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Students' engagement and meaningful learning experiences in using digitized concept stories in Grade 7 Biology

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Abstract

This study aimed at exploring students' engagement, difficulties, and meaningful learning experiences in Biology class relative to the use of the intervention material developed—the digitized concept stories. Students' engagement towards learning Biology and difficulties experienced in class were revealed through in-depth interviews with 20 Grade 7 students. The digitized concept stories were structured based on the results covering the five (5) main topics in Biology 7 and Most Essential Learning Competencies (MELCs) identified by the Department of Education (DepEd). After the utilization of the intervention material, the same respondents were again interviewed to encapsulate their meaningful learning experiences while using the intervention. Meanwhile, to evaluate the qualities of the digitized concept stories, the researcher administered the acceptability survey questionnaire to 22 Science 7 teachers at the selected secondary schools in the 2nd Congressional District of the Quezon Province Schools Division Office. It was found out that digitized concept stories serve as a learning aid in Biology 7 because it makes the lesson easier to understand, help increase retention rate, provide additional knowledge, and clear explanation, and allows recognition of importance of the lessons delivered. It engaged the students by providing learning enjoyment and increasing their motivation and interest. It is appropriate in distance learning for Grade 7 students and can also be used for other topics in sciences and other disciplines. It was also found that the developed materials are acceptable for teachers as they gave favorable evaluation on its qualities. Hence, the validated digitized concepts stories are ready for utilization in Biology classes. It was then recommended that the developed intervention material may be used in an experimental study to further test its ability in improving students' academic performance.

Keywords: biology, difficulties, digitized concept stories, engagement, meaningful learning experiences

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Introduction

In the 21st century we have right now, education like any other sector needs to adjust and adapt to the abrupt changes brought about by innovations and advancements. One of these changes in education is in terms of the attention span of the learners. As compared to the previous generations, the learners of today are less focused. Their attention span becomes shorter as they become more prone to distraction and getting bored in a conventional learning mode. Such learners' inattentiveness results in having difficulty learning. One such case is on how students consider science as a difficult subject in middle school (Topcu & Pekmez, 2009).

Among other natural sciences, Biology has been considered as one of the most content-based subjects. Because of this, it is identified to be a difficult discipline to teach and learn. It entails numerous terminologies to remember in order to properly describe and understand a certain context of study. Technical terms are also used most often in explaining parts and process, classification, and definitions (Çimer, 2012; Lazarowitz & Penso, 1992).

Cajaiba (2014) stated that storytelling shows potential in promoting positive attitude and increasing motivation in learning Biology. This jives with the studies about narratives and stories of Erickson and Rossi (1976) and Csikar and Stefaniak (2018). Meanwhile, storytelling in science is specifically termed as concept story, one of the novel teaching tools in the discipline.

Cascading with the development in technologies in teaching and learning though, storytelling spurs in a digital format known as digital storytelling. Several research studies have proven that the DST improves students' academic achievement, retention rate and learning (Saritepeci, 2021; Vivitsou, 2018).

Purpose of the research

This research aimed to explore the students' engagement and meaningful learning experiences in using digitized concept stories in Grade 7 Biology. Specifically, it sought to: (1) describe the Grade 7 students' engagement towards learning Biology; (2) determine the challenges encountered by Grade 7 students in Biology class; (3) develop digitized concept stories in selected topics of Biology; (4) encapsulate meaningful learning experiences of students while utilizing digitized concept stories; and (5) evaluate the qualities of the digitized concept stories.

Conceptual Framework of the Study

To deal with the difficulties in learning Biology, Dourado (2006) in Cajaiba (2014), suggested that storytelling shows potential in promoting positive attitude and in increasing

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motivation. This is in jive with the studies about narratives and stories from Erickson and Rossi (1976) and Bruner (1990) to Csifar and Stefaniak (2018). Meanwhile, storytelling in science is specifically termed as concept story, one of the novel teaching tools in the discipline.

Cascading with the development in technologies in teaching and learning though, storytelling spurs in digital format known as digital storytelling. Several research studies had proven that the DST improves students' academic achievement, retention rate and learning (Alonso et al., 2013; Dogan, 2016; Robin, 2016; Saritepeci, 2021; Smeda et al., 2014; Vivitsou et al., 2018; Yang & Wu, 2012),

Therefore, based on the comprehensive reviews made by the researcher, the idea of digitizing concept stories and using it in instructional delivery of lessons in Biology will elicit positive attitudes among students by engaging them in learning Biology thereby improving their academic performance.

Methodology

This study aimed to reveal students' engagement and meaningful learning experiences in Biology 7 relative to the utilization of the validated intervention materials developed, that is the digitized concept stories. Mixed methods of research design were used in order to realize the objectives of the study. The student-respondents of the study were 20 students of Grade 7-Jacinto of the school year 2020-2021 handled by the researcher in Bukal Sur National High School. They were chosen purposively satisfying the criteria of having a mobile device for viewing the digitized concept story and distribution of students' academic performance with 50% average academic performance, 25% below average and the other 25% above average. Similarly, cluster sampling was utilized to obtain teacher-respondents of the study who evaluated the qualities of the developed and utilized digitized concept stories.

Eight schools, one in each of the eight District Municipalities in the 2nd Congressional District of the province under DepEd-Division of Quezon were chosen. All the Science 7 teachers in each of the selected schools were taken comprising a total of 22 teacher-respondents. Table 1 summarizes the selection and distribution of the teacher-respondents in the 2nd Congressional District of the Quezon Province.

Table 1. Selection and Frequency Distribution of the Teacher-Respondents in the 2nd Congressional District of DepEd-Quezon Province

District-Municipality	School Chosen	Number of Science 7 Teachers

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Candelaria East	Dr. Panfilo Castro National High School	2
Candelaria West	Dr. Panfilo Castro National High School-Masalukot I Annex	2
Dolores	Dagatan National High School	2
San Antonio	San Antonio National High School	2
Sariaya East	Canda National High School	2
Sariaya West	Lutucan Integrated National High School	5
Tiaong I	Recto Memorial National High School	5
Tiaong II	Paiisa National High School	2
	Total	**22**

Research Instruments

Interview

To assess and analyze the selected Grade 7 students' engagement, difficulties, and meaningful learning experiences regarding their use of digitized concept stories, two sets of interview questionnaires were used. The first questionnaire focused on the engagement and difficulties of the learners in Biology 7 before the utilization of the thesis output, the digitized concept stories. The interview questions focused on when learners consider the lessons in Biology engaging, what difficulties they encountered and what they wish to offer to them to overcome the challenges they have and make learning more engaging to them.

The second instrument, meanwhile, concentrated in encapsulating the meaningful learning experiences of the respondents while using the said output. It is composed of two parts. The first part comprised five open-ended questions eliciting responses of the experiences they can share while utilizing the developed intervention material. The second is in the form of sentence completion to further elaborate the meaningful learning experiences and to cross-check the respondents' answers in the first half.

Survey Questionnaire

A survey questionnaire with Likert scale integration was used to reveal the teachers' evaluation of the qualities of digitized concept stories. It was divided into four parts, the content, appropriateness, engagement of the learners, and future use. Each of the four parameters has five indicators which respondents ponder upon. All the enumerated three questionnaires were structured based on the inputs in the review of related studies and literature. They were likewise validated by five experts in the field, two master teachers in Science, one Science professor, one master teacher in English and one language professor.

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Intervention Material

Digitized concepts stories were developed in identified contents of the MELCs in Biology 7. The students' grades in the First Quarter of the School Year 2020-2021 and the availability of mobile devices for digitized concept story viewing were the basis in choosing the student-respondents. Using the first validated interview questionnaire, the learners' engagement and difficulties during their elementary schooling were first determined to serve as inputs and bases in constructing the intervention material.

Data Analysis

The data gathered from the in-depth interview of the students on the first two sets of questionnaires were transcribed through handwritten notes and they underwent textual analysis. Themes were generated through open-coding to grasp the ideas the respondents wanted to imply.

On the other hand, the responses from the survey questionnaires of the teachers were tabulated and analyzed using simple arithmetic and weighted mean.

Ethical consideration

To ensure ethical conduct of the study, necessary consent and permits were secured from the key informants. Furthermore, the researcher assured that the data gathered were used only for the purpose of the research. Utmost confidentiality was observed in the conduct of this research. Also, the individual identity of the key informants and their provided responses were kept in full confidentiality.

Results and Discussion

Theme 1 – Expounding Students' Engagement towards Learning Biology

On the following pages are the emerging sub-themes generated in the open coding analysis of the in-depth interview data exploring the respondents' engagement towards learning biology prior to the utilization of the thesis output. Generally, two sub-themes surfaced. The first one was on interest and motivation that maneuvered positive engagement and the other one was the opposing idea of revealing the root cause of unappealing learning. The two sub-themes were elaborated below sorting out instances when students consider learning Biology engaging (interest and motivation) and not (unappealing).

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Sub-theme 1. Maneuvering/Facilitating Positive Engagement. As shown in Table 2, the three main ideas among the respondents in making their learning more engaging are the use of audiovisual materials, clear explanation and checking for understanding.

Table 2. Strategies in Promoting Positive Engagement

	Category-Code	Coded Response	Frequency (Percentage)
Strategies in promoting positive engagements	Use of audio-visual materials	Provides clear visualization of concept	4 (20%)
		Makes learning more interesting	3 (15%)
		in discussing the main idea of the lesson	2 (10%)
		For less pressure in learning	2 (10%)
		Controls classroom noise	2 (10%)
		Increases understanding	2 (10%)
	Clear explanation	Makes learning more interesting	3 (15%)
		Promotes attentiveness	1 (5%)
		Motivates learning	1 (5%)
		Is what learners look forward to	1 (5%)
	Checking for understanding	Increases understanding	1 (5%)
		Makes learning more interesting	2 (10%)
		Is what learners look forward to	1 (5%)

The audiovisual materials coded include video material, illustrations and still pictures. Clear explanation refers to the discussion proper while checking for understanding is all about oral questioning per student.

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The result of the most frequent coded response for student engagement in learning is the use of audio-visual materials. It is supported by the idea of Cajaiba (2014) that the use of audiovisual resources facilitates construction of knowledge both in teaching science and biology as with other disciplines. The audiovisual activity beyond didactic complement at certain times can serve as a tool for the implementation of activities that empower students through images, uncovering and clarifying doubts which often do not appear in the structure of a written text.

There is an association between the students' motivation towards science, enjoyment of science and future orientation towards science, and the frequency in which various teaching and learning activities take place in the classroom (Hampden-Thomson & Bennett, 2011). Understanding student engagement in science and the factors that influence it is essential in addressing the issue of uptake of science after compulsory schooling.

To be engaged, students need to have high levels of interest, skills and challenges. The students' situational interest, which is a psychological state that is aroused by specific characteristics of the learning situation, is changeable and is partly under control of teachers (Linnansaari et al., 2015).

Subtheme 2. Revealing the Root Cause of Unappealing Learning. School climate is important for the creation of effective learning environments (Narmadha & Chamudeswari, 2013). Alienation and disengagement of a student from the learning contexts in school will reduce his/her potential to master fundamental skills and concepts and develop effective learning skills.

Meanwhile, the analysis of the interview transcripts pointed out that students became less interested and less motivated to learn biology because of their difficulty in understanding the concepts and tasks that the teachers assigned to them, particularly copying down notes which make learning unappealing. The answers of the student-respondents varied in terms of what makes studying living things for them not engaging but the two mentioned codes were only the ones that re-occurred.

In middle school, students consider science as a difficult subject. Science education researchers like Topcu and Pekmez (2009) have initiated the argument that students still find it difficult to learn science concepts. This was proven by the conclusion of Karakoyun and Yapici (2016) that it is quite difficult to teach and learn biology as it includes complex relationships of unfamiliar and abstract concepts. The fact that biology concepts are abstract and complex in biology teaching causes students to have difficulty understanding certain subjects and to learn by just memorizing them.

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Table 3. Root Cause Analysis of Disengagement

	Category-Code	Coded Response	Frequency (Percentage)
Root cause analysis of disengagement	Difficulty in understanding concepts	Decreases eagerness/interest to learn	3 (15%)
		Makes lesson boring	1 (5%)
		Affects how lessons are delivered	1 (5%)
		Makes learning boring	1 (5%)
	Copying of notes	Considered as one of the teacher's strategies that learners do not like	1 (5%)

The biological level of organization and the abstract level of the concepts make learning biology difficult to understand (Cimer, 2012). The overloaded biology curricula, the abstract and interdisciplinary nature of biological concepts, and difficulties with the textbooks are the other factors preventing the students from learning biology effectively (Etobro & Fabinu, 2017).

Theme II – Unraveling Difficulties in Learning Biology

After revealing the students' engagement in learning Biology, focusing on when they consider the subject interesting and motivating (engaging) and when do they consider it unappealing (disengaging), here the research explored the reasons causing learning living things less motivating and less interesting to the learners. The interview administered to the respondents was directed into two sub-themes, persisting challenges in learning, and overcoming learning difficulties.

Subtheme 1. Persisting Challenges in Learning. Challenges in learning Biology coded response subsumes the three categories. Those are difficulty in remembering and understanding content, insufficient learning resources, and no direct application of learning.

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Table 4. Categories and Codes on Persisting Challenges in Learning

	Category-Code	Coded Response	Frequency (Percentage)
Difficulty in remembering and understanding content	Difficult to understand	Because of abstract concepts	3 (15%)
		Lesson because of complex relationships	1 (5%)
	Much to remember	Meaning of terms and ideas	1 (5%)
		Makes learning more difficult	5 (25%)
		Makes it confusing to learn	1 (5%)
		Because of too many terms	3 (15%)
	Easily forgotten ideas, concepts and meaning	Most of the time	1 (5%)
		Makes it difficult to have retention in learning	3 (15%)
Insufficient learning resources		In terms of books	6 (30%)
		Other than books	3 (15%)
No direct application of learning		Makes it difficult to understand why it is important to learn	2 (10%)
		Decreases interest in learning	1 (5%)

Table 4 presents the sub-themes under the challenges in learning followed by category-codes and responses from the students where the codes are generated from. In the first category, three main ideas are coded for conceptualization: difficult to understand; much to remember; and, easily forgotten ideas, concepts and meaning. The most frequent response among these three was the challenges encountered by the learners in terms of the difficulty in remembering and understanding the content. In this case, they easily forget the

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concepts. It was followed by the other two, namely, much to remember and difficult to understand with almost the same frequency.

The interrelatedness among the three coded ideas showed the pattern for the researcher to categorize them together. So did the relationship of the other two categories, it was found that there were insufficient learning resources and no direct application of learning to the first category and to each other.

It is parallel with the idea of Cimer (2012) who stated that another reason reported by many researchers why there is a challenge in learning biology is that, due to the nature of biological science, biology learning is generally based on memorization. It is supplementing the idea that biological science includes many abstract concepts, events, topics, and facts that students must learn. This makes it hard for students to learn them. Among these, the study revealed that the nature of the topic, teachers' style of teaching biology, students' learning and studying habits, students' negative feelings and attitudes towards the topic and lack of resources predominated.

Experiencing difficulties in topics in biology negatively affects students' achievement and students' attitudes toward science significantly alter their achievement in science (Cimer, 2012; Ozcan et al., 2014). Supporting the claim of sub-theme 2 in theme 1, unappealing learning will result in a negative attitude or disengagement to learning which of course will result in poor academic performance.

Subtheme 2. Overcoming Learning Difficulties. It concentrates on the idea of how challenges presented in learning Biology can be overcome by students as explicitly shown in their answers to semi-structured interviews. Using a similar process in developing all the three initial sub-themes discussed, this sub-theme was generated through open coding. The idea of why the coping mechanism was geared on the perspective of the respondents is in order to delve into their side.

Four categories emerge on the coping mechanism for students vis-à-vis challenges in learning Biology. Those are utilization of learning aid, teacher's effort, administrative support, and collaborative activity. Each of the categories were further detailed in the codes identified and responses where they are drawn from.

Table 5. Coping Mechanism in Overcoming Learning Difficulties

	Category-Code		Coded Response	Frequency (Percentage)
Coping Mechanism	Utilization of learning aide	Such as audio visual tools	Supplements modular learning	3 (15%)

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	Like electronic resources	Improves understanding of the lessons	2 (10%)
		Makes it easier to remember concepts and ideas	1 (5%)
		As discussion substitute	1 (5%)
		Is easier to provide Of books and text materials	1 (5%)
		Including video clips	2 (10%)
		Is easier to read and understand	2 (10%)
	as a supplementary material	Provides additional information	2 (10%)
		Serves as discussion substitute	1 (5%)
		Is easier to provide	1 (5%)
	To check for understanding	Makes learning more engaging	1 (5%)
		Increases retention in learning	1 (5%)
Teacher's effort	In building connections	Allows students to see relationships	1 (5%)
	Provides clear explanation	Makes learning more engaging	1 (5%)
	For lesson repetition	Increases retention in learning	1 (5%)
Administrative support		Is necessary to deal with the problems	3 (15%)
		To look for alternatives	1 (5%)
Collaborative activity		Increases retention in learning	2 (10%)

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	Makes learning more engaging	1 (5%)

This sub-theme is somewhat related to that of the theme 1 sub-theme 1, positive engagement. Hence it can be gleaned that the responses of the students are accurate for showing reliability. According to the respondents they can overcome the difficulties in learning Biology if they are provided with learning aids like audio-visual tools, electronic resources, and supplementary materials.

Highest frequency was denoted in the use of audio-visual tools followed by supplementary materials and electronic resources, respectively. Meanwhile, the second category (teacher's effort) also subsumes several codes under theme 1 sub-theme 1. Those are checking for understanding and clear explanations. That means that the students most likely would like their teacher to monitor their learning and provide the comprehensive discussions.

It is good to note in the 3rd category (administrative support) that the students also rely on the school administrators to deal with their needs. However, when further analyzed, it reflects that the administrative support they would like to ask for is limited on the insufficient learning resources.

Lastly, category 4 shows that the students recognize the importance of collaborative learning. They associate social involvement for a more joyful learning and it will also allow them to make their retention rate even higher when working in groups.

The four categories described above have been the bases for the development of the digitized concept stories because the student-respondents consider the use of audio-visual materials to increase their learning engagement by boosting their interest and motivation. In addition, it is because of the meaningful learning experience storytelling can provide learners in terms of making the lessons in biology less abstract and less complicated thereby increasing the rate of learning retention. Other sub-themes were also considered in developing the said intervention. However, because of the limits caused by the pandemic health crisis, collaborative activity, monitoring of learners' progress and administrative support were difficult to realize in full hand.

Theme III – Meaningful Learning Experiences in Using Digitized Concept Stories

As the main aim of this study is to encapsulate meaningful learning experiences of the students while utilizing the digitized concept stories, the developed semi-structured interview questionnaire in two parts was administered one-by-one to the same respondents.

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The first half is composed of open-ended questions while the other half is structured as completion type of sentences for elaborating experiences. The interview data gathered from the students were transcribed and coded descriptively. From the analysis of the codes and responses, three main sub-themes arose.

The three sub-themes identified were affirming utility to aid learning, deciphering the context to engage learning and presenting ideas for potential use. Each of these sub-themes is further discussed in the succeeding tables and paragraphs.

Subtheme 1. Affirming Utility to Aid Learning. Table 6 summarizes the insights of the student-respondents on the benefits of the digitized concept stories as learning aid.

Accordingly, the student-respondents denoted that digitized concept stories aid their learning by making lessons easier to understand, help them to better learn concepts, allow them to learn more, increase their retention in learning, let them recognize the importance of lessons and provide clear explanations

The results of thematic analysis jive with the notion of Erten et al. (2013) that scientific phenomena and events that students have difficulty understanding may become easier to understand when given within a story. Dahlstrom (2014) stated that narratives like developed digitized concept stories offer increased comprehension, interest, and engagement.

Storytelling provides an opportunity to explain and illustrate abstract ideas or concepts in a way that makes them more approachable and accessible (Isbell, et al., 2014). Stories offer a vehicle to bring facts to life, make abstract concrete and, through meaning making, make disciplinary literacies more accessible. It goes with the idea that who posits that storytelling is a fundamental means of meaning-making as a knowledge construction process (Wells, 1986).

Table 6. Benefits of Digitized Concept Stories as Learning Aid

	Category-Code	Coded Response	Frequency (Percentage)
Benefits as learning aid	Easier way to learn	As lessons are simplified	10 (50%)
		Because of the audio-visual component	7 (35%)
		Increases motivation	3 (15%)
		Enhances students' interest	3 (15%)
		Allows uncomplicated repetition	2 (10%)

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	Better than conventional textbooks	1 (5%)
	Because of the storytelling delivery	1 (5%)
	For distance learning	1 (5%)
	Less pressured	1 (5%)
helpful	In learning	3 (15%)
	For developing mastery	3 (15%)
	To learn new things	1 (5%)
	For modular distance learning	1 (5%)
Learn more	Ideas and concepts	2 (10%)
	Additional information	2 (10%)
Increase learning retention	Easier to remember	3 (15%)
	More senses involved	1 (5%)
	Because of the audio-visual component	1 (5%)
	Builds learning patterns and connections	1 (5%)
Recognize importance of lesson	To learners' daily lives	2 (10%)
	Through video viewing	1 (5%)
With clear explanation	Because of visual component added	3 (15%)

Subtheme 2. Deciphering the Context to Engage Learning. Although it is mostly related to arts and humanities, the use of digital storytelling in teaching of mathematics and science is also an effective method (Sadik, 2008). This was supported with the claims of Hung et al. (2012) that use of digital storytelling in science education increases students' motivation and success.

This sub-theme, deciphering the context to engage learning emerges from three persisting codes as presented in Table 7, enjoyment in learning, increasing motivation and making learning more interesting. Among the three codes, the most frequently occurring in the interview data was enjoyment in learning that the digitized concept stories provide. Of

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course, together with motivation and interest, the other two codes of equal frequency value allow the learning process to be more engaging.

Table 7. Dimensions of Learning Engagement

	Category-Code	Coded Response	Frequency (Percentage)
Dimensions of engaging learning	Enjoyment in learning	As how content was delivered through storytelling	12 (60%)
		In watching videos	5 (25%)
		For making lessons easier	4 (20%)
		For increasing level of understanding	2 (10%)
		As a discussion alternative	1 (5%)
	Increase motivation	Because of the videos	3 (15%)
		Simplifying lesson through storytelling	2 (10%)
		Increase understanding	1 (5%)
		For including examples	1 (5%)
		Widen perspective	1 (5%)
	Make learning more interesting	Because of how the story is told	3 (15%)
		Increase understanding	2 (10%)

This claim was further supported by the study of Suwardy et al. (2013) citing that as the students detailed that digital storytelling can enhance their 'activity, improve their ability to relate theories to the case, and make learning interesting and effective. Digital storytelling enhances their motivation and helps the teachers in building the constructivist learning environments that encourage creative problem solving based on collaboration and peer-to-peer communication. Added to this, according Dakich (2008), digital storytelling can be used to facilitate integrated approaches to curriculum development and engage learners in higher order thinking and deep learning.

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Subtheme 3. Presenting Ideas for Potential Use. Interestingly, during the coding process and thematic analysis, the digitized concept stories provided a potential use as shared by several respondents. It expounds how this was generated. The students revealed that the digitized concept stories developed can be used in other topics or lessons in sciences and even in other disciplines.

Similarly, as shown in Table 8, the student-respondents cited instances for the digitized concept stories' appropriate use for the target learners and current learning situation.

Table 8. Students' Perspective on the Functionality of Digitized Concept Stories

	Category-Code	Coded Response	Frequency (Percentage)
Perspective on the functionality	Can be used in other topics and discipline	To deliver lesson in easier way	3 (15%)
		To lessen pressure on learning	2 (10%)
		Especially in the new normal	2 (10%)
		To promote better understanding	1 (5%)
	Appropriate for use	In the new normal	5 (25%)
		In the level of learners	1 (5%)
		To increase understanding	1 (5%)

There are many different types of digital stories, but it is possible to categorize them into the following three major groups: personal narratives - stories that contain accounts of significant incidents in one's life; historical documentaries – stories that examine dramatic events that help understand the past; and stories designed to inform or instruct the viewers on a particular concept or practice. With these ideas, the application and integration of digitized stories ranges from language to math and science courses and even to arts and humanities (Robin, 2011).

Meanwhile, Smeda et al. (2014) mentioned that in one case or more digital storytelling would likely rise from changes in educational practice, such as distance education, online learning and blended learning. Stories advance e-learning in many respects: They set a tone in a class, build rapport, and convey the information on multiple levels. Stories can be effective classroom tools, but they present the intriguing challenges to

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presenters who would deploy them at a distance. This is what this study tried to cover as shown by the two previous themes of aiding and engaging learning for a more meaningful experience.

Evaluation of the Qualities of Digitized Concept Stories

Table 9. Teachers' Evaluation of the Digitized Concept Stories Qualities in terms of Content

The digitized concept stories…	**WM**	**DR**
1. cover the content standards in K-12 science curriculum.	3.73	SA
2. focus on the most essential learning competencies (MELCs) identified by the DepEd.	3.82	SA
3. base topics on the least learned competencies in Biology.	3.68	SA
4. present accurate scientific facts and information.	3.82	SA
5. have content which is relevant to the locality of the students.	3.59	SA
Average Weighted Mean	**3.73**	**SA**

Table 9 summarizes the qualities of digitized concepts stories as evaluated by the teacher-respondents in terms of content. The intervention material received favorable evaluation as signified by an average weighted mean of 3.73 that is described as "strongly agree." They strongly agree that the digitized concept stories developed present accurate scientific facts and information (3.82) and focused on the most essential learning competencies identified by DepEd (3.82). Though with lowest WM of 3.59, the respondents still strongly agree that the intervention material has content relevant to the locality of the students.

Digital storytelling, with all its other positive aspects which allow technology integration and which reflect upon educational environments, can be used effectively in teaching and learning process (Karakoyun & Yapici (2016). Hence, content integration in the developed digitized concept stories is really achievable.

Meanwhile, Table 10 below reveals that the respondents strongly agree (3.71) that the digitized concept stories developed are appropriate. The teacher-evaluators strongly agreed that the thesis output is very timely in today's condition of the learning environment (3.82) and uses words in telling a story which are appropriate to the learners' vocabulary or language level (3.82). They also strongly agree that it is in file format and quality which are appropriate for low- to high-tech range of devices (3.50).

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Table 10. Teachers' Evaluation of the Digitized Concept Stories Qualities in terms of Appropriateness

The digitized concept stories…	**WM**	**DR**
1. use words in telling the story which are appropriate to the learners' vocabulary or language level	3.82	SA
2. arrange the story flow on the level of the maturity of the learners	3.64	SA
3. are very timely in todays' condition of the learning environment	3.82	SA
4. have length of time told that is applicable to the learners' attention span	3.77	SA
5. are in file format and quality which are appropriate for low-tech to high-tech range of devices	3.50	SA
Average Weighted Mean	**3.71**	**SA**

According to Smeda et al. (2014), digital storytelling is a powerful tool to integrate instructional messages with learning activities to create more engaging and exciting learning environments. It is a meaningful approach for creating a constructivist learning environment based on novel principles of teaching and learning. Thus, this approach has the potential to enhance student engagement and provide better educational outcomes for learners. Appropriateness is hence directly connected to the constructivist principle that when learning activity matches the level of maturity of the learners will be able to benefit fully from it.

Table 11. Teachers' Evaluation of the Digitized Concept Stories Qualities in terms of Engagement to Learners

The digitized concept stories…	**WM**	**DR**
1. are motivation boosters for the learners.	3.59	SA
2. are motivating and interesting.	3.59	SA
3. are designed to increase the students' interests in the topics covered.	3.64	SA
4. have titles which are catchy and appealing.	3.55	SA
5. have interesting plots.	3.59	SA
Average Weighted Mean	**3.59**	**SA**

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As shown in Table 11, the average weighted mean is 3.59. The evaluators strongly agreed that the digitized concept stories increase the engagement of the learners.

Three indicators received equal values of 3.59. It corresponds to a strongly agree descriptive rating for being motivation boosters, motivating and interesting and having interesting plots. The result of the evaluation is analogous to the results of thematic analysis where engagement in learning emerges as a theme for meaningful learning experiences of students.

As Wells (1986) mentioned, the use of digital storytelling in the teaching of mathematics and science is also an effective method. His idea was proven still true by Hung et al. (2012) concluding that its use in science education increases students' motivation and success.

Digital storytelling can enhance students 'activity, improve the students' ability to relate theories to the case, and make learning interesting and effective (Suwardy, et al., 2013). It enhances learners' motivation and helps teachers in building constructivist learning environments that encourage creative problem solving based on collaboration and peer-to-peer communication. In addition, digital storytelling can be used to facilitate the integrated approaches to curriculum development and engage learners in higher order thinking and deep learning (Dakich, 2008).

Table 12. Teachers' Evaluation of the Digitized Concept Stories Qualities in terms of Future Use

The digitized concept stories…	**WM**	**DR**
1. are potentially beneficial as an intervention material for the science teachers.	3.91	SA
2. are recommendable for use to other Science teachers.	3.91	SA
3. are expected to be used in regular classroom instruction.	3.86	SA
4. would help in managing disruptive behavior of non-participatory learners in class.	3.55	SA
5. are helpful to deal with the problem of students' reading ability and comprehension.	3.68	SA
Average Weighted Mean	**3.78**	**SA**

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Table 12 presents the evaluation results of the developed intervention material in terms of its future use. On the average, the respondents strongly agree (3.78) with the functional features that the quality of the digitized concept stories possessed and their future utility in other classes and/or lessons.

The first two indicators received the highest evaluation rating. They strongly agree (3.91) that digitized concepts stories are potentially beneficial as an intervention material for Science teachers and are recommendable for use to other Science teachers. Likewise, at 3.55 weighted mean, helping in managing the disruptive behavior of non-participatory learners in class also received strongly agree descriptive rating.

Subtheme 3 on theme 3, potential use of the meaningful learning experiences strengthens the results of this part of evaluation on qualities of digitized concept stories. It is implied that the application and integration of digitized stories ranges from language to math and science courses and even in arts and humanities (Robin, 2011). Meanwhile, integrating literacy skills for storytelling, the intervention material would likely improve comprehension and reading ability of the target learners.

Conclusions

This study revealed that students exhibit positive engagement towards learning Biology when the audio-visual materials are utilized as there are clear explanations and mechanisms for checking for understanding. Conversely, they became disengaged due to their difficulties in understanding concepts and in taking down notes. Difficulties in remembering and understanding content, insufficient learning resources, and no direct application of learning are the challenges encountered by the students in Biology class, thus coping with them entails offering learning aids, extending teacher's effort, administrative support, and collaborative activity.

Thereafter, validated digitized concepts stories are ready for formal classroom utilization. These digitized concept stories serve as learning aids in Biology 7 because they make lessons easier to understand, help increase retention rate, provide additional knowledge, and clear explanation, and allow the recognition of importance of the lessons delivered, engage students as they enjoy learning, increase motivation and make learning more interesting. Therefore, they are appropriate in distance learning for Grade 7 students and can also be used for other topics in sciences and other disciplines. They are also acceptable for teachers given their qualities.

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Recommendations

Based on the conclusions drawn, the recommendations are hereby offered for the improvement of the study: (1) triangulation may be used by involving the teachers and parents/peer observation to increase reliability of results when the case permits to be possible; (2) the use of digitized concepts stories may be explored in other disciplines or topics of interests; (3) lesson exemplar may be associated with the digitized concept stories developed for a well-designed/structured learning delivery; (4) the developed intervention material may be used in an experimental study to further test its ability in improving students' academic performance: and, (5) the developed digitized concept stories may be further improved by considering the use of the different types of stories in language disciplines.

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