data below, the students Strongly Agreed that digital e-learning resources “are easy to use” received the highest mean score of ($M=4.83$, $SD=0.38$). On the other hand, students also Strongly Agreed that the use of digital e-learning resources, “preserve more information when utilizing digital resource rather than reading notes alone,” which received the lowest mean score of responses with ($M=4.42$, $SD=0.70$) yet was also remarked as Strongly Agree.

The level of student engagement in terms of focus attained a weighted mean score of 4.60 and a standard deviation of 0.38, and the result was evaluated to a Very Great extent among the respondents. Based on the results above, teachers play a very important part in gathering and creating teaching materials and ensuring that student's learning needs are considered. This may also help teachers to improve their teaching approach.

Table 14 Level of Student's Engagement in terms of Interest

STATEMENTS	MEAN	SD	REMARKS
1. I preferred using digital e-learning resources rather than a synchronous online class.	4.05	0.85	Agree
2. I can pause the digital e-learning resource and follow how to properly perform the instructions that were given, thus promoting skills and competence.	4.53	0.57	Strongly Agree
3. I can utilize the digital e-learning resource anytime I want, so I can recall the proper way of performing the task.	4.70	0.46	Strongly Agree
4. The digital e-learning resource provides a visual representation that helps to promote familiarization with the lessons.	4.77	0.46	Strongly Agree
5. I am more confident in performing after utilizing the digital e-learning resource.	4.47	0.68	Strongly Agree
Weighted Mean	4.50		
SD	0.37		
Verbal Interpretation	Very Great Extent		

Table 14 appears the level of students' engagement in terms of Interest.

Based on the data, the students Strongly Agreed that using digital e-learning resources "provides a visual representation that helps them to promote familiarization with the lessons" which received the highest mean score of ($M=4.77$, $SD=0.46$). On the other hand, students also Strongly Agreed that they preferred to utilize the digital e-learning resources rather than a synchronous online class" which received the lowest mean score of responses with ($M=4.05$, $SD=0.85$) but was still remarked as Agree.

The level of student engagement in terms of interest attained a weighted mean score of 4.50 and a standard deviation of 0.37, which was evaluated to a Very High extent among the respondents. In relation to this, interest serves as a powerful motivational process, and it significantly influences learning outcomes and motivation. In addition, knowing the students' interests can assist teachers in offering them high-quality learning experiences and allowing them to delve into subjects that capture their attention, such as the environment, which can increase their involvement in the learning journey.

Level of Students Performance

. The following tables reveal the level of students' engagement as perceived by them, which shows the statement, mean, standard deviation, and verbal interpretation.

Table 15 Level of student's performance in terms formative and summative assessment in the use of digital e-learning resources

Performance	Weighted Mean	Std. Deviation	Remarks
Formative	15.28	3.14	Satisfactory
Summative	19.32	3.88	Very Satisfactory

Table 15 illustrates the level of students performance in use of digital e-learning resources in terms of Formative and Summative

Almost all of the respondents' performance range "13-18" during the formative assessment received the highest weighted mean score of ($M=15.28$, $SD= 3.14$), with a remarkable Satisfaction rating among the students. In summative assessment, students' performance range "19-24" as the data obtained a weighted average of ($M=19.32$, $SD= 3.88$) with an improved base of Very Satisfactory among the students.

Table 16 Test of differences between student's performance in formative and summative assessment in the use of digital e-learning resources

		Mean	SD	Mean Diff.	95% Interval Difference Lower	Confidence of the Upper	t	df	Sig. (2-tailed)
Pair 1	Formative	15.28	3.14	4.04	-5.23	-2.98	-7.34	55	.000
	Summative	19.32	3.88						

Table 16 presents the test of differences between student's performance in formative and summative assessment in the use of digital e-learning resources

This implies that students performed better in the posttest. Their level of performance significantly improved from being Satisfactory to a Very Satisfactory level. Findings also indicate that at 0.05 level of significance, the null hypothesis stating that "There is no significant difference in students' performance before and after the use of innovative digital E-learning resources" is rejected. Thus, the alternative that incites there is a significant difference between them is accepted. In relation to this, student assessment allows teachers to evaluate the success of their teaching methods by connecting student achievements to particular learning goals. This enables educators to establish and refine effective teaching strategies while eliminating ineffective ones in their instructional approach.

Table 17 Test of relationships between components and characteristics of digital e-learning resource on student's engagement

TEST OF CORRELATION						
COMPONENTS OF E-DIGITAL LEARNING RESOURCES			Class Participation	Socialization	Focus	Interest
Kendall's tau_b	Objectives	Correlation Coefficient	-.131	.086	.009	-.344*
		Sig. (2-tailed)	.424	.609	.959	.038
		N	25	25	25	25

Kendall's tau_b	Content	Correlation Coefficient	-.068	-.008	.065	-.268	
		Sig. (2-tailed)	.675	.960	.703	.105	
		N	25	25	25	25	
	Activities	Correlation Coefficient	-.147	-.053	-.049	-.302	
		Sig. (2-tailed)	.373	.755	.773	.072	
		N	25	25	25	25	
	Assessment	Correlation Coefficient	-.094	-.087	-.038	-.233	
		Sig. (2-tailed)	.558	.600	.821	.152	
		N	25	25	25	25	
	Values	Correlation Coefficient	-.115	-.075	-.005	-.254	
		Sig. (2-tailed)	.493	.666	.978	.135	
		N	25	25	25	25	
CHARACTERISTICS OF E-DIGITAL LEARNING RESOURCES				Class Participation	Socialization	Focus	Interest
Accessibility	Correlation Coefficient	-.102	.048	.005	-.356*		
	Sig. (2-tailed)	.548	.782	.975	.039		
	N	25	25	25	25		
Appropriateness	Correlation Coefficient	-.163	-.054	.025	-.305		
	Sig. (2-tailed)	.332	.755	.886	.073		
	N	25	25	25	25		
Authenticity	Correlation Coefficient	.026	.078	-.084	-.322		
	Sig. (2-tailed)	.875	.648	.626	.056		
	N	25	25	25	25		
Aesthetic Value	Correlation Coefficient	-.093	.098	-.010	-.257		
	Sig. (2-tailed)	.580	.571	.954	.131		
	N	25	25	25	25		
Functionality	Correlation Coefficient	-.065	.025	-.095	-.157		
	Sig. (2-tailed)	.708	.889	.598	.371		
	N	25	25	25	25		

**, Correlation is significant at the 0.01 level (2-tailed).

*, Correlation is significant at the 0.05 level (2-tailed).

Table 17 demonstrates the significant correlation between the components and characteristics of digital e-learning resource on the student's level of engagement. The objectives, content, activities, assessment, and values of the components of Digital e-learning resource was observed to have no significant correlation to the class participation, socialization, focus and interest among the student engagement. This is

based on the computed correlation coefficient values obtained from the tests. Furthermore, the p-values obtained were greater than the significance alpha 0.05, hence there is no significance.

The accessibility, appropriateness, authenticity, aesthetic value and functionality of the characteristics of digital E-learning resource were observed to have no significant correction to the class participation, socialization, focus and interest among the student engagement. This is based on the computed correlation coefficient values obtained from the tests. Furthermore, the p-values obtained were greater than the significance alpha 0.5. Hence there is no significance Table 17 is the test of difference between the student's performance in formative and summative innovative digital e-learning resources. Data obtained through a paired of t-test indicates an increase score that is Significant ($p < 0.05$).

This proves that digital learning resources are tools that students and educators use to enhance the learning experience. They are designed to boost student involvement, simplify curriculum planning and access, and improve academic performance. Furthermore, digital media serves as more than just a platform for students to showcase their creativity; it also serves as a valuable tool for interactive learning. Students can actively participate with digital materials through educational games, online discussions, or multimedia displays.

4. Conclusion and Recommendations

Based on the preceding findings, the following conclusions were drawn.

The study shows a significant difference on the students' performance in formative and summative assessment in the use of digital E-Learning Resource. Therefore the hypothesis was rejected. This means that digital learning resources are tools used by students and educators to enhance the learning experience and performance.

Further, there is no relationship between the components and characteristics of digital E-learning resource to student engagement. Thus the research hypothesis was accepted Given the significant relationship observed, it shows that utilizing digital E-Learning resource has demonstrated its ability to offer a comprehensive approach to education, therefore it is important to consider the factors affecting student's involvement in learning process.

Based on the findings, the study resulted the following recommendations.

1. Teachers may consider the integration of Digital E-Learning Resource not only in General Biology classes and subjects considering that Digital E-Learning Resource is centered teaching pedagogy. Furthermore, teachers may recommend giving more examples to encourage students to apply their learning to real-life situations or scenarios and develop learning that encourages participation, leading to better understanding and retention of knowledge.

2. School heads and administrators can consider the study's results when providing teachers with resources, giving them autonomy to some of the resources that they are familiar with and providing optimal training to those who may need it on their technical growth journey.

3. Future researchers may utilize the outcomes of this study as a data resource for enhancing their readings of similar kinds and, therefore, could reinforce subsequent readings of the current research.

Reference:

Seemiller, C., & Grace, M. (2016). Generation Z goes to college. John Wiley & Sons.

Dy (2019) The philippine alternative learning system expanding the educational future of the deprived depressed and underserved.
https://www.researchgate.net/publication/330881893_

Castro, M.D.B.; Tumibay, G.M. A literature review: Efficacy of online learning courses for higher education institution using meta-analysis. *Educ. Inf. Technol.* 2021, 26, 1367–1385

Voxco, (2021). Descriptive Research Design: [https://www. Voxco.com/blog/descriptive Research-deign](https://www.Voxco.com/blog/descriptive-Research-deign)