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Research Article

Readiness of Science, Technology, Engineering, and Mathematics (STEM) Students in Online Distance Learning Modality as Perceived by their Teachers and Its Correlation with Academic Performance

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Abstract

This study aimed to assess the level of preparedness in online distance learning of STEM students in the Schools Division of Zambales. This study utilized a quantitative descriptive research design, specifically a cross-sectional design. It was conducted in the thirteen (13) secondary schools – Senior high schools offering STEM strand in the Schools Division of Zambales. A purposive sample of Forty-four (44) senior high school science teachers in the Schools Division of Zambales participated in the study. Data was gathered using a researcher-made close-ended questionnaire with 5-point and 4-point rating scales. The Pearson-r correlation was employed to determine the significant correlation between the student's overall performance and perceived level of preparedness in the three (3) domains: computer literacy competency, self-directed learning, and motivational learning. Frequency count, percentage, and weighted mean were other descriptive statistical tools used in the study. The study revealed that despite the challenges encountered during the Covid-19 pandemic, the STEM students performed excellently in their specialized subjects. It was also revealed that the STEM students are prepared for online distance learning as they are computer literacy competent they have a high level of self-directed and motivational learning. Finally, the study revealed that STEM students' overall performance correlates to their perceived readiness level in online distance learning. This study proved that students who are computer literacy competent, with a high level of self-directed and motivational learning, are high-performing.

Keywords: Online Distance Learning, Self-directed Learning, Motivational Learning

Introduction

A new infectious disease outbreak from Wuhan, China, has been spreading rapidly across the globe. The Coronavirus (COVID-19) disease is overreaching health services and increased with quarantine. Global disease outbreaks such as Influenza A (H1N1) from Spain, Middle East respiratory syndrome coronavirus (MERS-CoV) from Saudi Arabia, and severe acute respiratory syndrome (SARS) increase the death rate statistically, and it also affects the Philippines. In the early year of 2020, the Philippines was shocked by the attack of coronavirus known as COVID-19, and the seriousness level forced government action to apply for movement control order. This order is based on the Disease Prevention and Control Bureau (DPCB) and the Inter-Agency Task Force (IATF), where most Filipinos are subject to home quarantine for 14 days. Abrupt command by the government creates fear, anxiety, and panic situations that directly affect the education system. All education centers such as schools, colleges, and universities were ordered to stop the face-to-face operation immediately.

Coping up with the Covid 19 pandemic while continuing education, Online Distance Learning (ODL) is advised by the Department of Education and Higher education institutions. Due to the demand for the use of gadgets and internet connectivity, the educators are facing multiple issues in conducting ODL, such as little exposure to set up the platform (Zoom meeting, Google Meet, Messenger, Google Classroom, Google Drive, Edmodo), concerning student participation (Foon & Sum, 2014). Educators are concerned about students' access to devices and the Internet to participate in ODL sessions. As well as technical issues that students face to participate in ODL activities, such as not having an email address to create a new account, can students explore how to use tools in the platform, and do they know how to search the assessments uploaded, which, in turn, causes educators to panic. The question about the students' readiness for online distance learning made the researcher pursue this study. ODL significantly impacts science education, posing problems to its alignment with current global competency perspectives. The Philippines established the K to 12 Basic Education Curriculum to keep up with global trends. It also raised Filipino students' low TIMMS (Trends in International Mathematics and Science Studies) scores from 2003, when the Philippines ranked 43rd among 46 countries in science studies (TIMMS, 2013). The low International Science

achievement results were also felt in the 2012 National Achievement Test (NAT), in which, among the five core subjects, science got the lowest mean percentile score (MPS) (Naval, 2014).

To solve the challenges in Philippine education, specifically in science, the Department of Education (DepEd) mandated the allocation of different teaching-learning modalities. Most Senior High Schools (SHS) use online distance learning, especially in Science, Technology, Engineering, and Mathematics (STEM). The conceptual definition of online distance education states that the teaching method in which students complete their study from anywhere but not always physically come to the lecture session. This means that students learn, study, and complete their registered courses through online learning without attending any physical classes such as lecture hall, computer lab, library, or physical classes. According to (Kenny, 2010), most distance education today fully utilizes the Internet network and easy access for most students either through laptop or mobile phone (Hussin et al., 2017), whether in their own homes. The term online distance learning is also used interchangeably with terms like e-learning (Keiset al., 2017), blended learning (Deschacht & Goeman, 2015), online learning (Wallace, 2010), and virtual learning, with the main idea stating that learning activities in an informal form, make use of any Internet tools and no physical, social interaction with the lecturer (Kuo et al., 2014).

Furthermore, teleconferencing (Bhat et al., 2018), online chatting or forums, interactive video, recorded video, and audio is all employed to offer course information using various teaching style approaches. Students who use the online modality are expected to have a steady Internet network connection, usable hardware, and a high degree of online learning preparedness. To complete their studies, students must have computer/Internet literacy (Hernándezsellés & Muoz-carril, 2019), self-directed learning (Garrison, 1987), and high-level motivation of learning (El-Seoud, 2016). Technology is used to submit student tasks, take online quizzes, write themes, and write essays (Queroda, 2018). Online Distance Learning (ODL), also known as online distance education (Garrison, 1987), e-learning (Keis et al., 2017), blended learning (Deschacht & Goeman, 2015), interactive learning, and virtual learning, is a type of education in which the leading practice is the physical separation of lecturers and students, as well as the use of various online applications to facilitate interactive communicative learning. Joining online distance learning activities during pandemic outbreaks helps make learning achievable to ensure that learning continues for knowledge transfer (Park & Yun, 2017). With all these challenges faced by the educators and learners during the pandemic, studies prove that students were ready for ODL.

Contrary to this belief, online distance learning is not new to the Department of Education. RA 10665 and DO 46, S. 2006 – Guidelines on the Pilot Implementation of the Open High School Program (OHSP) is an alternative mode of formal secondary education program run by the Bureau of Secondary Education (BSE) of the Department of Education (DepED) of the Republic of the Philippines. The program provides an opportunity for elementary school graduates, high school dropouts, and successful examinees of the Philippine Education Placement Test (PEPT) to complete secondary education in a pure distance learning mode. Department of Education Senior High School Program Academic track use ODL, especially the STEM strand. STEM, in full science, technology, engineering, and mathematics, field and curriculum centered on education in the disciplines of science, technology, engineering, and mathematics (STEM). It is designed to prepare students who express keen interest in taking college degrees focused on Science, Technology, Engineering, and Mathematics (STEM); senior high school students will be exposed to learning activities that will hone their knowledge and skills in analyzing data, understanding real-world impacts, and conducting research. The senior high school STEM strand provides a deep dive into hard sciences, including chemistry, biology, Earth Science, Pre-Calculus, Basic Calculus, and Physics. Learning these subjects was challenging to students without the teacher's face-to-face assistance and harmed preparation for students' future undergraduate programs. For STEM majors, the online platform has made it difficult for students to get teacher assistance for science labs. Transitioning STEM labs to an online format poses a challenge for professors, as they must ensure students get quality learning. (Overall, 2020)

This study wanted to determine the level of readiness of STEM students to attend online distance learning. Since the Department of Education mandates the use of online distance learning, measuring the students' readiness on this platform is very important because it will help the students and the teachers in the school's division of Zambales by adapting to the student's needs. Determining the students' readiness level will help the School Division Office decide and prioritize facilities to be procured. The data to be gathered on the level of readiness of STEM students in online distance learning will provide the basis for a project or

program, training, and seminar to be given.

The Theory of Planned Behaviour by Ajzen & Holmes (1976) is the chosen theory in this study. The theory of planned behavior deals with to use of new technology. It assumes that for an individual to accept innovation, he must be willing to use it. The theory identifies three independent variables that would affect the adoption of an innovation. The first variable is the attitude towards the behavior, which refers to the extent to which an individual is for or against the behavior in question (Ajzen & Holmes, 1976). The second variable is the subjective norm which means the perceived social pressure to perform or not perform the behavior. Lastly, the theory considers perceived behavior control as the third variable. This refers to the perceived ease or difficulty of performing behavior assumed to reflect past experiences and anticipated challenges (Ajzen & Holmes, 1976). Students and institutional academies support distance learning by adapting to innovation in using technology in the teaching and learning process.

Previous studies have shown that Universities benefit by adding students without classrooms and housing, and students reap the advantages of working where and when they choose (Doculan,2016). Essentially, online distance learning engages in flexible learning activities to improve society's access to education, flexible learning for disabled or ill people, and rarely catches researchers' attention is to investigate the conduct of online distance learning during pandemic disease, where the approach differs from the ODL program enrolled by students. (Kenny, 2010). Other studies suggest that teachers must consider students' anxiety about joining online distance learning activities. Before planning online distance learning activities, educators need to analyze Internet access connections and the capability of students to use computers that may develop anxiety (Tuncay, 2010). Primarily, students in sub-rural and rural areas do students have the ability to complete the tasks listed in online distance learning activities without physical discussion with friends and lecturers, especially when dealing with science activities (Ajmal & Ahmad, 2019). Student motivation to complete study while dealing with interruptions and difficulties at home. Possible factors mentioned significantly affect students online learning readiness level (Hung et al., 2010) and academic performance (Saadé et al., 2017).

A series of studies on online distance learning suggest that students cannot perform activities, which triggers anxiety that leads to fear of achieving the best result for the course enrolled. Besides Internet speed connection, basic computer skills that need a student's ability to participate in online distance learning must have at least a satisfactory level for using a computer, software, applications, and online learning tools (Suprabha et al., 2017). Computer and Internet connection skills align with the student online learning readiness dimension (Hung et al., 2010). Furthermore, lack of self-discipline, which refers to self-directed learning, influences readiness levels due to environmental disturbances such as working responsibility and vast home environment. Besides, friend interruption during online distance learning sessions by inviting students to join online conversations such as chatting, online shopping, and gossiping influence readiness and self-discipline. Student who lacks self-discipline and a lower level of motivation can fall into the group that affects their academic performance and achievement. Computer and Internet Literacy improves Student Online Distance Learning Readiness. As online distance learning becomes helpful to learning institutions, especially during a pandemic disease outbreak, an observation of online learning readiness is vital for successfully implementing online distance learning as a platform for learning. Online distance learning can be successful by understanding student online learning readiness environments, such as competency in using a computer and reaching Internet access (Thammathirat & Tuntirojanawong, 2013). It is a different atmosphere in joining the online distance learning as nature of the academic program mode compared to 'forcibly joining online learning due to a pandemic outbreak. With no good plan or a high urge for self-dependent learning, students must develop self-motivation learning for academic achievement and equip themselves with computer/Internet literacy. Many online learning platforms such as Google meet and Zoom meeting require student computer literacy on engaging camera and microphone devices to the computer for successful online conversation.

This research study described STEM students' readiness level in online distance learning as perceived by Science Teachers in the Schools Division of Zambales.

Methodology

This research paper used the quantitative descriptive-

correlation research design is; Zikmund (2003) specified that the methods and procedures for collection and analyzing the needed information will be done using a descriptive- survey research design; moreover, this study utilized the descriptive cross-sectional design of research using a survey questionnaire. According to Gay (1996), it involves collecting data to answer questions concerning the status of the subject of the study; it is typically collected through a closed-ended survey questionnaire or an interview at a specified time. It describes and interprets the status of an identified variable as it aims to provide accurate information about a phenomenon, which seeks to measure the level of readiness of STEM students in online distance learning. It is primarily concerned with the present, although it often considers past events and influences related to current conditions (Bueno, 2019).

This study follows the careful classification of data. Facts obtained may be accurate expressions of the central tendency of deviation in correlating. However, the report does not research unless a discussion of data is carried out at the level of adequate interpretation. Data must be subjected to the thinking process in terms of reasoning. Furthermore, Angus and Katona (2007) cited that descriptive survey research typically employs questionnaires to determine the researcher's opinions, attitudes, preferences, and perceptions of interest. The respondents of this research work are the public-senior high school teachers specializing in science within the Schools Division of Zambales. This study was conducted in the thirteen (13) secondary schools in the Schools Division of Zambales, which offer the Science Technology Engineering and Mathematics (STEM) strand. The respondents of this research work are the public-senior high school teachers specializing in science within the Schools Division of Zambales. Their role in measuring the level of preparedness of STEM students in online distance learning is essential for these teachers were the ones that have direct contact with the students.

The researcher used the purposive sampling technique, specifically total enumeration sampling, wherein all SHS science teachers (44) were the subject of this study. Taderdoost (2016) mentioned that the purposive sampling technique, specifically enumeration sampling, is used if participants are deliberately selected to provide important information. Table 1 presented the distribution of participants according to their zone and school.

Table 1. *The participants of the study, according to their schools and zone*

Name of School/Zone	*Frequency (f)*	*Percentage (%)*
Lipay NHS/Zone 1	2	4.55
Pamibian IS/Zone 1	1	2.27
Lauis NHS/Zone 1	3	6.82
Taltal NHS/Zone 1	2	4.55
Rofulo M. Landa HS/Zone 2	2	4.55
Zambales NHS/Zone 2	6	13.64
Botolan NHS/Zone 2	6	13.64
Cabangan NHS/Zone 3	2	4.76
Gov. Manuel Baretto NHS/Zone 3	6	13.64
San Antonio NHS/Zone 3	1	2.27
San Guillermo NHS/Zone 4	4	9.09
Castillejos NHS/Zone 4	3	6.82
Subic NHS/Zone 4	6	13.64
Total	44	100

Closed-ended researcher- modified survey questionnaires were employed to collect quantitative data from selected teachers. The questionnaire is convenient for conducting surveys and acquiring the necessary information about the study subject quickly. Furthermore, it makes an economy of time and expense possible and provides a high proportion of usable responses (Best & Kahn, 2003). The survey questionnaire collected the teacher respondents' general assessment of the performance of STEM students for SY 2020-2021 and the perceived readiness of STEM students in online distance learning as to computer literacy competency, self-directed learning, and motivational learning.

The closed-ended items were prepared by using Likert scales. A 5-point Likert scale will be used to identify the STEM students' performance, and a 4-point Likert scale will be used to assess the STEM student's readiness for online distance learning. The self-design questionnaire underwent reproducibility or test-retest reliability. The questionnaire was pre-tested to fifteen (15) Junior High School Special Science Curriculum teachers in Zone 1, including the Districts of Sta Cruz, Candelaria, and Masinloc. These initial respondents were selected based on their characteristics and capability to contribute to the needed data of the study established by the researcher. The questionnaires were evaluated, critiqued, and set for approval by the researcher's adviser and expert evaluators. Suggestions from the pilot testing respondents were collected. This process was needed to ensure that the data gathering

instrument was reliable.

Before and during data collection, some ethical considerations were undertaken to ensure the following rights of the respondents were safeguarded. (1) Right to Privacy - Respondent information was anonymized as no personal information such as name, address, contact no, email, age, and gender will be gathered to protect and secure their data privacy. (2) Right to Fairness - The researcher ensured that all the 4 Zones that made up the Schools Division of Zambales Science Teachers were duly represented in the survey and that no discrimination was made in selecting the population. (3) Right to Safety - In this time of the pandemic, the health and safety of respondents is the primary consideration for using the Google survey form in data collection. The online survey ensures no face-to-face meet-up with the respondents to mitigate the risk of the researcher or the respondents being infected with the Covid 19 virus. (4) Right to Voluntary Participation - School, heads first sought permission before teachers were enjoined to participate. Individual respondents participated based on informed consent. The researchers provide sufficient information and assurances about participating to allow the Respondent to understand the implications of participation. Moreover, participants have the right to withdraw from the study at any stage if they wish to do so.

To achieve the study's objectives, the researcher employed scientific means of obtaining data. The following were the procedures undertaken in the collection of data. The researcher notified the Schools Division Office of Zambales of the intent to conduct the study and asked permission from the Schools Division Superintendent, Dr. Romeo Alip, CESO IV, thru Dr. Evelyn Tarrayo-EPS in Science, to proceed with the study in public secondary schools within the division. Second, a letter to the School Principals was crafted to seek permission to float the questionnaires with the approved consent of the Schools Division Superintendent attached as their reference.

The survey questionnaires were directly administered to the respondents to give the researcher ample time to explain the nature of the study, ask further questions, and entertain some, if any. The manner of floating the questionnaires will be adjusted to the world's current situation with the CoViD – 19 pandemic. Using different social media platforms such as Facebook Messenger and Google forms, the researcher privately sent them the tool and still had an open line of communication that enabled both parties to further questions and explanations and a better chance of retrieval. The researcher also requested help from friends, colleagues, and relatives to speed up data gathering.

The study used various statistical tools to quantify and analyze the numerical data gathered comprehensively. The required data will be collected, organized, and tabulated to employ the appropriate statistical treatment necessary to extract the results. Frequency Count was used to count equated with entities, the tally for each variable indicator. The percentage was used to determine the proportion of the respondents with the same experiences in the frequency of exposure to the level of readiness in online distance learning. Weighted Mean was used to seek the respondents' overall assessment of the readiness level of the STEM students in online distance learning.

Moreover, Pearson's Product Moment Correlation was employed in testing the relationship between performance and level of online distance learning readiness of STEM students. Thus, the following scales facilitated the point values, mean ranges, and descriptive equivalents. For the degree of student's performance, the following scale was used: (5) 4.20-5.00= Excellent (E) ;(4) 3.50-4.49= Outstanding (O); (3) 2.50-3.49= Above Average (Aa); (2) 1.50-2.49= Average (a); and (1) 1.00-1.49= Poor (p). And for the perceived level of readiness of STEM students in an online distance learning, the following were used: (4) 3.25-4.0 = Always Observed (AO); (3) 2.50-3.24 = Sometimes Observed (SO); (2) 1.75-2.49 Seldom Observed (SeO); and (1) 1.00-1.74 = Not Observed (NO).

Results and Discussion

Overall performance of STEM students. The data revealed that 22 or 50% of students perform with 91-100 (E). Only 1 or 2.27% are performing from 61-70 (A), and No STEM student is performing below 60 (p). Surprisingly, most STEM students perform tremendously in their specialized subjects based on the quality and completeness of output regardless of the challenges encountered by the Covid-19 pandemic. This data revealed that STEM students are submitting their output ahead of time. This finding confirmed that the STEM students could keep pace in the changing world of learning. Undoubtedly, the study by Ahmad (2011) discovered that distance learning and face-to-face learning have no difference in terms of student effectiveness. Excellent distance learning Student performance on interaction and compliance is

influenced by the instructors facilitating and delivering processes (Adams, D., Sumintono, B., & Mohamed, A.,2018). Student performance of online distance learning adequately presents information in teaching and learning (Chen, A. E. W. & J. V., 2017). In addition, Doculan, J. A. D. (2016) proved that e-learning is easy to use when the teacher's confidence is higher. This fact suggests that e-learning becomes valid when the teachers are more experienced in acquiring and developing electronics. Meanwhile, student performance in Online instruction and e-learning activities resulted from the demand for high Internet connection speed (Cooper, 2006), time-consuming, determination, and obligation. Neither the less, STEM students in the Schools Division of Zambales are performing excellently despite the new teaching modalities used due to the Covid-19 pandemic because they could adapt to the new teaching-learning process.

Perceived level of readiness of STEM students for online distance learning

Computer literacy competency. The extent of readiness of STEM students for online distance learning in computer literacy was presented. Data shows that STEM students are generally computer literate, which shows WX ranges from 4.41 to 4.70. Overall, the computer literacy competency was always observed in the STEM students (3.51). From the data presented, it was found that STEM students in the Schools Division of Zambales are computer literate because they can and can use the computer. Students could search materials through the Internet and use any applications or software for online distance learning, such as Google Classroom, Google Meet, google forms, google drive, Zoom meetings, and present their output in PowerPoint presentations. As online distance learning becomes beneficial to learning institutions, observing online learning readiness is essential for successfully implementing online distance learning as a platform for learning. Thammathirat & Tuntirojanawong (2013) mentioned that success in online distance learning could be achieved by understanding student online learning readiness environments, such as competency in using a computer and Internet access. An assessment of computer literacy competency is required for the successful implementation of online distance learning among students.

Online distance readiness is linked to computer literacy competency. It requires using computers to search for reading materials through Internet browsers for activities. Students can upload and download documents from the Internet and possess the ability to use applications or software (Yu & Richardson, 2015). Nowadays, online education through the help of mobile wireless technologies like smartphones, tablets, and laptops is also needed to execute the process. Cook and Sonnenberg (2014) discussed that worldwide communications have continued to speed up, leading to students' technology literacy. In online distance learning, personal computers/laptops are used as educational support hardware and computer literacy level to guarantee that students can work independently to complete their activities (Suprabha et al., 2017). The computer literacy and competency measures include using computers to search reading materials through Internet browsers for online distance learning activities; students can upload and download documents from the Internet and use applications or software for online distance learning. Hung et al. (2010) reported that student online learning readiness is significantly influenced by computer literacy. According to Gordon (2013), many students are ready to adopt online learning technology, but it must complement a high computer literacy competency. Even though most students accept online distance learning as an advanced learning platform, a lack of basic computer skills control or restricts them from using the e-learning platform effectively (Kuo et al., 2014).

Self-Directed Learning. The extent of readiness of STEM students for online distance learning as to self-directed learning is reflected. The data on STEM students' self-directed learning behavior showed a score that ranges from 3.39 to 3.61. The overall self-directed learning assessment is 3.51 (AO). This data proved that STEM students are more than eager to learn despite the challenges encountered during the pandemic. They are willing to adjust to the new system of teaching and learning process. STEM students in the Schools Division of Zambales have high self-directed learning in online distance learning readiness is correlated with student computer literacy. They can confidently operate online platforms such as Google meet and Zoom Meet, demanding student computer literacy on engaging camera and microphone devices to the computer for online conversation (Ameerbakhsh, 2018). Online distance learning readiness tests the level of internal, external, and motivational monitoring among students. The result of the study proved the idea of Garrison (1997) that in self-directed learning, students are expected to have a high motivation for learning to forecast personal performance and plan personal responsibility by managing cognitive performance to achieve learning outcomes which are always observed in the STEM

students. Yu & Richardson (2015) pointed out that students must be able to carry out their study plan, manage time very well, and have high expectations for learning performance. To analyze students' online distance learning readiness, the study should consider that the self-directed learning level among STEM students in the Schools Division of Zambales is always observed. This finding reported that students could manage internal monitoring (cognitive factors), external monitoring (environment factors), and motivation among STEM students. Literature on SDL highlighted that a student with self-directed learning had high self-disciplined, self-independent study and high self-confidence to complete a task in ODL (Zainuddin, 2019). Measuring self-independent learning, self-management, and self-monitoring among students must be considered in assessing their readiness for online distance learning (Thammathirat & Tuntirojanawong, 2013). However, this study develops the SDL dimension by measuring the self-goal of the STEM students. Successful students can manage the learning activities but must know what and how to reach the learning goal for their performance and achievement. The idea is to expand the self-directed learning dimension by including self-goal and discipline as unit analysis; this study concern student capability to set up self-goal and discipline for achievement driven by self-performance (Annuar & Shaari, 2014).

Motivational Learning. The degree of readiness of STEM students for online distance learning as to motivational learning ranges from 3.48 to 3.91. The overall assessment of STEM students in their motivational learning behavior is 3.57 (AO). The findings stipulated that STEM students' online distance learning readiness for motivational learning is exemplary. It was justified in the data that STEM students are fueled by their motivation by engaging in mental activities and performing experiments despite learning innovation. Another factor that affects students' online distance learning level is the motivation of learning (MOL). In measuring the level of motivational learning, identifying the things that motivate students should be identified (Saadé, R. G., Kira, D., Mak, T., & Nebebe, F.,2017). Besides, creating study groups so students will no longer be studying in isolation and helping students make friends by meeting fellow students in the online environment guaranteed to develop learning motivation (Kenny, 2010). On the other hand, destructions may affect students' motivation and focus in joining online distance learning activities. Samir, A. El-S. (2016) mentioned that online learning is crucial for students to maintain focus due to many issues such as family, environment, and technical destruction. Technical destruction such as computer failure to run smoothly, limited Internet data, and single devices being used by many family members to perform work tasks are the issues raised that affect the motivational learning of students (Alem, Zuccaro, &Bernard, 2016). Hernández & Muñoz (2019) mentioned that digital destructions ruin the student's self-motivation toward learning. Spending time on social media like Facebook, Twitter and Instagram triggers students to participate not actively in online classes. Data proved that STEM students in the Schools Division of Zambales could overcome digital or technical destructions they encountered. Thus, motives and incentives for people attending learning sessions to complete the task need to be strongly motivated for higher academic achievement, and it requires establishing good study habits for the student to make themselves into the productive learner (El-Seoud, 2016; Chen, 2017).

Correlation of overall performance and the perceived readiness of STEM students for online distance learning

The overall performance has significant moderate positive correlations with the perceived readiness of STEM students for online distance learning in terms of computer literacy competency, self-directed learning, and motivational learning with r- values of 0.745, 0.664, and 0.609, respectively. The null hypothesis is rejected at 5% alpha. The correlations are all significant. This information proved that the performance of STEM students in the Schools Division of Zambales is correlated to readiness. This means that a highly motivated computer-literate student with good self-direction will have a better overall performance. The same study by Pukkaew (2013) indicates that student performance is affected by their knowledge in the use of technology because it promotes actual interactions and active engagement of students during online distance learning. A motivated learner performed better (Garrison, 2007). In the related study from Tucker (2000), students' performance increases with student disciplines like avoiding online destruction, computer/internet self-efficacy, and good study habits. In the period where technologies are compelling, evaluating online distance learning readiness is very important since it assesses the learning effectiveness, which reflects the learning process. Furthermore, technology self-efficacy, personality, and engagement are the numerous student characteristics significant to online learning, leading to higher academic performance (Olaitan,2020). Ameerbakhsh (2018) found that well-built e-learning systems create a more sensible, easy,

practical, engaging, and challenging learning process. Additionally, assessing online distance learning readiness can enhance the learning environment. The factor that contributed to its effectiveness was the students' computer literacy, motivation, and self-directed learning (Nalini et al.,2020).

Conclusion

This research aimed to assess the online distance learning readiness of STEM students in the Schools Division of Zambales. The study made a remarkable discovery; despite the challenges experienced by the students in the School Division of Zambales, the overall performance of STEM students regarding quality and completeness of output and the timeliness of submission is excellent. The study also revealed that the students are prepared for online distance learning in the three (3) domains: computer literacy competency; the student's ability to independently operate the hardware and software of a computer is evident. Self-directed learning: STEM students are very responsive to their education by prioritizing their learning, having good study habits, and avoiding destruction. Lastly, motivational learning: STEM students are highly motivated in their studies because despite the digital and technical destructions experienced, it was noteworthy that these students find ways to complete the assigned tasks. The study also revealed that students who are computer literate, with self-directed learning behavior, and are motivated with learning are the ones with high overall performance in their studies. Technology is essential in transferring knowledge, information, and skills through distance learning education. An innovation to the teaching-learning process is a challenge accepted by the students. In this era of emerging technologies, assessing the online readiness of the students is essential.

Surprisingly, the study revealed that the STEM students in the School Division of Zambales are ready for online distance learning. The students perform excellently in terms of quality and completeness of output and the timeliness of submission. It was also found that STEM students are computer literacy competent, self-directed in their study, and motivated to learn despite the innovation of the teaching-learning process. Even though the study will provide data to improve the assessment of the readiness of the STEM students in the Schools Division of Zambales, future researchers may explore the quality of instructional innovation and how the 4C's (Critical Thinking, Creativity, Collaboration, and Communication) of 21st Century skills be implemented in online distance learning in teaching science. The researcher also suggests further research in private schools to provide data for compassions on the level of preparedness of private school students. The researcher also suggests that a quasi-experimental study should be carried out to determine the impact of online distance learning on students' performance in science. The findings from such a study will provide a strong justification for the need for continued government investment in digital infrastructures in Senior High Schools to support the improvement of quality education.

Online distance learning is beneficial to continue the teaching-learning process during the COVID-19 pandemic. And to maximize the data presented on the readiness of STEM students, the researcher recommends that the school head and teachers check the details focusing on the academic performance of STEM students. It is also recommended that motivational learning be enhanced as it helps improve students' academic performance in online distance learning. The researcher recommends that the national or regional level secure that schools have developed ICT facilities to enhance the quality of education in connection with online distance learning. The school head or education program supervisor should organize special in-service training needed by science teachers to build their capacity to enable them and effectively implement technology in online distance learning that will enhance students learning.

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