

Linking College Learners' Competence in Information and Communication Technology and Learning Styles during the COVID-19 Pandemic

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Abstract: The purpose of the study was to determine the learning styles and Information and Communication Technology Competence of university students in the course of the COVID19 pandemic. It also aims to identify possible associations related to ICT Competence and the students' learning styles. A descriptive and correlational quantitative approach was applied in the study and used a non-probabilistic sample of 686 students in a state university in the Philippines. The results showed that the students' dominant learning style is collaborative and seconded by dependent. This means that university students in the course of the COVID19 pandemic exposed to flexible learning modalities learn best when given opportunities to exchange ideas to small group discussions than large group lectures. However, a significant number of students lack intellectual interest and learn only what is asked of them. Meanwhile, students' ICT skills and attitudes are closely connected to their learning styles. Collaborative learners have a higher level of ICT competence than the other groups. Furthermore, the findings revealed that students' learning styles are strongly linked to their college programs. Other variables, such as ICT-related burnout levels, should be examined to see whether they have a possible mediation impact on ICT competence.

Keywords: Learning Styles, ICT Competence, COVID19 Pandemic

1. Introduction

COVID-19 has undeniably interrupted the traditional delivery of higher education in universities and colleges, not only in the country, but also around the world (UNESCO-IESALC, 2020). In addition, this pandemic has triggered a slew of social and economic issues, including health care and political divisions. Under the 'New Normal,' digital transformation has been highlighted in education as a potential alternative to society's educational needs and demands. Furthermore, online learning is becoming prominent, and information and communication technologies (ICT) have developed into a critical tool in continuing the delivery of instruction in schools.

Educational institutions, through the advent of technology-based learning, can also use online tools to help in the learning process. Faculty members are encouraged to incorporate digital learning resources into their online teaching, supplement courses with additional electronic content, and offer online courses fully in some cases. It is important to note that, unlike online and distance learning, flexible learning does not rely solely on the use of technology. Although distance education delivery strategies and educational technology facilities are commonly used, these can differ depending on computer availability, internet connectivity, and in most cases, digital literacy. In a report made by the Philippine Daily Inquirer (2020), according to the Commission on Higher Education, only 20% of state universities and colleges (SUCs) are prepared to hold online classes this school year. This just adds to the sense that most HEIs have never dealt with similar circumstances before and that the adjustment has been difficult. It has, thus, become critical to investigate the introduction of flexible learning in its early stages in order to facilitate the migration of HEIs from traditional to flexible teaching and learning options.

Flexible learning recognizes that ICTs have the ability to innovate teaching skills; to empower and increase students' engagement; and to make learning more authentic (Davis and Tearle, 1999). Teachers are now being motivated by technological developments in teaching, as traditional methods of education have become less of a trend (Stockwell, 2016). The use of technology in teaching is expanding in order to create both individual and immersive learning environments where students can learn with ease (Groff, 2013). However, in as much as technology has become successful in revolutionizing education, the skills of learners in the use of ICT play a critical role in this paradigm shift.

The students' ability to use accessible technologies for learning is one of the core elements in an effective delivery of instruction using ICT. It is important not to overlook students' competence in ICT, which is needed for them to fully participate in the flexible learning process (Rosman, 2013). In relation, students' use of ICT in developing countries vary with those from developed countries, since students' ownership and access to certain types of ICT may be restricted, which may affect the degree and nature of their use of digital technology for educational purposes. Furthermore, some countries' cultures can influence students' use of ICT (Gasaymeh, 2018). Being better informed about students' awareness of, abilities, accessibility, and use of ICT could lead to the betterment of utilizing educational gains among higher education administrators and designers.

In line with previous researches, researchers have looked at attitudinal and motivational factors as main predictors of intention to continue with any kind of technology-assisted instruction. Considering the prevailing health concerns' elevated levels of stress, it is not surprising that more learners are disturbed about the negative psychological response to online education. According to research, academic achievement is aided by a strong desire to learn. Students who are more driven devote more time to their studies and achieve better performance than those who are less motivated (Schunk, 1995). Many researches on motivation to learn have been performed in traditional classroom settings, but little is known about how motivation works in online learning environments.

Meanwhile, a number of factors, including preferred learning styles, may trigger differences in learners. In order to improve and introduce innovations in teaching and learning, it is important to recognize learning styles of students. This will help teachers teach and treat them with appreciation on their particular characteristics, resulting in more successful learning. Rita Dunn coined the concept of "learning style," which has been defined in a variety of ways by a number of studies. They all accept that this is an important concept that should be investigated further (Bhat, 2015). Similarly, Kolb defines learning styles as a person's preferred method of receiving and processing information (Johassen & Grabowski, 1993). Finally, Grasha (1996) described learning styles as "personal qualities that influence a student's ability to acquire knowledge, connect with peers and the instructor, and engage in learning experiences in other ways."

When creating learning materials with ICT, such pedagogical principles must be carefully considered. ICT methods by themselves do not make for good pedagogy (Majumdar, 2006). ICT should be used to meet the diverse needs of all types of learners, including those with multiple intelligences, who are affected by a variety of socio-cultural factors (Majumdar, 2006). In this context, learning styles are therefore viewed as personal variables linked to students' competence in ICT that manifest themselves in various approaches throughout the learning process.

In this research, the level of ICT competence of students in higher education was investigated in relation to their learning styles. Furthermore, the researcher looks into the impact of learning style on students' ICT abilities, attitudes, and applications. As an end, this research is conducted with the assumption that learning styles are relatively stable but can be modified for teachers to use as a guide to better understand how their students learn and, as a result, change or strengthen their own teaching approaches, which will positively affect student learning processes resulting to academic success.

2.Methodology

This study employed the descriptive method to carry out successfully the research questions on the level of competence in ICT of the students, and their learning styles. On the other hand, correlation method was utilized to answer the inferential questions on the relationship of ICT competence and learning styles. Generally, a survey was conducted to gather pertinent data and was treated using descriptive and inferential statistics. This study used a sample of 686 students from Cagayan State University- Carig Campus. Convenience random sampling was used because the survey forms were administered online.

The level of ICT Competence was measured with items associated with three scales: Attitude, Application and ICT Skills. This instrument was adapted from Grigg (2016). Meanwhile, the respondents' learning styles will be identified based on the classification set by the Grasha-Reichmann Learning Style Inventory. There are 60 statements in the instrument and these statements correspond to 6 types of learning styles: avoidant, dependent, participant, independent, competitive, and collaborative learning styles.

Because of the pandemic's guidelines, this study made use of online platforms in floating the questionnaires. A Google Survey Form was developed and the link was sent to the students.

Mean was used to describe the ICT competence of the students. Meanwhile, in the identification of the dominant learning style of the respondents, the weighted mean was computed in all types of learning styles and the highest mean determines the dominant learning style of the respondents. The respondents will be categorically identified in terms of their ICT skills, attitude, and application. Lastly, Chi-square test was used in testing the relationship between ICT competence and learning styles. The hypotheses were tested at 0.05 level of significance.

3.Results and Discussion

One of the objectives of this study is to identify the level of competence of the students in ICT in terms of their ICT Skills. Figure 1 presents a scatter plot of the ICT Skills scale scores for all students. It can be seen that out of the 686 students, only 0.7% (5) were Highly Competent, 21.6% (148) Competent, and 77.7% (533) Basic. This suggests that most of the students surveyed are possessing only basic competence in their ICT Skills.

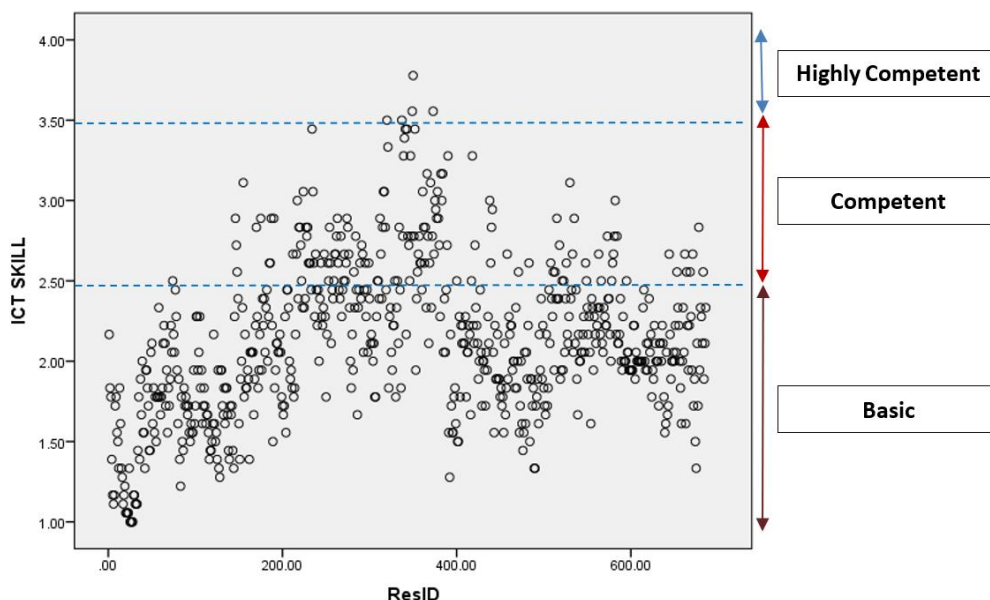


Figure 1. Plot of ICT Skills scores of the respondents.

To further understand the results presented above, the ICT Skills scale is comprised of sixteen items concerning the skill in the use of common computer applications. Table 1 summarizes the mean responses by students to these 16 items that were ranked from highest to lowest in terms of the mean score. Based on the table, it turns out that there is only one application that is higher than the mean skill level above the mid-point of 2.5 which is Video Sharing. In all other applications, the respondents registered basic competence only. Nonetheless, it is interesting to note that the top applications are using the internet in one way or another. For example, video sharing and social networking are both activities done in the internet. Videos can be shared in several social media sites and message hosting services. It has been reported that in the country, there are 37.6 million Internet users, of which 34 million were on Facebook. Thus, one in every three Filipinos were on Facebook. Social media is also making various information available to us in various formats (ABS-CBN News, 2020). Next to those applications are examples of productivity software like image editing, word processing, and video recording. These types of applications let the students use ICT in making a project or completing a course requirement.

It must also be noted that the students have the lowest competence in accessing databases. This could be explained by the inclination of the students to use the internet in searching for information. In fact, Togia & Tsigilis (2010) in their study reported that the vast majority of the participants used Internet search engines rather than specialized databases and full-text resources. Moreover, Google is the most used search engine by the respondents. The study found that the available PCs in computer labs are inadequate in meeting the needs of student and they have problem in accessing computers.

Table 1. Ranked order of the skill level measured by the mean scores of the respondents on the use of different ICT Tools (ICT Skills).

Rank	ICT Tools	Mean	Std. Deviation
1	Video Sharing	2.61	0.98
2	The internet	2.49	0.97
3	Social Networking (Blogs, Facebook, Forums)	2.32	0.78
4	Digital Photography	2.31	0.94
5	Image Editing	2.28	0.77
6	Email	2.26	0.69
7	Word Processor (MS Word)	2.25	0.88
8	Video Recording and Editing	2.23	0.82

9	Content Hosting Services (Dropbox, Google Drive)	2.23	0.96
10	Slideshow Software (Powerpoint)	2.19	0.86
11	LMS (Moodle, Edmodo, Schoology, LENS)	2.18	0.60
12	Computer File Management	2.08	0.77
13	Spreadsheets (Excel)	1.74	0.79
14	Web Page authoring	1.68	0.77
15	Podcasting	1.66	0.81
16	Database (Access)	1.60	0.80

Moreover, aside from the skills of the students in using ICT, their attitude towards ICT is also important to investigate. Studies have shown that the attitude of a person is a factor in integration of ICT in teaching and learning (Kzenek & Christensen, 2008). Positive attitudes towards ICT might have an effect on its usage by individuals for educational purposes (Efe, 2011).

Table 2 presents the mean responses to the eight statements in the ICT Attitude scale. Responses to each statement were made using a five-point Likert scale. The mean scores were ranked from highest to lowest highlighting the statements with the most positive responses. As the results demonstrate, the statement with the highest mean is “computers help me to learn” and “I see a need to use computers”. Both of these statements imply the necessity of computers in education. This finding reinforces the point that students commonly agree that using computers is important (Osodo, Indoshi, & Ongati, 2010). Overall, the students have positive attitude towards the use of ICT in their learning.

The findings above support what was proved by previous researches that the use of ICT in teaching enhances the learning process and maximizes the students’ abilities in active learning (Jamieson-Procter et al., 2013). Roma & Salgotra (2016) found majority of the students they surveyed have positive attitude towards ICT in education.

Table 2. Ranked order of the mean scores of the respondents in the ICT attitude scale (ICT Attitude).

Statements	Mean	Description
Computers help me to learn	3.28	Very Positive
I see a need to use computers	3.21	Positive
By using computers, I think in different and interesting ways	3.03	Positive
I complete more work with a computer	2.96	Positive
I learn more quickly with computers	2.91	Positive
I enjoy learning with a computer	2.91	Positive
Using computers takes away time.	2.57	Positive
It is difficult to use technology	2.35	Negative
Overall Mean	2.90	Positive

Furthermore, Table 3 shows the mean responses of the respondents to different computer tasks. The mean scores were ranked from highest to lowest application highlighting the statements with the most regular applied tasks. The top ranked applied task is accessing the LMS. This is followed by accessing information in the internet. Evidently, these findings are expected because of the implementation of flexible learning in the university which is mostly done online. Learning management systems are platforms where teachers and students can continue with regular classroom transactions virtually. The task that received the lowest mean is making a product like videos, research papers, or projects. With the current situation where students experience difficulties in their access to technologies, teachers learned to adjust their expectations and minimize course requirements.

Overall, the level of ICT application of the respondents can be described as moderate. This is similar with the results of the study of Al-Jaberi (2018). His findings indicate that the students’ use of computer applications was

moderate, and that students use the applications included in the study to very similar extents. However, the same author noted the lack of an administrative educational system that would integrate and implement several technologies such that of a learning management system. This led him to conclude that e-learning is an elective form of learning, and has not been integrated successfully in the higher education system where the study was conducted. This is contrary to the present study since different forms of LMS are being used in the university. As such, teachers and students alike are forced to learn the technical-know-hows of the systems.

Interestingly, looking at the same table, it can be noticed that the tasks on the upper level lean towards knowledge building while the tasks at the bottom lean towards creating a product. This pattern was also observed in the study of Grigg (2016).

Table 3. Ranked order of the mean scores of the respondents on their frequency of doing various ICT-related Tasks (ICT Application).

Tasks	Mean	Qualitative Interpretation
access the schools LMS (e.g. Schoology, CSU LENS))	3.14	Each Week
access information (e.g. internet search, CD’s, blogs)	3.07	Each Week
develop a skill (e.g. typing, tables)	2.72	Each Week
store information (e.g. hard-disk drive, thumb-drive, CD)	2.65	Each Week
type work (e.g. word-processing, publisher)	2.62	Each Week
analyze information (e.g. statistics, graphs)	2.59	Each Week
present information (e.g. PowerPoint, posters)	2.53	Each Week
make a product (e.g. brochure, video, website)	2.25	On Occasion

The current study also probed the learning styles of the students in the university and investigated the relationship between their learning styles and ICT Competence. The results, as shown in Table 4, revealed that the Collaborative learning style was most common among the students which accounted for 39.21% or 269 of the total respondents. A considerable number of Dependent learners (27.41% or 188) can also be observed. This is an interesting result because those two types of learning styles are found in the opposite ends of the spectrum. İlçin et al (2018) described Collaborative learners as students who learn by sharing and cooperating with their teachers and peers. They also prefer lectures with small group discussions and group projects. In contrary, dependent learners prefer that the teacher guides them and tells them what to do. They only learn what is required and they look up to the teacher for specific guidelines on what to do. They show little intellectual curiosity. They prefer outlines, clear instructions and guidelines and teacher-centered classroom activities.

However, some of the respondents have an avoidant style of learning (11.22 % or 77). According to Grasha and Riechmann (1974), these respondents don’t like to be present in the classroom and don’t participate in the activities other students and the teacher do in the classroom. In general, they don’t enjoy the classroom climate and whatever is happening in the classroom. Meanwhile, 8.02% or 55 of the respondents have a Participant type of learning, these respondents follow the class and enjoy going to and participating in the class so that they are eager to volunteer for activities and prefer to have discussion and lecture in the classroom (Baneshi et.al, 2014). Meanwhile, seventy-six (76) or 11.08% of the respondents are independent learners they like to think by themselves and they are sure that they have the ability to learn. They prefer to learn the content which they think is important. Individuals with competitive style learn the content with the aim of having better performance than the other students in the classroom. Lastly, 21 or 3.06% of the respondents are complete learners, these students believe that they have to compete with other students in the classroom to get reward.

It is imperative that students' learning preferences are taken into account in online education. Instructors need to understand learning differences and how to handle the different learning styles found among their students in order to educate more efficiently even on online courses. In online education, instructors who are aware of different learning styles are better able to respond their teaching methods and techniques. This will help guarantee that their strategies, materials, and tools match the learning styles of their students, resulting in a learning atmosphere that maximizes each student's learning potential (Zapalska & Brozik, 2006).

Table 4. Learning styles of the respondents.

Type of Learning Styles	Frequency	Percent
Avoidant	77	11.22
Collaborative	269	39.21
Competitive	21	3.06
Dependent	188	27.41
Independent	76	11.08
Participant	55	8.02
Total	686	100

Finally, the relationship between learning styles and the three dimensions of ICT competence was explored in this report. The findings of the study are shown in Table 5, and it can be deduced that the respondents' learning styles are substantially related to their ICT competence since all of the p-values are less than the significance mark. The findings were backed up by a study by Bhatt (2015), which found a connection between students' attitudes toward learning with ICT and their learning styles. This demonstrates how ICT integration aids in learning assimilation. Alakrash (2019) backed up this argument, claiming that using ICT in education would improve students' learning.

Pogarcic et al. (2009) proposed that the use of ICT in e-learning is linked to learning styles. Electronic forms of learning, according to the authors, allow for communication through cooperation and collaboration. It is in this area that the impact on learning style can be observed. This is especially beneficial for students who prefer to learn in a collaborative environment. However, in the case of independent learners, the constructivist approach emphasized by online learning causes an individual to consider how an activity is carried out and, as a result, possible changes in style. It's also worth noting that online learning has its own set of limitations. Because online learning is prone to repetitive activities, it does not allow for the expression of personal style. Similarly, all automated activities are devoid of style because they are routine.

The use of ICT in teaching, especially in learning, has made a significant contribution. Ghavifekr & Rosdy (2015) backed up this assertion, claiming that technology-based learning is more successful than conventional classroom learning. This is because using ICT resources and equipment would provide a more engaging and productive learning experience for both teachers and students. As a result, teachers must be literate and have strong skills and experience in using ICT to develop their teaching methods and approaches in order to facilitate successful learning and meet the demands of 21st century teaching skills.

Table 5. Results of the test of relationship between the learning styles and ICT competence of the respondents.

Dependent Variable	Dimensions of ICT Competence	Pearson Chi-square Value	Sig. value
Learning Styles	ICT Skills	20.412	0.026*
	ICT Attitude	34.854	0.000**
	ICT Application	45.001	0.000**

*significant at 0.05 level, **significant at 0.01

4. Conclusion and Recommendations

From the results of this present study, the followings conclusions and recommendations were obtained:

ICT integration helps learners enhance their skills and allows them to become active participants to the learning process; thus, the need for instructors to carefully and objectively determine appropriate technologies as part of their instructional delivery.

As a result of the on-line teaching and learning implemented since the pandemic, students have been bound to the use of Learning Management Systems (LMS) as major channel of instructional exchanges with their instructors; hence, top-management officials in the university need to identify the most student-friendly LMS to be utilized, considering the fact that with the other applications or educational tools that work hand-in-hand with the LMS, large data consumption is usually required among learners, from whom a number of student populace still depend on mobile data.

Most of the learners would exhibit collaborative learning style as their way of learning, in which they tend to share and discuss among their groups; while some would prefer dependent learning style wherein teachers' guidance and instructions matter largely. These extreme cases are imperative for instructors to review the objectives of learning contents vis-a-vis learnings tasks in their modules. In that way, they would better respond to the varying learnings styles of students.

In as much as significant relationship was found to have been linked between learning style and the dimensions of ICT, respectively, instructors should provide avenues to further expose learners into ICT experiences that may help boost their ICT attitude, intensify their ICT skills and strengthen their ICT application towards productive and competitive ends. For further research, other variables such as ICT-related burnout levels, should be examined to see whether they have a possible mediation impact on ICT competence.

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