



Online Learning Preparedness and Preferences Among Central Mindanao University Veterinary Medicine Students

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ABSTRACT

The COVID-19 pandemic has affected all sectors of the society, especially the education system, which now has to design a flexible learning environment. This study aimed to assess the level of preparedness towards online learning among veterinary medicine students at the College of Veterinary Medicine, Central Mindanao University, and to determine their online learning attitude, styles, and preferences through mixed methods approach. The study utilized a survey and interviews in data collection. The results show that a majority (62.13%) of the students were well-prepared for online learning. A majority (60.43%) of them had a neutral attitude towards online learning. The students mostly preferred visual learning (30.64%), with 40.0% leaning towards non-interactive teacher or learner-centered online instruction. A significant relationship between online learning experience with preparedness and attitude toward online learning was found. Veterinary students in the study are capable of conducting an online learning method, and most have the necessary technology access, internet, and software skills, and social support. However, they still have doubts about this method of learning. A longitudinal survey is suggested to be conducted in future studies to determine improvements in the students' attitudes since online learning experience is significantly associated with it.

Keywords: COVID-19, E-learning, Higher Education, Philippines

INTRODUCTION

Over the past few years, digital media have improved the teaching and learning experiences and have become commonplace with university students and teachers (Alper & Gülbahar, 2004). In light of rising concerns about the spread of COVID-19, most higher education institutions have stop in-person classes. The current pandemic has revealed vulnerabilities in schools and the need for a flexible and resilient education systems is clear to face unpredictable futures (Houlden & Veletsianos, 2020).

While digital technologies enable people to work and learn from home, online learning in the Philippines still faces some barriers. A study conducted by Marcial et al. (2015) reveals that internet cost and access and technical problems are substantial barriers to online learning. Moreover, little is known about learners' preferences and styles in online environments. Previous studies revealed that if the instruction is delivered in the preferred methods of a student, an increase in motivation and achievement can be observed (Fahy & Ally, 2005; Manochehri & Young, 2006; Offir et al., 2007). Thus, it is essential to evaluate first the accessibility of online learning and then identify the students' online learning styles and online instructional preferences to present learners with an effective and efficient environment that enhances learning.

This study will provide information on whether the implementation of online learning is accessible among CMU-Veterinary Medicine students, especially in times

of crisis that will not permit the traditional face-to-face learning. The study will also help identify the students' preparedness and attitudes towards online learning, determine their online learning styles, online instructional preferences, and online learning experience for the basis of designing online learning environments in the future that considers individual differences.

METHODOLOGY

Data Collection

The study employs mixed method in data collection. A survey was conducted and follow up interviews were done. A modified questionnaire adopted from Mercado (2008), Alper and Gülbahar (2004), and Toni Mohr et al. (2012) were used in the survey. This questionnaire included items about the respondents' demographic profile, level of online learning preparedness, attitude towards online learning, online learning styles, and instructional preferences. The factors included in preparedness were technology access, which was answerable by yes or no, internet/online skills, software application skills, and social support, which can be answered using a 5-points Likert scale. The rest of the questionnaire was also answerable by a 5-points Likert scale.

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A communication letter was first sent to the respondents through an online messaging application and short message service (SMS) requesting them to join the survey and then asked their preferred way to answer the survey – either online or through a recorded phone call. For respondents who chose to answer online, a URL of the survey was sent to them, and for those who preferred the other method, the researcher made a recorded phone call. The first part of the online survey and recorded phone call was the informed consent, where the respondents had the option to participate or decline and then followed by the survey questions. After completing the survey, a follow-up question through an online messaging application was done for clarification and discussion purposes.

Sample size

The sample size was determined using a prevalence study formula for the finite population by Daniel (1999). The following assumptions were used: population size of 482 according to the official list of students enrolled in the current semester, 95% confidence level ($Z = 1.96$), the expected proportion of 50%, and 5% precision. The result sample size was 214, and 10% was added to address the null-response making a final sample size of 235 students.

Selection of Respondents

Proportionate stratified sampling was used to determine the number of respondents each year level. It was obtained by dividing the number of students per year level with the total population size (482 students) and multiplying it with the derived sample size in which in this case was 235. The number of male and female respondents were determined in the same manner. The names of the respondents involved per year level were identified through randomization using the Microsoft Excel program.

Statistical Analysis

The data for this study was encoded in Microsoft

Excel and was analyzed using the Statistical Package for Social Science (SPSS). Descriptive statistics were used to illustrate the demographic profile of the respondents and their level of preparedness. Chi-square test of independence was used to determine the relationships between the respondents' gender and year level to their online learning styles, online learning style to their online instructional preference, and online learning experience with online learning preparedness and attitudes.

RESULTS AND DISCUSSION

Level of Preparedness and Attitude Towards Online Learning

The respondents' preparedness scores were determined in categories as poorly prepared, fairly prepared, and well-prepared. The factors included in assessing preparedness were technology access, internet/online skills, software application skills, and social support. Meanwhile, attitude levels were identified as positive, neutral, and negative.

In online learning preparedness, 62.13% of the students were well-prepared, 37.02% were fairly prepared, and the remaining 0.85% were poorly prepared (Figure 1). In general, the respondents were well-prepared to engage in an online learning environment. Being well-prepared means that the students have the necessary technology for learning online, have the skills to use the internet and associated software, and have enough social support from their parents, teachers, and school to motivate them to learn online. The subtopics below describe the result of each factor considered in assessing online learning preparedness.

Technology Access

Under this category were technologies commonly used in online learning such as a computer, printer, internet

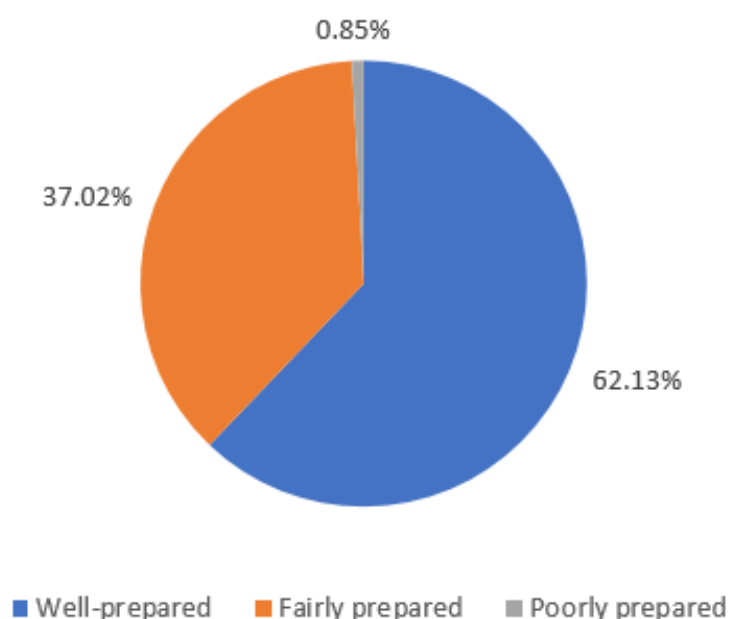


Figure 1. Distribution of the level of online learning preparedness among CMU-Veterinary Medicine students.

access either through mobile data or Wi-Fi, and access to fast internet.

More than half of the respondents agreed to have access to the said technologies (57.36%). In detail, 96.6% of the students owned a computer or smartphone capable of online learning, but most of them (65.5%) did not have printers installed with their computers. There was also a high percentage (96.17%) of students with internet access – 78.72% of these students had access through mobile data, 55.74% had access through Wi-Fi, and 38.30% had access through both. Even though most students could access the internet, the majority (78.7%) did not have fast internet. This result is similar to the study conducted in Turkey by Akaslan and Law (2011), where the majority of the respondents reported that they have access to the internet at their residence and university but the speed of the internet that the students used at the place they live and at university were not sufficient. According to Akaslan and Law (2011), this result can be interpreted that students' access to the internet was not enough for e-learning and must be improved before embarking on e-learning.

According to Oye et al. (2011), bandwidth (colloquially referred to as internet speed) is a significant issue in the deployment of e-learning. The content and services that can be accessed through the internet are dictated by the bandwidth available. Moreover, having fast internet will result in high perceived ease of use, which, in turn, plays a significant part in shaping user behavior in using e-learning technology. Several studies concur that when users perceive an e-learning tool to be easy to use, they would also see it to be useful (Garcia, 2017).

3.1.2 Internet/Online Skills

This category included skills such as sending emails with file attachments, ability to use web browsers confidently, knowledge on fixing surfing errors, knowledge on accessing online library and other resource databases, and ability to use asynchronous online learning tools such as discussion boards, chat tools, YouTube, blogs, and digital library.

The mean score of the respondents was 3.83, and that is equivalent to "agree," which means that they were affirmative of having the earlier said internet/online skills. However, there were two statements that the respondents only scored "neutral." That was on the ability to resolve common errors while surfing the internet like "page cannot be found" or "connection time out" and knowledge on accessing online library and other resource databases. These observations of neutrality were also found in the study conducted by Lamarca (2019) at the University of Northern Philippines. The said study showed inadequate knowledge of the faculty and students on resolving common errors while surfing the net. According to them, there is a need to provide more training programs and mentors to improve the respondents' ICT skills.

3.1.3 Software Application Skills

This category included skills like using Microsoft office programs and alike; knowledge on PDF files and

ability to view and download them; ability to use several programs simultaneously and move between them; knowledge on using video conferencing software and messaging/chat applications.

The mean score of the respondents was 4.2, corresponding to a descriptive score of "agree". Thus, the respondents generally have the necessary skills in using associated software for online learning, which will help make the implementation much easier. This result was most probably due to the respondents being millennials and "generation Z/Gen Z", which means that they were born when the internet was first commercialized. Scholars described the latter generation as "digital natives" and "net generation" (Dimock, 2019). Moreover, secondary education systems in these generations have subjects on Information and Communication Technology, which provided them enough knowledge of computer software (Ramos, 2010; Tomaro, 2018).

3.1.4 Social Support

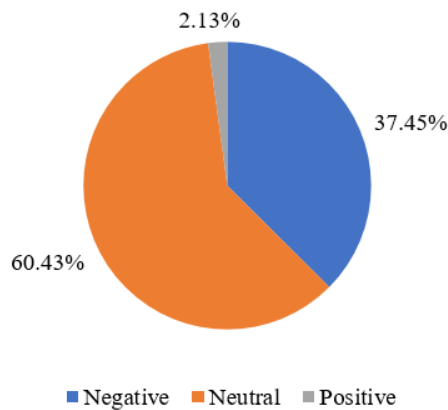
Factors included in social support were those coming from the respondents' parents, teachers, and friends. These included encouragements to use the internet and associated electronic devices for online learning and provision of the school/institution with e-learning materials and the opportunity to learn online.

The mean score of the respondents was 3.76, corresponding to a descriptive score of "agree". This result implies that the students have enough support from their parents, teachers, and friends to use the internet and electronic devices to learn online. This support could be through financial assistance to purchase the required materials/devices/equipment or through encouragements if the necessary devices are already present. However, there was one statement where the mean score was only "neutral" (3.39), and that was on the provision of the school of e-learning materials and the opportunity to learn online.

The respondents' neutral perception on the said statement was because most of the instructors/professors provided their handouts or learning materials in forms of hardcopy or through sharing of softcopy in flash drives. The respondents were also enrolled in a Veterinary Medicine curriculum, where the instructors/professors usually advise them to read or learn from their reference books. Moreover, due to the unexpected outcomes of the crisis, most of the faculty were not prepared at the time of the survey to migrate to online learning. The available learning materials were mostly for conventional instruction.

3.2 Attitude Towards Online Learning

This section contained statements of the advantages and disadvantages of online learning. Illustrated in Figure 2 is the distribution of the respondents by their attitude towards online learning. It shows that most (60.43%) of the respondents had a neutral attitude towards online learning. Being neutral means that the respondents neither agree nor disagree that online learning is beneficial to them. The result also indicates that although most (62.13%) of the respondents were well-



prepared, there were still factors that made them doubtful in learning online. In the conducted follow-up interviews, the respondents' primary reason was due to the slow internet in their localities and the country in general. It was also described in the data in which 96.17% of the students had internet access, but most of them (78.7%) had no access to fast internet.

The Speedtest Global Index (2020), as of April, shows that the Philippines ranked 121st out of 139 surveyed countries on mobile speed and 110th out of 174 countries on fixed broadband. The global average speed in mobile internet is 30.89 Mbps for download and 10.50 Mbps for upload, while in fixed broadband is 74.74 Mbps and 39.62 Mbps, respectively. However, the Philippines has only 12.09 Mbps download, and 5.23 Mbps upload speed for mobile internet, while 21 Mbps download and 20.18 Mbps upload in fixed broadband.

Moreover, the Philippine economic update by the World Bank (2017), shows that internet speed in Mindanao is much slower than in the rest of the country and significantly slower than in Metro Manila. In cities throughout Mindanao, average Internet speeds range from 141 kbps in Marawi to 2.4 Mbps in Cagayan de Oro, compared to 3.6 Mbps in Makati. According to the report, Davao users have to pay about 1.5 times more to get the same speed as in Makati, and Marawi users have to pay 26 times more. This data shows the inequitable accessibility and inconsistency of the internet speed across the country.

To further broaden the understanding of the respondents' perception of online learning, follow-up interviews were conducted. Some respondents have a strong preference for traditional face-to-face learning. They were already used to conventional teaching because it has been the way they were taught since their younger years. It further means that they lack experience in learning online. The idea of shifting to online modes of instruction is an abrupt change for them, and they have no idea how the learning experience will be, which caused the doubt and neutral attitude. They also prefer the physical interaction between their teachers and other students. They think that physical interaction makes it easier for them to ask clarifications on the topics being discussed directly. According to them, the lack of physical presence

of their instructors/professors will be a great challenge for them since it will be like learning independently. In line with this, they think that online learning will only result in poor guidance and limited feedback or a delay in response, which will lose their momentum of interest. Some of them also prefer actual notes or books that they could read and highlight than just reading e-books. Nonetheless, some of them are still open to the idea of learning online.

The respondents also said that the home does not provide a conducive learning environment. One of the mentioned examples to this is the presence of distractions when learning at home, most notably when they think that they will do household chores afterward. The respondents also pointed out that learning in front of their devices makes it easier for them to procrastinate. Aside from that, they also think that home provides so much comfort that it cannot give enough pressure to the students to submit or finish their assigned tasks on time. Without enough pressure, the students will tend to submit their requirements for compliance purposes only, and in this case, the students will not be learning.

Moreover, the respondents were neutral because they think that we are unprepared to engage in online learning since there is no equitable access to a fast and stable internet. According to them, some places do not have a signal or any internet connectivity at all. The students living in these areas are most likely to be forced to go outside and find a place where they can get an internet connection, which is inconvenient if it will be the routine.

The respondents also mentioned the financial problem. According to them, not everyone has a privileged life to afford technological devices and access to the internet like Wi-Fi, which is more convenient for online learning than using mobile internet. This incapacity also made some of them not technologically-oriented. Some students also mentioned that they know some of their classmates who only owned a keypad phone, which is incapable of online learning. Further, if online learning is pushed through, some will be obliged to expend money to buy load for internet access though coming from a low-income family. The privileged students also sympathize with those who cannot access the internet, so they chose to be neutral.

Meanwhile, some respondents think that their instructors and professors should make changes and decisions, and it is not for them to decide whether or not we should conduct online learning. Due to the complications brought by the health crisis, the students believe that they do not have a choice but to engage in online learning, and this results in a neutral attitude towards it. Furthermore, some think that learning online in a veterinary medicine course can compromise their knowledge. According to the respondents, veterinary medicine is not only knowledge-based but also skill-based, which cannot be easily learned online. The subjects are also particularly hard to learn if there is no physical or hands-on experience to supplement the learning. Some of them even said that others might have the suspicion that their answers will influence the school's future trajectory; that is why a neutral option is the safest choice.

These statements were similar to the result of the study conducted in Pangasinan State University, Lingayen Campus, where it aimed to reveal the students' sentiments in view of synchronous online instruction (Pastor, 2020). The majority of the respondents forecasted that they might face issues while using the proposed online learning method, and they were worried about internet connectivity in their area. Other stated problems were background noises, fairness in grading, and expensive mobile loads/financial issues. The research further shows that most of the respondents had negative sentiments followed by neutral sentiment, and only a few had positive sentiments towards the proposed method of online instruction.

Meanwhile, illustrated in Figures 3 and 4 are the distribution of the respondents' attitudes on the positive and negative statements regarding online learning, respectively. In the positive statements, the respondents were in the range of being neutral to agree except for the statement "online learning is easily accessible," where the responses were tied (69 points) at disagree and neutral. In the negative statements, most of the respondents answered

strongly agree, except for the statement "learning online does not have the opportunity to meet peers and make relationships," wherein most of the respondents were neutral.

Statement topics:

1. Students who are too shy can use online materials to get the help they need.
2. Online education allows learning at a person's own pace and convenient time.
3. Online learning is easily accessible.
4. Learning online allows for a pressure-free environment.
5. Online learning allows working alone and helps focus on understanding the parts that need to spend more time on.

Statement topics:

6. Online learning makes it easier to procrastinate.
7. Online learning provides less guidance and assistance on the learning material such that students who are confused and have questions may fall even further behind.
8. Online learning relies on the internet that may crash and a disadvantage for those who are unfamiliar with technology.
9. Learning online does not have the opportunity to meet peers and make relationships.
10. There is no instant feedback between professors and students when learning online.

3.3 Online Learning Style and Instructional Preference

The online learning styles used in this study were those described by Alper and Gülbahar (2004), which is composed of eight dimensions - individual/solitary, social/collaborative, auditory, visual, abstract, concrete, logical, and sensual learning. It is a learning style model often used

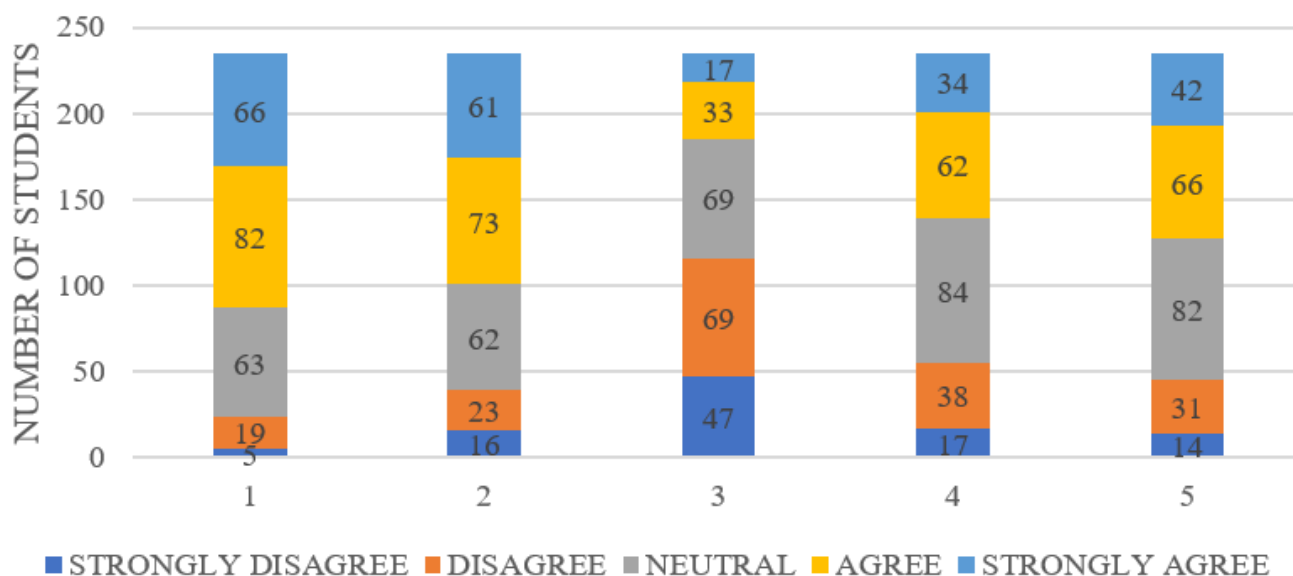


Figure 3. Distribution of respondents by their attitude on each positive attitude statement towards online learning (n = 235).

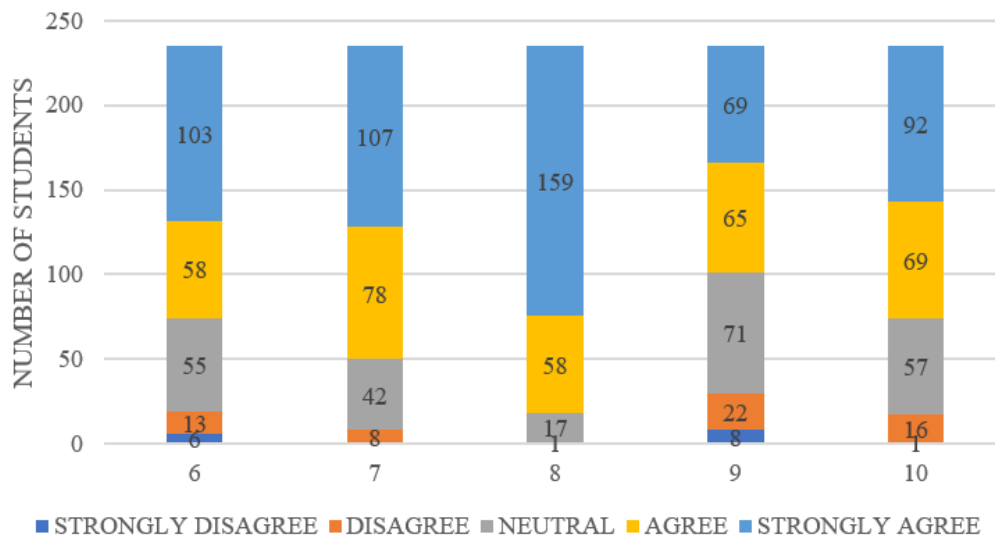


Figure 4. Distribution of respondents by their attitude on each negative attitude statement towards online learning (n = 235).

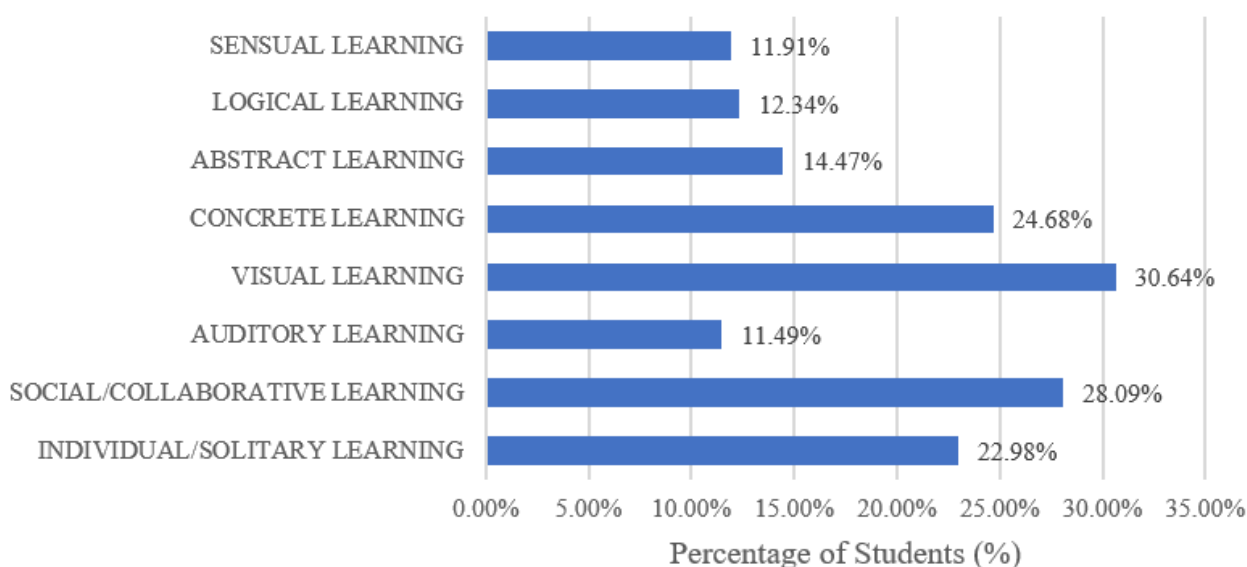


Figure 5. Distribution of online learning styles among CMU-Veterinary Medicine students (n=235).

in technology-enhanced learning previously designed for traditional learning (Graf et al., 2007).

The most preferred online learning style among the respondents was visual learning at 30.64% (Figure 5). Among year levels, most of the first years, second years and sixth years preferred visual learning at 34%, 38%, and 38% respectively, most third years and fourth years preferred social/collaborative learning at 75% and 33% respectively, while the fifth years preferred concrete learning at 34%. In comparison between genders, males mostly (31.11%) preferred visual learning, while females preferred both social/collaborative learning and visual learning at 30.34%.

Online learning instructional preference was determined using the online instruction methods described by Toni Mohr et al. (2012). These include interactive, non-interactive teacher-centered, and non-interactive learner-centered online learning.

The veterinary medicine students mostly preferred

non-interactive online instruction at 40% in both methods. However, non-interactive learner-centered is much higher of about 3.40% than non-interactive teacher-centered since there were students with multiple instructional preferences in which non-interactive learner-centered was also included (Figure 6). In general, non-interactive learner-centered online instruction was preferred by most of the respondents at 47.66%.

Among the year levels, first years and fifth years preferred non-interactive learner-centered at 56.70% and 47.73% respectively, while the second years, third years, fourth years, and sixth years preferred non-interactive teacher-centered at 47.62%, 50%, 55.56%, and 43.59% respectively. Comparing the instructional preference between genders, males mostly preferred non-interactive learner-centered (46.67%) online instruction while females mostly preferred non-interactive teacher-centered (44.14%) online instruction.

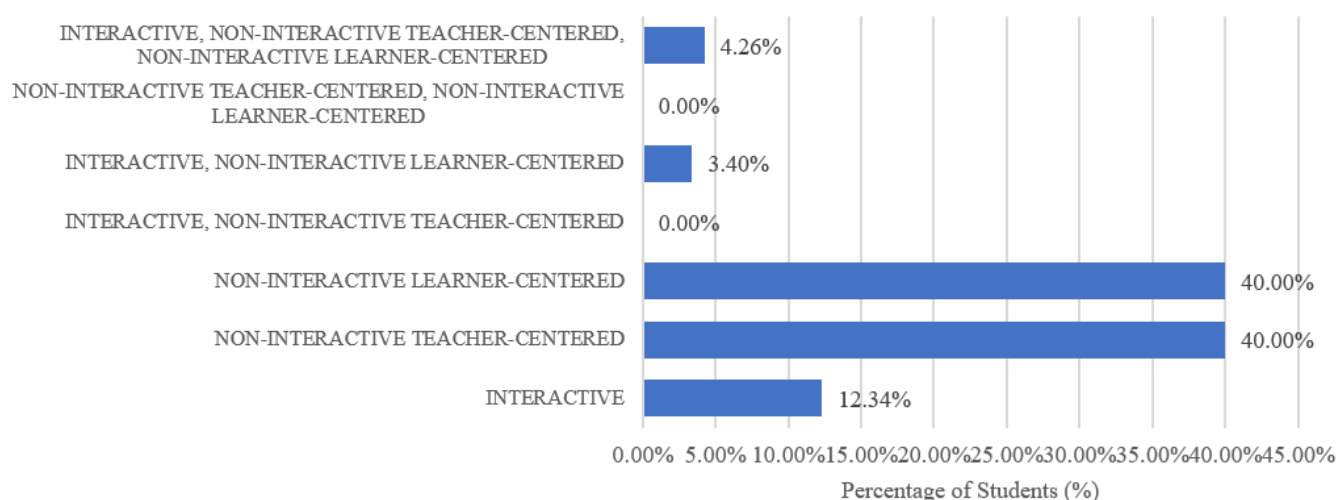


Figure 6. Distribution of online instructional preference among CMU-Veterinary Medicine students (n=235).

In the conducted follow-up interviews, it was discussed why the veterinary medicine students chose non-interactive learner-centered online instruction over the other methods. According to the respondents, they preferred non-interactive learner-centered online instruction because it will allow them to learn at their own pace or have control over how they manage their time. It is essential for them because there were times that they could not cope with the instructor/professors' pace of teaching. Methods of non-interactive learner-centered online instruction like web-assignments will allow them to show up more of their imaginative or creative side since they will have more time. Having time control will make it easier to understand concepts since it will allow them to give themselves more time to think, rationalize, and follow the lessons. They will also have more time to search for more facts from the internet to enhance their learning. Some respondents also see it as fun because it will allow them to develop their learning style and probably improve their other abilities. They also like it because it does not require an immediate response to the questions being asked by the instructors. They also think that learning on their own will make finishing a specific task easier than sharing it with others due to lack of cooperation. Non-interactive learner-centered online learning also allows them to evaluate their knowledge of the topics being tackled. It also does not require a fast and stable internet for a particular time like interactive online learning. They were also unsure of the audio and video quality produced by interactive online learning because of the slow and unstable internet. Interactive online instruction like video conferencing also consumes a lot of data, increasing its cost. Some students even mentioned that they have low device specifications causing lags, which will make them unable to cope with interactive learning. According to them, methods of interactive online learning like listening to the instructor's discussion alone is somewhat ineffective because the students tend to get bored, and learning in chat rooms can be quite noisy and distracting as well. Some first-years also have fear to voice their ideas in interactive online instruction, especially when they think that there will be other students online listening or watching. The students were even considering that everyone has different learning

styles, so they tend to learn on their own so that no one will adjust with one another. Meanwhile, some respondents that preferred interactive online learning think that other students might have good comprehension. That is why it is easier for them to understand the lessons without any discussion from their instructors and professors.

Based on the online learning instructional preference and follow-up interviews, it is therefore recommended to adopt blended learning, mainly a combination of non-interactive online instruction and the traditional teaching method. The implementation of non-interactive online instruction will address the issue of slow internet connectivity. Unlike interactive online learning, the students can access the learning materials any time when a good connection is already established. Moreover, those in the minority that does not have computers and smartphones will also have more time to find ways they can access the materials. Fully-online education is not also advisable because of the laboratory subjects that need to be practically performed. The respondents also mentioned that they prefer hands-on experience to supplement the learning. Blended learning has also proved to overcome various limitations related to online learning and face-to-face instruction (Alammary et al., 2014). A meta-analysis of more than 1,100 empirical studies published between 1996 and 2008 concluded that blended learning is more effective than online learning or face-to-face instruction (Means et al., 2009).

3.4 Relationship Between the Respondents' Online Learning Style to Their Online Instructional Preference

The relationship between the respondents' online learning style and their instructional preference was measured using the Chi-square test of independence (at $\alpha=.05$). The result showed no significant difference, $\chi^2(228, N = 235) = 173.07, p = .997$. It implies that online learning style and online instructional preference are independent with each other. In other words, the choice of a learning style does not necessarily affect the inclination towards an online learning instruction and vice versa.

3.5 Relationship Between Gender and Year Level to Respondents' Online Learning Style

The relationship between the respondents' gender with their online learning styles was determined using a Chi-square test of independence at $\alpha=.05$. The result showed that the relation between these variables was insignificant, $X^2 (57, N = 235) = 74.25, p = .06$. This result was also observed in the study conducted in Ethiopia by Yemane et al. (2017) ($\alpha = .05; p = .37$). Thus, the respondents' learning style preference is independent of the respondent's gender.

Meanwhile, the relationship between the respondents' year level and their online learning styles using the chi-square test of independence (at $\alpha=.05$) revealed no significant relationship, $X^2 (285, N = 235) = 209.73, p = 1.0$. This result means that being at a specific year level does not follow a particular learning style preference.

3.6 Online Learning Experience and its Relationship to the Respondents' Online Learning Preparedness and Attitude

Out of the 235 respondents, more than half (61.28%) had no previous online learning experience, while 38.72% had enrolled or experienced online course/learning sessions. Their online learning experience was conducted through various methods such as non-interactive teacher-centered like streaming videos; non-interactive learner-centered like submission of requirements online, answering online quizzes and activities; lastly, interactive online learning using video conferencing software and online messaging applications.

A chi-square test of independence indicated significant association between online learning experience and online learning preparedness with a small to medium strength of relationship, $X^2 (2, N = 235) = 17.62, p < .001, V = .26$. This result implies that the respondents' online learning preparedness is dependent on whether or not they have a previous online learning experience. Moreover, the relationship between online learning experience and attitude towards online learning also showed a significant association with a small strength of relationship, $X^2 (2, N = 235) = 7.87, p = .02, V = .18$. This result means that the respondents' attitude towards online learning is dependent on whether or not they have experienced online learning. This data can be a basis for conducting a longitudinal survey if online learning or blended learning is to be implemented to determine if there will be improved attitude and preparedness among the respondents. A follow up survey is very essential considering that in the study of Okwumabua et al. (2010), 52% of the respondents admitted that their negative attitudes toward online learning will not change even if they become accustomed to the approach.

CONCLUSION AND RECOMMENDATION

The findings of this study show that the implementation of online learning in CMU-College of Veterinary Medicine is feasible. Most of the students were

well-prepared in engaging online learning. They have access to technology, have internet and software application skills, and social support necessary for learning online. Although most students were neutral towards online learning, this can change since attitude is significantly associated with an online learning experience. It also shows that most of the students were visual learners, which means they prefer watching when learning. In the method of online learning instructions, most of them preferred non-interactive learner-centered due to their preference for independent learning, and they want to have control over how they manage their time when learning.

Although online learning is feasible, it is recommended to do non-interactive online instruction and blend it with face-to-face instruction, as it is also essential to develop students' practical skills, especially in Veterinary Medicine. Non-interactive online instruction will help to address the issue of the slow internet connection of the students since it will allow them to access the learning materials when a good internet connection is already established.

Moreover, before the implementation of blended learning, it is essential to determine first the average internet speed used by the students. This information is necessary because it will serve as the basis of the learning materials' data rate, and it should be lower than the student's average internet connection. Future studies should also venture on the assessment of preparedness among the faculty since they will be the ones who will implement the learning instruction.

The neutral attitude can be dealt with by providing mechanisms to inform and orient learners on the learning system to be implemented, which may be in the form of course packages for students and accessible through offline and online modes. It will address the students' confusion on how the proposed learning continuity plan will work, which is a factor of the neutral response. Since most of the respondents are visual learners, the learning instructional media and materials that can be utilized in this form of learning are videocasts, video visuals of sample cases and scenarios, simulations, and graphic organizers; these can be taught through demonstration and presentation.

The unprecedented impacts of the COVID-19 pandemic are indeed leading educational systems to a new normal period in human history. Other courses or degrees within the university must also assess their students' and faculty's preparedness for online learning before its implementation to minimize complications; however, it is inevitable during this uncertain time. Higher education institutions thereby need to seize the opportunity to develop a resilient education system responsive to the needs of the changing times and be prepared when another crisis comes in the future.

REFERENCES

Akaslan, D., & Law, E. L. C. (2011). Measuring student e-learning readiness: A case about the subject of electricity in higher education institutions in Turkey.

Paper presented at the International Conference on Web-Based Learning.

Alammary, A., Sheard, J., & Carbone, A. (2014). Blended learning in higher education: Three different design approaches. *Australasian Journal of Educational Technology*, 30(4).

Alper, Y., & Gülbahar, A. (2004). Learning preferences and learning styles of online adult learners. *International Education Journal*, 4(4).

Daniel, W. W. (1999). *Biostatistics: A foundation for analysis in the health sciences*, 7th edR Wiley.

Dimock, M. (2019). Defining generations: Where millennials end and generation z begins. *Pew Research Center*, 17, 1-7.

Fahy, P. J., & Ally, M. (2005). Student learning style and asynchronous computer-mediated conferencing (CMC) interaction. *The American Journal of Distance Education*, 19(1), 5-22.

Garcia, M. B. (2017). E-learning technology adoption in the philippines: an investigation of factors affecting Filipino college students' acceptance of learning management systems. *The International Journal of E-Learning Educational Technologies in the Digital Media*, 3(3), 118-130.

Graf, S., Viola, S. R., Leo, T., & Kinshuk. (2007). In-depth analysis of the Felder-Silverman learning style dimensions. *Journal of Research on Technology in Education*, 40(1), 79-93.

Houlden, S., & Veletsianos, G. (2020). Coronavirus pushes universities to switch to online classes — but are they ready? Retrieved from <https://theconversation.com/coronavirus-pushes-universities-to-switch-to-online-classes-but-are-they-ready-132728>

Lamarca, B. I. J. (2019). E-learning framework for the University of Northern Philippines. *International Journal of Advanced Research (IJAR)*, 7(4), 1374-1383. doi:<https://doi.org/10.21474/IJAR01/8962>

Manochehri, N., & Young, J. I. (2006). The impact of student learning styles with web-based learning or instructor-based learning on student knowledge and satisfaction. *The Quarterly Review of Distance Education*, 7(3), 313-316.

Marcial, D. E., Caballero, R. D. B., Rendal, J. B., & Patrimonio, G. A. (2015). "I am offline": Measuring barriers to open online learning in the Philippines. *Information Technologies and Learning Tools*, 45(1), 28. doi:10.33407/itlt.v45i1.1170

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC, U.S.

Mercado, C. A. (2008). Readiness assessment tool for an e-learning environment implementation. *International Journal of the Computer*, 16, 18-11.

Offir, B., Bezalel, R., & Barth, I. (2007). Introverts, extroverts, and achievement in a distance learning environment. *The American Journal of Distance Education*, 21(1), 3-19.

Oye, N. D., Salleh, M., & Iahad, N. A. (2011). Challenges of e-learning in Nigerian university education based on the experience of developed countries. *International Journal of Managing Information Technology*, 3(2), 39-48.

Okwumabua, T. M., Walker, K. M., Hu, X. & Watson, A. (2010). An exploration of African American students' attitudes toward online learning. *Urban Education*. doi:10.1177/0042085910377516

Pastor, C. K. L. (2020). Sentiment analysis on synchronous online delivery of instruction due to extreme community quarantine in the Philippines caused by Covid-19 pandemic. *Asian Journal of Multidisciplinary Studies*, 3(1), 1-6.

Ramos, D. D. (2010). Ict-integration-in education as a social practice in a post-conflict setting: an analysis of an ict-integration in education program in ARMM. *Dalumat eJournal*, 1, 40-54.

Speedtest Global Index. (2020). Speedtest Global Index. Retrieved from <https://www.speedtest.net/global-index>

Tomaro, Q. P. V. (2018). ICT integration in the educational system of Philippines. *Journal of Governance Public Policy*, 5(3), 259-282.

Toni Mohr, A., Holtbrügge, D., & Berg, N. (2012). Learning style preferences and the perceived usefulness of e-learning. *Teaching in Higher Education*, 17(3), 309-322.

World Bank. (2017). The Philippines economic update October 2017: Preserving consistency and policy commitment. Retrieved from <http://documents.worldbank.org/curated/en/109431507121621231/pdf/120239-REVISED-72p-Philippines-Economic-Update-October-2017-FINAL.pdf>

Yemane, Y., Ambaye, E., Alehegn, A., Sahile, E., Dimtsu, B., Kebede, S., . . . Girma, A. (2017). Assessment of gender difference on learning styles preferences among regular undergraduate students of Mekelle University Collage of Health Science. *Journal of Stem Cell Biology Transplantation*, 1(2), 14.