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Improving STS Teaching Practice Through Transversal Competencies Towards Seamless Blended Digital Learning

Nikko Lorenz P. Lawsin^{1*}, Maricar S. Prudente²

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ABSTRACT

Improving the teaching practice of Science, Technology, and Society (STS) is the primary goal of this action research and it was done by developing STS Modules that incorporated the frameworks of UNESCO Transversal Competencies and UN Sustainable Development Goals, and Seamless Blended Digital Learning Modality (SBDLM). These modules were utilized to determine its effects on student's Transversal Competencies, Conceptual Understanding, Sustainable Development & Solution-oriented Mindset, and on the perceptions of STS faculty members. This study utilized action research design to improve the STS teaching practice by developing and implementing STS Modules and evaluating their effects on the above-mentioned variables. Based on the results, the STS module contributed to the improvement of student's conceptual understanding, inculcation of transversal competencies, and cultivation of sustainable development and solutions-oriented mindset. The modules are perceived by the students and virtual classroom observers as helpful as they assist the students to maximize learning even if there is minimal interaction between teachers and students because of the situations brought by COVID-19 pandemic. The study recommends continuous utilization of these STS Modules for its further improvement, modification of learning activities towards contextualization once these STS modules are adapted by future researchers in designing Seamless Blended Digital Learning Course Plan for flexible, agile, and responsive learning modality.

INTRODUCTION

The Philippines has started to implement the Enhanced Basic Education Curriculum or otherwise known as K-12 Curriculum in 2015. This educational reform in basic education caused them to revise and replace the course under General Education they offer at the undergraduate level. This revision was mandated by the Commission of Higher Education (CHED), and it aimed to develop a set of new general education courses because the old general education courses were brought down to the Senior High School (Grades 11 and 12) curriculum (CHED memorandum order no. 20 series of 2013 & CMO no. 105, series of 2017). Based on these memoranda, the newly required 27-unit general education courses, including STS course, aimed to expose and engage undergraduate students to the different domains of knowledge and ways of understanding, and involve them in social and natural realities to develop intellectual competencies and civic capacities. Science, Technology and Society (STS) course allows the teachers and students to discuss timely and relevant socio-scientific issues in different perspectives such as pure sciences, environment, sociology, economics, etc. These issues are contemporaneous in society and have basic explanations that are anchored with scientific concepts or at least have a scientific basis. Since STS is a general education course, this is a required course to be taken by the students from different programs of study. Thus, several approaches and strategies can be used or integrated in the delivery of its lessons depending on students' needs in which programs of study they are

enrolled in. Another issue that Philippines is facing today is the disruption driven by the COVID-19 pandemic as a global health emergency crisis. The educational landscape is greatly affected, and the transition of its learning modalities has abruptly been introduced to educational sectors (World Bank, 2020). The usual seminars were replaced by a series of webinars that mostly contain or talk about Online Teaching, Online Transition Schemes, Online Learning Platform, Integrating Technology, Education 4.0, Module Writing, etc. These words were bombarded to our teachers in preparation for the New Normal of Education (Quimba, *et al.* 2018; Department of Education, 2020). School administrators also experienced dynamic changes on their leadership as challenges continuously arise such as teachers' preparedness for the new normal scheme of education, equipment to be used and internet connectivity for online teaching, students' capacity towards online learning, and the struggles of deciding what learning modality is the most suited and favorable for teachers and students. Education sectors are firm that education shall continue education despite the limitations that COVID-19 pandemic brings (Rizva & Bogdan, 2017; Commission on Higher Education, 2020; Department of Education, 2020a). Different learning modalities have been suggested by education experts such as synchronous learning, asynchronous learning, or hybrid of these two learning modalities that can be utilized in the implementation of flexible learning (Ventayin, 2018; Department of Education, 2020b). Many education experts positively consider this pandemic

¹ Ospital ng Muntinlupa, College of Medicine, Muntinlupa City, Philippines

² De La Salle University, Manila City, Philippines

* Corresponding author's e-mail: nikkolorenzlawsin@plmun.edu.ph

as an opportunity to improve classroom teaching practices by modernizing the lesson delivery through integration of technology, online authentic assessment, innovations in virtual classrooms which all reflect the adaptability of teachers to equip and update themselves in terms of their knowledge and skills (Lapada, *et al.*, 2020).

Another consideration of this study was the emerging UNESCO Transversal Competencies framework (UNESCO, 2015). One of the growing concerns in educational systems is our definitive and intense focus on academic cognitive skills but we tend to disregard the more elusive, essential, and hard-to-measure non-academic skills and competencies such as efficient communication with others, innovative thinking, respect for diversity and the environment, conflict resolution, problem-solving, teamwork, and so on (Care & Lou, 2016; Cruz & Saunders-Smiths, 2019). These so-called “non-academic” skills are essential not only to prepare the students for the future of their work, but also to adequately equip the future generations with meaningful, sustainable, and responsible lives in a rapidly changing and interconnected world (Whittemore, 2018). This emerging concept challenged UNESCO and other Asia-Pacific Countries to come up with policy and curriculum changes that aimed to build, cultivate, and enhance the development of these “non-academic” skills and competencies in learners (UNESCO, 2015). This educational trend of acquiring non-academic skills and competencies serves as one of the bases of this study in establishing student’s mindset towards sustainable development and solutions-oriented mindset.

Given the limitations and challenges that local colleges are facing amidst the COVID-19 pandemic, the management of the local college has planned and devised a systematic way in transitioning from the old normal to the new normal setting of education. In the present condition, synchronous learning is done through conducting 45-minute to 1-hour online sessions.

The concept development is given emphasis via asynchronous learning modality by allowing and instructing the students to work on their modules at their most convenient time as long as it is within the time frame. While for synchronous learning modality, it is now allotted for concept enrichment in which the class will discuss the activities and answer the guide questions in the module via online discussions. But in the next school years, Seamless Blended Digital Learning (SBDL) will be viewed as a flexible, agile, and adaptive learning modality that transitions from face-to-face learning modality to online classes when there is disruption to instructional delivery, the concept development upon doing the STS Modules, while concept enrichment will be done through face-to-face discussion or through synchronous online class when there is disruption.

This study primarily aimed to improve the teaching practice of STS by developing STS Modules that integrate the frameworks of UNESCO Transversal Competencies, UN Sustainable Development Goals, and Seamless Blended Digital Learning Modality (SBDLM).

The utilization of these modules aimed to determine its effects on student’s Transversal Competencies, Conceptual Understanding, Student’s Engagement, Sustainable Development & solution-oriented mindset, and perceptions of STS faculty members. Finally, the outputs of this study were collected as inputs in the development of a policy framework, Seamless Blended Digital Learning Modality (SBDLM), that is suitable in the context of a local community college.

METHODOLOGY

Research Design

This study utilized educational action research design to address the main objectives of the study. It is educational action research in the sense that it follows the Plan-Do-Study-Act (PDSA) model to improve the teaching practice of Science, Technology, and Society (STS) course by developing STS Modules that incorporate the frameworks of UNESCO Transversal Competencies and UN Sustainable Development Goals. According to Brydon-Miller, Prudente, & Aguja (2017), action research is the best design to utilize in this study as it shows the iterative nature of its study to document the improvements on teaching practices considering the conceptual understanding, student engagement, transversal competencies, and sustainable development mindset as indicators or variables in the succeeding cycles of implementation.

Material Development

There are 10 STS Modules that were developed for the entire 18 weeks of instruction in the Science, Technology, and Society for a semester. The development process of module development was based on the study of Plomp, *et al.*, (2007) and Abualrob & Shah (2012)

Needs and Context Analysis

The college administration finalized the learning modality that was implemented through the conducted Google-form survey about the capacity and willingness of the students, faculty members, and college staff to cope with the challenges of the new normal of education. The survey covered the availability of computers and other electronic gadgets for online learning, internet connectivity, familiar productivity tools, and attitude towards the implementation of asynchronous learning modality assisted with modules.

Versioning

The researcher constructed a curriculum alignment sheet per module to observe the alignment among the competencies set by the CHED for STS course, the provided activities, the elements of how seamless blended digital learning can be applied, and the intended transversal competencies that were tapped and demonstrated by the students in the conduct of the study, and

Assessment

The 10 developed STS Modules were face-validated by

the Education Program coordinator of the College in which she assessed its physical format with respect to the suggested format of college administration. These 10 developed modules were further evaluated by the 5 STS content experts who are teaching Science, Technology, and Society. The comments, suggestions, and evaluation of these science content experts were recorded, tabulated, and considered for the revisions of the developed STS materials. After the initial evaluation, the STS Modules were re-checked by these content experts to see if the changes that they have recommended were followed. The revalidation by experts was repeatedly done until it reached the 100% compliance as perceived by these content-experts.

Sampling and Participants

This study was conducted in a local college in Navotas City in the first semester of Academic Year 2020 – 2021. After getting permissions from the top management, permissions were also asked from the respondents of the study. The participants were informed about the purposes and conduct of the study, the nature of their participation, and their rights as participants. A total of 129 students participated in this study and they were divided into 4 groups. These 4 groups were categorized based on their courses. The two groups were from the Business Administration classes, and they were labeled as BA1 and BA2, while the two groups were from the Education classes, and they were labeled as BSED1 and

Table 1: Demographic profile of the respondents

		Frequency				Total
		BA1	BA2	BSED1	BSED2	
Sex	Male	16	17	3	2	38
	Female	18	16	29	28	91
	Total	34	33	32	30	129
Age	18	4	2	1	2	9
	19	28	31	30	28	117
	20	2	0	0	0	2
	21	0	0	1	0	1
	Total	34	33	32	30	129

BSED 2 for discussion purposes. Table 1 shows the distribution of the respondents of this study based on their demographic profile.

Research Instruments

In this study, the following research instruments were utilized to answer its objectives:

1. NPC Student, Faculty, and College Staff Survey on Online Learning in Preparation of New Normal. This researcher-made instrument was developed and designed via google form and was answered by the students, faculty members, and college staff of academic year 2020-2021. This survey provided significant inputs to the college administration in deciding what learning modality, learning platforms, and assessment tools that can be implemented and suited to its context.

2. Science, Technology, and Society (STS) Module. As discussed in the Material Development Module, it is composed of 10 modules allotted for the 18 weeks of instruction (54 hours in a semester). Each module contains 1 to 2 lessons which were discussed within a specific time frame. These modules followed the college module formats to organize the collected videos, online and offline resources, activity sheets, and assessment tools. The frameworks of UNESCO Transversal Competencies and UN Sustainable Development Goals were incorporated to build and enhance student's transversal competencies, conceptual understanding, student's engagement, and student's sustainable development and solutions-oriented mindset.

3. STS Content Expert Evaluation tool. It is a researcher-made dichotomous item response that was answered by the 6 Science content experts as described in the assessment stage of STS Module Development section. This research instrument aimed to evaluate the STS Modules in terms of Intellectual Property Rights Compliance, Learning Competencies, Instructional Design and Organization, Instructional Quality, Assessment, and Readability.

4. Seamless Blended Digital Learning (SBDL) Course Plan. This matrix document contained information on how the entire semester is divided into 18 weeks and the corresponding modules to be used parallel to allotment of week sessions. The main goal of this course plan was to guide the course instructor on his instructional delivery by distributing the class hours full-online, hybrid, or full-asynchronous hours.

5. STS concept test inventory. These written assessment tools are composed of 40 items each and were given to the students on the midterm and final examination to assess their conceptual understanding.

6. STS project proposal matrix. This document allowed the students to propose their STS project that can promote a solutions-oriented mindset towards sustainable development.

7. Transversal skill assessment rubrics. This instrument aimed to describe the level of student demonstration of transversal competencies as evaluated by the course instructor and 3 virtual classroom observers.

8. Virtual Classroom Observation Tool. This tool

aimed to document the demonstration of student transversal competencies during synchronous online sessions as perceived by the virtual classroom observers. These observations were recorded and analyzed as qualitative evidence to support the quantitative results in the transversal skill assessment rubrics.

Research Procedure

The developed STS Modules materials were utilized to test its effectiveness. Figure 1 shows the 2 phases of the study distributed in a semester. The two phases varied in terms of the topics that were allocated among the modules under each phase. The phase 1 contained topics focusing on how sociological constructs affect the development of science and technology while the phase 2 contained

topics focusing on the advancement of science and technology and how it will contribute to the development of societal conditions. The phase 1 was allotted for the midterm period in which modules 1 to 5 were utilized to see its effectiveness on student's transversal competencies, conceptual understanding, teacher and student's experiences, and sustainable development and solutions-oriented mindset. The results of phase 1 served as the initial basis of this study since this practice is new to the college's academic system. All inputs from the consultation hours for the STS projects and clarifications in the module instructions in phase 1 were considered in the implementation of the next cycle. Phase 2 was allotted for the final term in which modules 6 to 10 were utilized to observe changes on the above-mentioned variables.

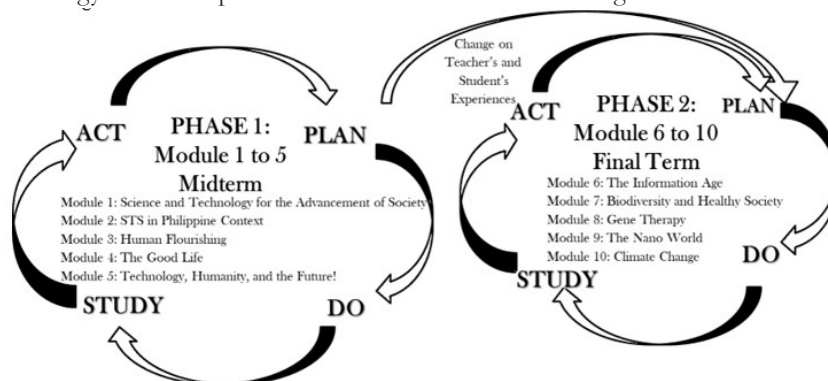


Figure 1: The PDSA Model in the implementation of the study

All quantitative data were tallied first using Microsoft Excel 2019 Edition and were further analyzed using SPSS version 22 for statistical analysis. For qualitative data, the thematic analysis protocol of Braun and Clarke (2009) was utilized in the study by encoding and organizing the responses of the students during the online consultation and the virtual class observations of teacher-observers. The matrix contains the student responses, repeated responses or selective codes, and interpretation. At the end of the data gathering procedure, the participants were informed about the results of the study and have filled-out the consent form allowing the researcher to utilize the gathered data for research purposes only.

RESULTS AND DISCUSSION

Objective 1: Determine the effect of utilizing the STS Modules to student's conceptual understanding, transversal competencies, and solutions-oriented mindset towards sustainable development.

Table 2 summarizes the student scores of the 4 groups in the pretests and posttests including their standard deviations during the midterm and final terms for the 40-item STS concept test inventories. Using Welch F-test, it was found out that there are highly significant differences among the pre-tests and post-tests of the Education major groups, BSSED1 and BSSED2, as they obtained a p-value of 0.000 that is less than the level of significance,

Table 2: Students score in the pretest and posttest concept inventory

Groups		Midterm Mean Score		Final Term Mean Score	
		Pre-test	Post-test	Pre-test	Post-test
BSSED1		22.65 (6.004)	38.21 (2.761)	23.71 (6.196)	38.38 (2.807)
	Welch F-test	188.445		158.260	
	p-value	0.000		0.000	
	Remarks	Highly significant		Highly Significant	
BSSED2		25.39 (7.378)	37.14 (2.942)	23.52 (5.848)	38.61 (2.221)
	Welch F-test	97.031		192.065	
	p-value	0.000		0.000	
	Remarks	Highly significant		Highly significant	
BA1		20.63 (10.487)	29.94 (10.150)	21.56 (5.984)	35.94 (4.819)

	Welch F-test p-value Remarks	13.028 0.031 Significant	124.269 0.000 Highly significant
BA2		18.40 (9.825)	26.27 (9.965)
	Welch F-test p-value Remarks	9.480 0.040 Significant	133.950 0.000 Highly significant

p=0.05. While there are significant differences among the pre-tests and post-tests of the Business Administration major groups, BA1 and BA2, as they obtained p-values of 0.031 and 0.040, respectively, that are less than the level of significance, p=0.05. Based on the results, the integration of available videos to explain the topics in Science, Technology, and Society (STS) class greatly helped them to conceptually understand the details of sophisticated scientific principles, socio-technological issues, and societal impacts of the development of science and technology even though there is less contact time with the course instructor to discuss the whole content of the course. On the student journal, BSED1-27 noted that these videos assisted him to answer the succeeding questions raised in every module or perform the assigned tasks in the module in the most simplified, guided, and practical ways. This result is synchronized with the study of Brame (2017) wherein she mentioned that the effective use of educational videos plays an important role in higher

education, and it provides important content-delivery tool in many flipped, blended, and online classes. Same comments were also observed from the students, BSED2-16 and BSED1-8 who enjoyed the use of STS Modules, in which the effective use of video as an educational tool can enhance student's learning, engagement, and promote active learning. (Allen and Smith, 2012; Schmid, 2014). Table 3 summarizes the results of the transversal competencies that were tapped and demonstrated by the students in the 10 STS Modules including the average mean scores and remarks for midterm and final term assessment. During the midterm period, the students from education majors (BSED) obtained remarks ranging from developing level to proficient level in terms of the student's capacity to demonstrate their transversal competencies while the business major obtained remarks ranging from beginning level to developing level of TVC's demonstrations. Throughout the implementation up to the final term wherein the modules 6 to 10 utilized,

Table 3: Improvement of Student's Transversal Competencies across the 10 STS Modules

Transversal Competencies	Level of Students' Transversal Competencies (TVCs) across the Modules (M1-10)			
	Midterm (M1 to M5) BSED	Final Term (M6 to M10) BSED	Midterm (M1 to M5) BA	Final Term (M6 to M10) BA
1. Creativity	1.72 Developing	2.53 Advanced (++)	1.50 Beginning	2.37 Proficient (++)
2. Applicability skill	1.87 Developing	2.71 Advanced (++)	1.22 Beginning	2.10 Proficient (++)
3. Problem-solving skill	1.61 Developing	2.35 Proficient (+)	1.34 Beginning	2.22 Proficient (++)
4. Resourcefulness	2.05 Proficient	2.64 Advanced (+)	1.72 Developing	2.41 Proficient (+)
5. Reflective thinking	1.74 Developing	2.27 Proficient (+)	1.49 Beginning	2.21 Proficient (++)
6. Ability to learn independently	2.24 Proficient	2.65 Advanced (+)	1.33 Beginning	1.97 Developing (+)
7. Presentation and communication skill	1.65 Developing	2.73 Advanced (++)	1.20 Beginning	1.86 Developing (+)
8. Organizational skill	1.80 Developing	2.42 Proficient (+)	1.38 Beginning	1.87 Developing (+)
9. Teamwork and collaboration	1.92 Developing	2.39 Proficient (+)	1.21 Beginning	1.73 Developing (+)
10. Flexibility and Adaptability	1.75 Developing	2.30 Proficient (+)	1.46 Beginning	2.12 Proficient (++)
11. Perseverance	1.83 Developing	2.41 Proficient (+)	1.30 Beginning	2.26 Proficient (++)
12. Self-motivation	1.74 Developing	2.35 Proficient (+)	1.40 Beginning	2.03 Proficient (++)
13. Ability to locate and access information	1.90 Developing	2.56 Advanced (++)	1.45 Beginning	2.18 Proficient (++)
14. Ability to analyze and evaluate media content	1.89 Developing	2.43 Proficient (+)	1.50 Beginning	1.97 Developing (+)
15. Intercultural understanding	1.82 Developing	2.39 Proficient (+)	1.50 Beginning	2.11 Proficient (++)
16. Respect to diversity	1.95 Developing	2.26 Proficient (+)	1.81 Developing	2.07 Proficient (+)

***Note: Levels of TVCs: 1.00-1.50 Beginning; 1.51-2.00 Developing; 2.01-2.50 Proficient; and 2.51-3.00 Advanced. "+" indicates the level increased on remarks*

it appeared that both groups of students significantly improved in terms of demonstrating their transversal competencies in accomplishing the tasks given in the said modules. During the final term, the education major groups obtained remarks ranging from proficient level to advanced level, while the business education major obtained remarks ranging from developing level to proficient level. Throughout the interventions, the transversal competencies that significantly improved to the students are creativity, applicability skills, and ability to locate and access information.

The improvement in these 3 transversal competencies may be attributed to the nature of the course wherein the students were asked to creatively design their STS project, retrieve online videos for asynchronous tasks, and accomplish the task sheets for societal applications of science and technology. These findings are synchronized with the studies of Wijayati *et al.*, (2019) and (Sharipova & Wessler, 2018), in which they highlighted that the use of project-based learning can contribute to building and enhancing student's creativity in learning as they respond to the needs, challenges, and problems of their community in terms of technological innovations.

In terms of the improvement of students' sustainable development and solutions-oriented mindset, the business major students designed and developed the

prototype of their STS projects that are aligned with the needs of Navotas community, while the education major students examined their STS knowledge by identifying which topics in STS require instructional material interventions to promote concept mastery. The education major students as well developed the prototype of their teaching tools in coherence with their needs analysis. See tables 4 and 5 which list the STS projects of the students. Table 4 shows the 3 common problems that were cited in the proposed STS Project Matrix of BA1 and BA2 groups to solve those problems. The STS Projects of BA1 and BA2 students were mostly focused on upcycling of materials or creation of high-quality products out of the original form of discarded materials due to the prevalence of pollution in plastic (Calvo, *et al.*, 2020). Examples of their products were bao-light (Figure.2a) pen holder (Figure.2b), DIY lampshade (Figure.2c), piggy bank out of coke [soda] plastic bottle (Figure.2d), and wall clock out of plastic spoon (Figure.2e). During the online consultation of STS projects, the students recognized already the pollution that is brought by plastic containers and its negative effects in the environment. Students exemplified environmental concerns by proposing a project that will protect the continuous degradation of our planet as due to the excessive use and improper disposal of plastic in the community.

Table 4: Most common problems cited in STS Project Matrix as proposed by the BA1 and BA2 groups

Rank	Common Problems	Solutions Offered
1	Plastic pollution in the environment	DIY Pen holder, DIY piggy bank, Christmas lantern, and table organizer out of coke [soda] plastic bottle
2	Energy usage	Bao lights, solar table lampshades with sensor
3	Excessive availability of raw materials	Paño de Florera, organizers out of ice cream bowl, DIY bao bag, DIY umbrella bag, DIY lampshades, DIY wall clock

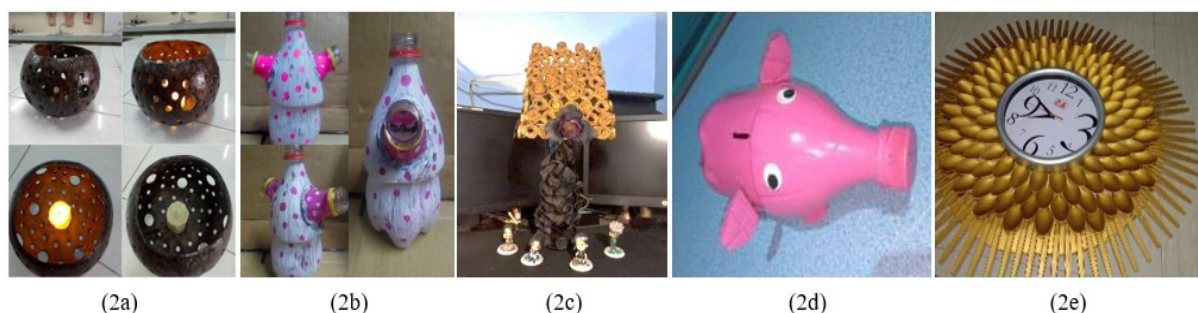


Figure 2: STS projects of business major students

Table 5: STS topics requiring reinforcement as proposed by BSED1 and BSED2 groups in their STS Project Matrix

Rank	Topics in STS	Offered game teaching tools
1	History of Science and Technology that leads to the advancement of the Society	Modified Snake and Ladder, card game (Pares-pares),
2	Human flourishing	Eudaimonia Monopoly Board game, Pick-up sticks
3	Climate change	Modified Snake and Ladder



Figure 3: STS projects of business major students

Table 5 and Figure 3 show the top 3 topics in STS listed in their STS Project Matrix which students perceived as the topics that require reinforcement. The most repeated topic that was cited is the History of Science and Technology that leads to the advancement of society. Students considered this as topic that requires more reinforcement because students appreciate the scientists who invented and discovered significant contributions for the advancement of modern society. During the discussions, students realized the values of how those discoveries and invention brought up in the society; what were the hardship and adversities underwent by the scientists, the stories and controversies behind the present discoveries, and how societal needs input to the discoveries of the present technology. In connection to this, students created different game-based teaching tools to deliver the content of this topic. Examples of these game-based teaching tools include card game out of the concept of Pares-pares, a card game that requires the player to match the related cards (Figure.3a), the Modified Snake and Ladder (Figure.3b) and the Modified Eudaimonic card game (Figure.3c). The modification of their game-based tools was merely focused on the change of mechanics to infuse the STS concepts.

The second most cited topic in the STS Project Matrix is eudaimonia or human flourishing. This reflective topic allowed the students to consider the sociological needs and demands why and how the present technological products exist and continue to emerge. Thus, during the consultation of projects, 2 game-based teaching tools were proposed and developed by the BSED1 and BSED 2 students and these are the Modified Monopoly Board Game and the pick-up sticks. In the Eudaimonia Monopoly Board Game, the mechanics of the classic monopoly board games were adapted however the tiles were also replaced with the events and descriptive words that are related in seeking human flourishing such as happiness, prosperity, and healthy living. While in the Pick-up sticks, the sticks were labeled with the words that were related to human flourishing. Like the classic goal in using Pick-up sticks, the target color is the one that is picked by the player but for this game, these colors have been tagged with numbers and descriptive words that lead to human flourishing was the general target of the player to be picked.

The third most cited topic in the STS Project Matrix is

climate change. This timely and relevant topic allowed the education major students to strategize how they will integrate the concept of climate change, its drivers, implications, and ways to at least alleviate the possible catastrophic phenomena predicted in the science-based documentary. Thus, during the consultation of projects, another a game-based teaching tool was proposed and developed by some students from the BSED1 and BSED 2 students and it is also in the form of Modified Snake and Ladders. The modification of the game-based tool was merely focused on the change of mechanics to infuse the concepts related to climate change.

CONCLUSION AND RECOMMENDATIONS

Based on the following findings, the following conclusions were drawn: the STS module contributed to the improvement student's conceptual understanding, inculcation of transversal competencies, and cultivation of sustainable development and solutions-oriented mindset based on the presented pieces of evidence from the student's scores, student's and virtual classroom observers' responses, reflection journals, and the STS project matrix proposal. The modules perceived by the students and virtual classroom observers as helpful as they assisted the students to maximize learning even if there is minimal interaction between teachers and students because of the situations brought by COVID-19 pandemic. Both students and virtual classroom observers agreed that the STS Modules inculcated transversal competencies to the students as these modules contained activities and tasks that developed their creativity, resourcefulness, applicability skill, reflective thinking skills, media literacy skill, flexibility and adaptability, intercultural understanding, independent learning, and so on.

These findings are only limited to the variables mentioned above and to the samples of the study -- the Education major and the Business Major. The researcher of the study recommended the continuous utilization of this module in the teaching of STS including its course plan to further improve its quality as a learning material and apply its ultimate goals to improve student's conceptual understanding, inculcate transversal competencies to the students, and cultivate their minds to always move their lenses towards solutions and think of sustainable development in every aspect of their lives.

This course plan has helped the researcher to plan and

divide the topics and activities that the students did throughout the implementation of the study. By doing this, the researcher was able to efficiently distribute the tasks for asynchronous and synchronous learning especially this time of pandemic and during the time that there were disruptions of classes due to the 2 Typhoons that happened in the conduct of study. This course plan, as well, will be helpful to other institutions to plan their modes of delivery in preparation of the post-COVID-19 pandemic.

The researcher foresees that seamless blended digital learning will become the new default of learning modality in education for most institutions. Many educational institutions have already invested in their modules and after this COVID-19 pandemic, the schools can easily go back to online learning and utilize these modules whenever there is disruption in the learning modality.

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