

Significant Experiences of Grade 7 STE Students in Utilizing DOST Science Courseware

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Abstract

To determine the significant experiences of Grade 7-Science Technology and Engineering (STE) class in science learning regardless of profile in times of the COVID-19 pandemic, Department of Science and Technology (DOST) Science courseware was utilized in this study. Specifically, this study aimed to: (1) know the demographic profile of the students (2) identify the most essential learning competencies to be supplemented by the DOST Science courseware; and (3) document the significant experiences of Grade 7 STE students in utilizing DOST Courseware. This utilizes the descriptive research method and the purposive sampling method was also employed. In terms of statistical treatment, the researcher used qualitative analyses to gather insights from the data collected from the respondents. Content analysis was used to analyze the learning competencies suited for each of the mobile apps of the DOST Grade 7 Courseware. The researcher also used thematic analysis to determine the significant experiences of Grade 7-STE students after using the courseware materials. During this difficult time, it is vital to consider the demographic profile of students in selecting effective and efficient supplementary materials. The DOST Courseware selected is based on the Most Essential Learning Competencies and from that only three courseware were utilized. To gather data for the significant experiences digital technologies were used such as web surveys through Facebook messenger. The findings of the study suggest that most of the significant experiences of the students were found on the "visual-aided discussions" theme along with motivation; the "Presence of inquiry-based teaching features" theme along with interest; and the "Completing game-based tasks" theme along with satisfaction. Based on the results and conclusions posted in the study, the same evaluation may be conducted in all the remaining DOST Courseware and can be conducted in regular classes where technology is scarce and development is low.

Keywords: Education and Teaching, Significant Experiences, Thematic Analysis, Philippines-Asia

Introduction

As COVID-19 pandemic continues to prevail, education sectors of every country are sorted to different mechanisms of distance learning for it to continue its mandate of delivering quality education to its learners. In the Philippines, the Department of Education implemented the Basic Education Learning Continuity Plan in 2020 and about 79% of the learners from public schools adopted a printed modular learning setup. However, despite most of the reforms implemented to combat learning losses caused by the pandemic, the effects of the pandemic can still be seen in the education sector.

As the primary institution in promoting science and technology, the Department of Science and Technology Science Education Institute (DOST-SEI) and the Department of Science and Technology Advanced Science Technology Institute (DOST-ASTI) spearheaded the development of course materials way back in 2005. Its primary goal is to provide educational technology, teaching, and learning innovation to promote the upgrading and enhancement of Science and Mathematics education in the Philippines. However, there was only a little research that dwells on the effects of using these materials during the pandemic.

In response to the results of situation analyses conducted by the Department of Education, they outlined several strategies in their Basic Education Development Plan 2030 such as the enhancement of DepEd platforms for learning resources, promote partnerships to benefit education for learners in situations of disadvantage and alignment of resource provision to key stage learning standards. With these, it may be deduced that the utilization of DOST Courseware materials as supplementary materials in classrooms is aligned with these ideals to deliver accessible and quality education for all.

Symbolic interactionism can significantly support the claim that teachers use supplementary materials as a way of depicting the idea of how humans use symbols to interact/communicate with each other which pertains to the idea of providing help and concern of teachers to the teaching and learning process in the education system. Social ties are built based on how we interpret one another's behavior. Additionally, according to this idea, words, gestures, and other symbols help to enhance human relationships, and, over time, these motions come to have conventionalized meanings (Hasa, 2021).

In the context of Sto. Domingo National High School, a Science, Technology, and Engineering (STE) class program was established, which aims to provide students with an enriched science-oriented curriculum integrated with research and technology. Thus, the researcher opted to use the DOST Courseware materials for the students of the Grade 7 STE class. This is because of the researcher's observations in the administration of the printed modular setup in the schools. Usually, since the modules are made to suit all types of learners and the teachers were once tasked to replicate copies of the modules, their time to contextualize learning activities for the students was decreased. Also, 32 out of 40 (80%) of STE learners may not look for other materials because according to them, modules were already provided. As per the result of STE students' summative tests in science, the students obtained a rating of 62. 87% Performance Level (PL) which is likewise interpreted as "moving towards mastery," and as per further interpretation, supplementary material which can be given to students apart from the module to boost the interest and performance of the students may be applied and the researcher used the courseware materials developed by DOST for Grade 7 students. The researcher opted to utilize DOST Mobile Courseware because 100% of STE Grade 7 students are android and iPhone users.

Promoting and maintaining students' motivation is one of the most difficult aspects of instruction. The subject of student involvement and motivation in the learning process has persisted since the beginning of the 21st century. With rapid progress, technology has become the go-to tool for many teachers to encourage and maintain students' interest in learning. The common usage of technology in the classroom has been followed in studies on the relationships between motivation and technology.

Objectives of the Study

The researcher aimed to document the significant experiences of students in utilizing DOST Courseware for Grade 7 Science. Specifically, this research answered the following questions:

- 1) Determine the profiles of the Grade 7 STE students of Sto. Domingo National High School in terms of: Age, Sex, Perceived level of ICT Skills, Geographic Location

2) Identify the learning competencies in Grade 7 Science that may be supplemented with the Grade 7 Science DOST Courseware; and 3) Identify the significant experiences of the STE students of Sto. Domingo National High School after utilizing the Grade 7 DOST Courseware along Motivation, Interests, Satisfaction

Methodology

This research used a descriptive research design which aimed to define, clarify, and verify study findings (Dudovskiy, 2009). It was used since it was primarily concerned on the profiles of the students, the possible learning competencies that may be supplemented with the DOST Courseware materials, as well as the significant experiences that the Grade 7 STE students had before and after using the said materials.

An informed consent form for each parent's participant has been formulated and parents were given time to read and sign this before the conduct of the event. The intact class size of Grade 7 STE students at the school year 2021-2022 which was composed of 40 students were the chosen respondents in this research endeavor. The purposive sampling method was utilized in which the researcher uses his or her judgment to pick people from the population to take part in the study. It is also referred to as judgmental, selective, or subjective sampling (Dudovskiy, 2010).

To gather data for this study, digital technologies were used such as web surveys through Facebook messenger. According to Pedrajita (2022), web surveys, often known as internet surveys, are a type of data-gathering technique in which a sample of respondents receives surveys or questionnaires via the internet and can answer them online. Thus, the respondents of this study received and answered the researcher-made survey questionnaires and focus group discussion questionnaires through Facebook messenger. Also, most importantly, the respondents used the DOST Courseware materials in this research.

The data gathering started when the researcher mapped the Grade 7 DOST Courseware materials to Most Essential Learning Competencies (MELCs) to determine what learning competencies may be supplemented with the said materials. Then, after the researcher remotely facilitated the installation of the android version of the courseware materials, the researcher gave the questionnaires to the respondents through Facebook messenger after they used the mobile apps. However, it should be noted that only the android version of the courseware materials was used in this pilot study. The pilot study lasted from first to third quarter of the school year specifically from September 2020 to February 2021.

The researcher also employed a 5-point Likert scale to determine the level of ICT Skills of students which pertains to their ability in using open educational resources like android applications. This tool was adapted from the study of Rivers (2020).

In terms of statistical treatment, the researcher used qualitative analyses to gather insights from the data collected from the respondents. Specifically, content analysis was used to analyze the learning competencies suited for each of the mobile apps of the DOST Grade 7 Courseware. The researcher also used thematic analysis on the responses of the respondents to determine their significant experiences after using the courseware materials.

Results and Discussion

This section includes the data presentation, analysis, and interpretation of the following: (1) The demographic profile of the Grade 7 STE Students of Sto. Domingo National High School (2) The learning competencies in Grade 7 Science supplemented with the Grade 7 DOST Courseware (3) Significant

experiences of Grade 7 STE students of Sto. Domingo National High School after utilizing the Grade 7 DOST Courseware

1. Profiles of the Grade 7 STE students of Sto. Domingo National High School

1.1. In terms of Age

Table 1
 Demographic Profile of Students with Regards to Age

Age	Frequency	Percentage
11	17	42.5%
12	20	50%
13	3	7.5%
Total	40	100%

Table 1 showed that 42.5% or 17 respondents, 50% or 20 respondents, and 7.5% were 11,12, and 13 years old respectively, and had a mean age of 12 years old. Thus, this implied that the respondents are indeed regular Grade 7 students this school year, 2020-2021. Age qualification for Grade 7 learners in both public and private schools should not be older than 15 years old.

1.2. In terms of Sex

Table 2
 Demographic Profile of Students with Regards to Sex

Sex	Frequency	Percentage
Male	17	42.5%
Female	23	57.5%
Total	40	100%

Table 2 showed that most of the respondents are females, which represented 23 or 57.5%. Next, respondents belong to male, which represented 17 or 42.5%.

1.3. In terms of Perceived Level of ICT Skills

Table 3 showed the result of the self-assessment of the level of ICT skills of the respondents in the online survey given to them through Facebook messenger. It showed that the greatest number of respondents were at the proficient level or at the expert level of expertise of ICT skills.

Table 3
Perceived Level of ICT Skills of Grade 7-STE Students

Numerical Rating	Level of ICT Skills	Description	Number of Respondents
5	Expert	Fully capable and experienced; Sought for help by others; Needs no assistance to complete task; Demonstrated ability to lead and train others.	7
4	Proficient	Capable and experienced; Able to work independently with little help	33
3	Developing	Able to perform at a basic level; needs help from time to time	0
2	Basic	Limited in ability or knowledge; Needs significant help from others	0
1	Low	Unable to Perform	0
Total			40

1.4. In terms of Geographic Location

Table 4
Geographic Location of Grade 7- STE Students

Geographic Location	Frequency	
	Male	Female
Upland	2	3
Lowland	15	20
Total	17	23

Table 4 showed that there are more male and female respondents who are residing in lowland barangays compared to Upland barangays with only two male respondents and three female respondents.

2. Learning Competencies in Grade 7 Science Supplemented with the Grade 7 Science DOST Courseware

As supported by the Most Essential Learning Competencies (MELCS) of the Department of Education, only four MELCS in Grade 7 Science was supplemented with the Grade 7 DOST Courseware. The Department of Education initially developed 15 courseware for Grade 7 Science but among these, only eight were working and only three were selected as supplementary materials. The researcher employed the 5 E’s learning model in this study and table 5 present the lessons, MELCS, and courseware used as supplementary learning materials aside from the modules that were given to the respondents. Table 5 shows the data gathered by the researcher.

Table 5
Learning Competencies in Grade 7 Science Supplemented with the Grade 7 DOST Courseware

Lesson	Most Essential Learning Competencies	DOST Courseware
Elements and Compounds	<ul style="list-style-type: none"> ○ Recognize that substances are classified into elements and compounds (S7MTIg-h-5) 	<ul style="list-style-type: none"> ○ Elements and Compounds
Energy: Its Sources and Different Forms	<ul style="list-style-type: none"> ○ Describe the characteristics of sound using the concepts of wavelength, velocity, and amplitude (S7LT - III d – 7) ○ Infer that waves carry energy. ○ Infer the conditions necessary for heat transfer to occur (S7LT - III h - i -12) 	<ul style="list-style-type: none"> ○ Energy and its Different Forms ○ Energy Sources

3. Significant Experiences of Grade 7 STE students in Utilizing DOST Courseware

Table 6
Significant Experiences of Grade 7 STE students in Using DOST Courseware along Motivation and Age

Theme	Mobile Apps	Significant Experiences along Motivation	Age	Frequency	Percentage (%)
Sense of “facilitated or guided” while learning		“There are guides all throughout the app that inspired me to finish it.”	11	3	18
			12	8	40
			13	3	100
Visual-aided discussions	Elements and Compounds; Energy and its Different Forms; Energy Sources	“The app somehow inspired me to study Science by presenting cool representations of facts that I observed in real-life scenarios.”	11	5	29
			12	12	60
			13	2	67
Engaging interactions		“The app inspired me to learn Science because I can interact with it while studying.”	11	7	41
			12	5	25
			13	2	67

It is evident from Table 6 that all 13-yr old students agreed that they significantly experienced the sense of being facilitated or guided when they used the DOST Courseware materials that inspired them or motivated them to study Science lessons.

Table 7

Significant Experiences of Grade 7 STE students in Using DOST Courseware along Motivation and Sex

Theme	Mobile Apps	Significant Experiences along Motivation	Sex	Frequency	Percentage (%)
Sense of “facilitated or guided learning”		“There are guides all throughout the app that inspired me to finish it.”	Male	6	33
			Female	8	36
Visual-aided discussions	Elements and Compounds, Energy and its Different Forms,	“The app somehow inspired me to study Science by presenting cool representations of facts that I observed in real-life scenarios.”	Male	12	67
	Energy Sources	There are visual representations of what is being discussed.”	Female	9	41
Engaging experiences		“The app inspired me to learn Science because I can interact with it while studying.”	Male	8	44
			Female	6	27

It is evident from Table 7 that the highest percentage of male Grade 7 STE students registered they were motivated because of the visual-aided discussions of the DOST Courseware materials. It was 12 out of 17 male students or 67 % that found to be motivated by the said significant experience.

Table 8

Significant Experiences of Grade 7 STE Students in Using DOST Science courseware along Motivation and Perceived Level of ICT Skills

Theme	Mobile Apps	Significant Experiences along Motivation	Perceived Level of ICT Skills	Frequency	Percentage (%)
Sense of “facilitated or guided learning”		“There are guides all throughout the app that inspired me to finish it.”	Expert	3	43
			Proficient	9	28
Visual-aided discussions	Elements and Compounds, Energy and its Different Forms,	“The app somehow inspired me to study Science by presenting cool representations of facts that I observed in real-life scenarios.”	Expert	1	14
	Energy Sources	There are visual representations of what is being discussed.”	Proficient	20	61
Engaging experiences		“The app inspired me to learn Science because I can interact with it while studying.”	Expert	6	86
			Proficient	8	24

Table 8 showed that in terms of the level of perceived ICT skills of the STE students, most of those at the expert level stated that it is the engaging experience that has been significant to them for them to be motivated enough to study Science lessons. On the other hand, most of those students in the proficiency level stated that it was the visual-aided discussions that motivated them to study the lessons.

Table 9

Significant Experiences of Grade 7 STE Students in Using DOST Science courseware along Motivation and Geographical Location

Theme	Mobile Apps	Significant Experiences along Motivation	Geographical Location	Frequency	Percentage (%)
Sense of “facilitated or guided learning”		“There are guides all throughout the app that inspired me to finish it.”	Upland	4	80
			Lowland	10	60
Visual-aided discussions	Elements and Compounds, Energy and its Different Forms,	“The app somehow inspired me to study Science by presenting cool representations of facts that I observed in real-life scenarios.”	Upland	5	100
	Energy Sources		Lowland	16	46
Engaging experiences		“The app inspired me to learn Science because I can interact with it while studying.”	Upland	5	100
			Lowland	20	58

Based on Table 9, it was highly evident that the upland STE students wrote visual-aided discussions and the engaging experiences while using the app were the most significant experience for them that made them motivated to study the Science lessons. It may be attributed to the novelty effect of the app and its innate features of interactivity.

Table 10

Significant Experiences of Grade 7 STE students in Using DOST Courseware along Interest and Age

Theme	Mobile Apps	Significant Experiences along Interest	Age	Frequency	Percentage (%)
Logical Presentation of Ideas		“I find the learnings in the applications easy and relevant to real life, it boosts my interest in pursuing Science related course someday!”	11	10	59
			12	13	65
			13	2	67
Visual-aided discussions	Elements and Compounds; Energy and its Different Forms;	“The animations and characters in each application are easy to remember. Iba talaga kapag inapply ang concepts into real life. Interesting!”	11	6	36
	Energy Sources		12	10	50
Presence of inquiry-based teaching features		“Hoping to encounter more Science courseware with animations in the next school years. I am loving Science more.”	13	1	33
			11	12	71
			12	16	80
		13	3	100	

It is observable from Table 10 that all 13-yr old Grade 7 STE students noted that it is the experiences under the “presence of features of inquiry-based teaching” themes that were remarkable to

them. Those experiences made them feel interested to learn Science lessons. This may be attributed to their maturity in comparison to other age levels.

Table 11
Significant Experiences of Grade 7 STE students in Using DOST Courseware along Interest and Sex

Theme	Mobile Apps	Significant Experiences along Interest	Sex	Frequency	Percentage (%)
Logical Presentation of Ideas		“I find the learnings in the applications easy and relevant to real life, it boost my interest in pursuing Science related course someday!”	Male	15	88
			Female	10	43
Visual-aided discussions	Elements and Compounds; Energy and its Different Forms;	“The animations and characters in each application are easy to remember. Iba talaga kapag inapply ang concepts into real life. Interesting!”	Male	8	47
	Energy Sources	“Hoping to encounter more Science courseware with animations in the next school years. I am loving Science more.”	Female	9	39
Presence of inquiry-based teaching features		“Feels like it is our teacher that asks the questions in the apps. More courseware pa po, Ma’am!”	Male	15	88
			Female	16	70

Based on table 11, it can be observed that most of the male STE students felt interested to learn Science lessons after using the DOST courseware materials because of their notable experiences that fell under themes of “Logical Presentation of Ideas” and “Presence of inquiry-based teaching features”. Meanwhile, the lowest recorded response was from the group of female STE students under the theme of “visual-aided discussions.”

Table 12
Significant Experiences of Grade 7 STE students in Using DOST Courseware along Interest and Perceived Level of ICT Skills

Theme	Mobile Apps	Significant Experiences along Interest	Perceived Level of ICT Skill	Frequency	Percentage (%)
Logical Presentation of Ideas		“I find the learnings in the applications easy and relevant to real life, it boosts my interest in pursuing Science related course someday!”	Expert	6	86
			Proficient	19	58
Visual-aided discussions	Elements and Compounds; Energy and its Different Forms;	“The animations and characters in each application are easy to remember. Iba talaga kapag inapply ang concepts into real life. Interesting!”	Expert	5	71
	Energy Sources	“Hoping to encounter more Science courseware with animations in the next school years. I am loving Science more.”	Proficient	12	37
Presence of inquiry-based teaching features		“Feels like it is our teacher that asks the questions in the apps. More courseware pa po, Ma’am!”	Expert	7	100
			Proficient	24	73

It can be seen from Table 12 that all expert level in ICT skills-STE students found that it was the presence of inquiry-based teaching features that made them interested to learn Science lessons. It was also the most observed response even from the STE students who were at a proficient level in terms of their ICT skills.

Table 13
Significant Experiences of Grade 7 STE students in Using DOST Courseware along Interest and Geographic Location

Theme	Mobile Apps	Significant Experiences along Interest	Geographic Location	Frequency	Percentage (%)
Logical Presentation of Ideas		“I find the learnings in the applications easy and relevant to real life, it boosts my interest in pursuing Science related course someday!”	Upland	4	57
			Lowland	21	60
Visual-aided discussions	Elements and Compounds; Energy and its Different Forms; Energy Sources	“The animations and characters in each application are easy to remember. Iba talaga kapag inapply ang concepts into real life. Interesting!” “Hoping to encounter more Science courseware with animations in the next school years. I am loving Science more.”	Upland	4	57
			Lowland	15	43
Presence of inquiry-based teaching features		“Feels like it is our teacher that asks the questions in the apps. More courseware pa po, Ma’am!”	Upland	5	100
			Lowland	26	74

Based on Table 13, all STE students from upland areas believed that those experiences that made them feel the presence of inquiry-based teaching also made them feel to be interested in learning the Science lessons. It is also the most prominent response that had been gathered even from the STE students who live in lowland areas with 26 out of 35 or 74%.

Table 14
Significant Experiences of Grade 7 STE students in Using DOST Courseware along Satisfaction and Age

Theme	Mobile Apps	Significant Experiences along Interest	Age	Frequency	Percentage (%)
Completing game-based tasks	Elements and Compounds; Energy and its Different Forms; Energy Sources	“ Parang di na po ako maglalaro ng ibang mobile apps. The games embedded in the app deepened my understanding on the concepts of elements and compounds as well as energy sources and forms while enjoying. Ang galing po!”	11	12	71
			12	16	80
			13	3	100
			11	8	47
Understanding concepts behind real-life scenarios		“The activities in the application helps me to define issues or challenges and identify possible solutions. Sana marami pa po na ganitong app ang DOST”	12	9	45
			13	2	67

Based on table 14, there were 16 out of 20 12yr-old students, the greatest number of students who responded in this area, stated experiences along the “completing game-based tasks” theme that made them satisfied in learning Science lessons after using the DOST Courseware materials.

Table 15

Significant Experiences of Grade 7 STE students in Using DOST Courseware along Satisfaction and Sex

Theme	Mobile Apps	Significant Experiences along Interest	Sex	Frequency	Percentage (%)
Completing game-based tasks	Elements and Compounds; Energy and its Different Forms;	“Parang di na po ako maglalaro ng ibang mobile apps. The games embedded in the app deepened my understanding on the concepts of elements and compounds as well as energy sources and forms while enjoying. Ang galing po!”	Male	13	76
			Female	18	78
Understanding concepts behind real-life scenarios	Energy Sources	“The activities in the application helps me to define issues or challenges and identify possible solutions. Sana marami pa po na ganitong app ang DOST”	Female	6	35
			Male	13	57

Table 15 showed that in terms of sex, the female STE students were found to be more inclined to the experiences under the “completing game-based tasks” theme than the male students. There were 78% of them noted that they experienced this feeling of satisfaction in learning Science lessons because of those game-based tasks featured on the mobile apps.

Most of the Grade 7 STE students with proficient ICT skills got the highest percentage of responses under the “Completing game-based tasks” theme with 82%. It is seemingly supported by an additional 57% of the students with the expert skills in ICT.

Table 16

Significant Experiences of Grade 7 STE students in Using DOST Courseware along Satisfaction and Geographic Location

Theme	Mobile Apps	Significant Experiences along Interest	Geographic Location	Frequency	Percentage (%)
Completing game-based tasks	Elements and Compounds; Energy and its Different Forms;	“Parang di na po ako maglalaro ng ibang mobile apps. The games embedded in the app deepened my understanding on the concepts of elements and compounds as well as energy sources and forms while enjoying. Ang galling po!”	Upland	5	100
			Lowland	26	74
Understanding concepts behind real-life scenarios	Energy Sources	“The activities in the application helps me to define issues or challenges and identify possible solutions. Sana marami pa po na ganitong app ang DOST”	Upland	3	60
			Lowland	16	46

Based on table 16, all the Grade 7 STE students who lived in upland areas shared experiences of how they were satisfied in learning Science after using the mobile app from DOST Courseware all on the same theme – “Completing game-based tasks” theme thus with a 100% of the upland respondents. It is seemingly supported by an additional 74% of the students who lived in the lowland areas.

Conclusions

During difficult times, it is vital to consider the demographic profile of the students in terms of age, sex, perceived ICT skill level, and geographic location while selecting effective and efficient supplementary materials. As per reviewing the MELCS, only four learning competencies were identified and only three among eight working DOST Courseware were utilized as supplementary material.

In terms of significant experiences along with motivation, most responses of the STE students reflect experiences under the “Visual-aided discussions” theme where the students highlighted that the discussions that were presented with cool visuals inspired them to study the Science lessons. It was mostly found among 12 yr-old male students with proficient ICT skills and who lived in lowland areas. In terms of significant experiences along interest, most responses of the STE students reflect experiences under the “Presence of inquiry-based teaching features” theme where the students highlighted that the feeling of having a teacher asking the questions found in the mobile apps had made them feel interested to study Science lessons. It was mostly found among 13 yr-old female students with proficient ICT skills and who lived in lowland areas. In terms of significant experiences along with satisfaction, most responses of the STE students reflect experiences under the “Completing game-based tasks” theme where the students highlighted that whenever they complete tasks in the mobile apps, it makes them feel satisfied to study Science lessons. It was mostly found among 12 yr-old female students with proficient ICT skills and who lived in lowland areas.

Recommendations

Based on the results and conclusions posted in the study, the following recommendations were formulated.

1. The same evaluation may be conducted in all the remaining DOST Courseware.
2. This study may be conducted in Grade 7 regular classes where technology is scarce and development is low.
3. For students, other topics in Math and Science DOST Courseware may be explored and navigated. Teachers may look for educational technologies like DOST Courseware in providing varied activities.
4. Future research may be undertaken to further analyze the use of the DOS Courseware in evaluation and correlation between perception and purpose of instruction, usability and sustainability.

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