JOURNAL OF INTERDISCIPLINARY PERSPECTIVES

ISSN Print: 2984-8288, ISSN Online: 2984-8385
Vol. 3 No. 9, pp. 354-363, September 2025

Distance Students' Readiness for a Flexible Learning Approach in Mathematics Education

Rene C. Llanera
Negros Oriental State University – Bais Campus II, Bais City, Philippines

Author Email: rnllnr2@gmail.com

Date received: July 9, 2025
Date revised: July 28, 2025
Date accepted: August 18, 2025

Originality: 99%
Grammarly Score: 99%
Similarity: 1%

Recommended citation:
Llanera, R. (2025). Distance students' readiness for a flexible learning approach in mathematics education. *Journal of Interdisciplinary Perspectives, 3*(9), 354-363. https://doi.org/10.69569/jip.2025.557

Abstract. The purpose of this study was to investigate the respondents' extent of readiness for a flexible learning approach in Mathematics education in terms of: (a) availability of hardware, (b) internet connectivity, (c) information literacy, and (d) psychological preference. This study is based on descriptive-comparative research to determine the readiness among distance students. The digital form was produced and shared with the mathematics students via a group chat, and their responses were collected immediately after submission. Data were entered and analyzed in MS Excel and SPSS. The conclusion of the findings indicated that the student's readiness to practice flexible learning was considered to be satisfactory. In addition, there were no significant differences in the respondents' readiness when they were grouped according to their age, sex, and civil status. These findings showed that a flexible learning approach in Mathematics education was viable in the sampled university. To this end, math instructors were encouraged to implement a blended learning model, which included the completion of online courses and offline work via printed modules, videos, and learning packets. Moreover, the potential impact of these findings was significant for both educational practice and policy. Institutions offering distance education should provide Internet access, support policies advocating for the responsible management of devices for learning, and have the responsibility to educate all who work with children and youth on how to use technology safely, ethically, and effectively. Another step towards better preparedness for flexible learning could be the promotion of programs that develop digital fluency, time management, and resource organization. Finally, students' positive attitude and their information literacy that have been fostered within the hybrid teaching scenario can be exploited as building blocks for the construction of new experiential Mathematics curricula targeted at a hybrid teaching or a fully online scenario.

Keywords: Flexible learning; Descriptive-comparative design; Distance education; Mathematics readiness; Blended learning

1.0 Introduction

Information and Communication Technology (ICT) has played an important role in our daily lives. As stated by Ramos et al. (2024), the trend of information and communication technology (ICT) has had an influence on education, changing the modes of learning that learners use digital environments and hybrid contexts. The importance of ICT for increasing autonomy and inclusion in educational processes has been highlighted more recently. In this context, Bautista & Valtoribio (2024) added that higher education institutions (HEIs) globally are increasingly delivering flexible provision – including online, modular, and blended forms – to address differences in learner modes and contexts of study, as well as other situational imperatives, such as the outbreak of COVID-19.

In this regard, Higher Education Institutions (HEIs) in the area are now employing the flexible learning approach. During the pandemic in the Philippines, Banawis et al. (2023) asserted that the CHED, which is responsible for the development of HEIs in the Philippines, required HEIs to implement a combination of various flexible teaching strategies, from e-learning (using virtual platforms), modular delivery, and broadcast medium, to ensure continuity of education while the campus was closed However, implementation barriers remained substantial. Filipino university students studying engineering or technology acknowledged flexible modes of learning, but their preparation and attitude toward these modes of learning depended on the reliability of the available internet. Likewise, Ramos et al. (2024) emphasized that in a Philippine study on the application of HyFlex teaching and learning, e-learning readiness mediated the relationship between student engagement and learning outcomes successfully.

In localized Philippines studies in Mathematics, Palma & Dalaya (2024) stressed that flexible learning modes of delivery have been found to bring about positive impacts on student performance. For instance, quasi-experimental research on Grade 10 students unveiled that their problem-solving abilities were significantly enhanced when they used blended flexibility materials. However, Bautista & Valtoribio (2024) articulated that at the state university, flexible learning in Mathematics was still grappling with infrastructure, pedagogical, and engaging students in the new mode of delivery of learning. In a West Philippine university, mixed-methods research revealed that flexibility in teaching Math provided opportunities for student engagement, if accompanied by ongoing infrastructure support and professional development.

Notwithstanding this awareness, there was a significant void in knowledge on the readiness of the students studying Mathematics at the tertiary level – especially in the provincial HEIs – for flexible learning. Readiness was defined by access to hardware, access to reliable internet, information literacy, and psychological acceptance, all factors that needed to be in place to support the successful adoption of flexible pedagogy. This void prevented practical application and threatened equity for teaching throughout various regional contexts. Thus, this research aimed to examine the availability of access to hardware, access to the internet, information literacy, and the psychological orientation of the mathematics students at Negros Oriental State University – Bais Campuses I & II. By profiling student readiness, the research sought to guide the institution in facilitating inclusive and resilient Mathematics teaching and learning that would be responsive to flexible learning practices.

2.0 Methodology

2.1 Research Design

This study used a descriptive–comparative research design to determine the readiness of the mathematics students for flexible learning at Negros Oriental State University – Bais Campuses I and II. The descriptive side enabled the researchers to build up a profile and systematically collect detailed information about students' readiness to participate in flexible Mathematics learning. The testing for significance also contributed to the ability to compare differences in readiness among a range of demographic groups, including age, sex, and civil status. The purpose of this design was to describe the overall state of student readiness and to compare subgroups on selected personal variables to identify patterns or disparities that would guide targeted instructional interventions. This approach was appropriate for the research objectives, as it allowed quantifying readiness levels and investigating the comparisons among demographic variables and readiness for the flexible learning approach.

2.2 Respondents and Sampling Technique

The respondents of this study were the students from Negros Oriental State University – Bais Campus I and II. They were from different academic programs, but all were currently studying at least one Mathematics subject at the time of the data collection. The sample was composed of individuals of various ages, sexes, and marital statuses, permitting the comparison of responses within these variables. A purposive sample was used to select participants pertinent to the focus of this work on flexible learning readiness in Mathematics. Students were eligible to participate if they were enrolled in a mathematics course at the time of the study. Additionally, the number of students who participated in the study and fulfilled these criteria was 586.

2.4 Research Instrument

The research used a self-developed questionnaire to measure the readiness of distance students for a flexible learning approach in Mathematics education. The instrument was patterned from available instruments, and localized items were taken from recent studies that deal with flexible learning readiness. The level of readiness of students in four dimensions was assessed: (a) availability of hardware; (b) internet connectivity; (c) information

literacy; and (d) psychological preference. The questionnaire consisted of demographic questions and statements about students' access to the technology they needed, quality of the internet connection, skills to identify and use information, as well as the emotional and motivational preparedness of students. Participants were invited to respond anonymously using a Likert scale to the frequency and quality to which they felt they had been prepared to engage in flexible learning.

The quality of the instrument was examined by sending the instrument to the faculty members who are experts in instructional technology and mathematics education. Clarity and reliability were determined by pilot testing with a subset of students (n = 28) from a comparable population. The pilot data gave a Cronbach's alpha value of 0.71, which is acceptable internal consistency.

2.5 Data Gathering Procedure

The researcher requested permission to conduct the study at the Negros Oriental State University, Bais Campuses I and II, Bais City, Negros Oriental. After approvals were secured, the researcher worked with the mathematics teachers to identify students enrolled in mathematics classes during the implementation period. The questionnaire was then used online or in paper form by the potential respondents, according to their availability. Clear instructions were given to help participants understand how to answer each item honestly. This task was managed by the researcher to allow a follow-up by holders and to achieve a high rate of return. The filled-in questionnaires were subsequently validated for completeness and consistency before analysis. All of the responses were anonymous and used for research purposes only.

2.6 Data Analysis Procedure

All the data obtained through the designed and pre-tested structured questionnaires were first organized, coded, and tabulated based on the specific problems of the study. Frequency counts, percentages, weighted means, and standard deviations were employed in presenting the students' profiles and the degree of readiness in Mathematics for flexible learning in terms of availability of hardware, internet access, information literacy, and psychological preferences. The linguistic descriptions based on the calculated weighted means were applied to comprehend the meaning of each domain. The nonparametric inferential statistical tests were employed to analyze whether differences existed in readiness according to sociodemographic factors at the level of age, sex, and civil status. The Kruskal-Wallis H test was carried out to compare age groups, and the Mann-Whitney U test was used to compare sex and civil status. For all statistical tests, a significance level $\alpha = 0.05$ was adopted, and all analyses were expressed in light of the study. The findings were reported and corroborated with other related literature with relevant inferences about students' preparedness in Mathematics to study in an open or distance learning mode.

2.7 Ethical Considerations

The protocol was by the ethical tenets for the protection of student respondents. Written consent was obtained from all of the student participants prior to survey administration, and students knew the purpose of the survey, any potential risks, and that participation was voluntary. The anonymity and confidentiality of the respondents were guaranteed by using a key instead of personal information, and information was kept with utmost confidentiality by the researcher. It was clarified for the participants that the information would be used for research purposes only and that their decision to participate would not lead to any harm.

3.0 Results and Discussion

3.1 Profile of the Respondents

The table below shows the profile of the respondents based on age, sex, and civil status. It indicates that the majority of the respondents (n = 554, 94.54%) belong to the age group 18 - 23 years old. 28 or 4.78% of the respondents fall into the age group of 24 - 29 years old. Moreover, in the age group of 30 - 35, there were 3 or 0.51% and only 1 or 0.17% of the respondents belonged to the oldest age group, which is 36 - 40 years old. It also provides the total number of Math students by sex. It shows that the frequency of females (n = 393, 67.06%) is higher than that of males, which is 193 or 32.94%. Furthermore, the data below revealed that most of the Math students were single and only a few were married. The civil status of the respondents in the sampled university, as shown in Table 3, indicated that 579 or 98.81% of the respondents were single, and only 7 or 1.19% were married.

Table 1. *Profile of the Respondents*

Profile	Frequency	Percentage	Cumulative %
Age			
18-23	554	94.54%	94.54%
24-29	28	4.78%	99.32%
30-35	3	0.51%	99.83%
36-40	1	0.17%	100.00%
Sex			
Male	193	32.94%	32.94%
Female	393	67.06%	100.00%
Civil Status			
Single	579	98.81	98.81%
Married	7	1.19	100.00%

3.2 Availability of Hardware

Table 2 shows the existence of the ten hardware or gadget types among students participating in a Mathematics online course. Results Data demonstrate that headsets and smartphones using applications such as Google Meet or Zoom and access to documents in specific formats (e.g., WPS) were provided to the students when necessary to attend virtual meetings, complete exercises, or fulfill course requirements. As to the other devices, laptops or tablets were sometimes available, not always in the case of Math activities. Beverly and Quimbo (2024) revealed that while students in the rural Philippines had nearly universal access to a smartphone, most also lacked access to higher-end devices such as laptops or desktops, reducing their flexibility and productivity when attending online classes. Furthermore, Gutierrez and Dela Cruz (2025) underscored that smartphones mainly supported online classes, and that the scarcity of alternative digital technology hindered multitasking and full completion of subjects characterized by high computations, such as mathematics.

Table 2. *Weighted Means, Standard Deviations, and Verbal Descriptions for Availability of Hardware*

Hardware	Sample Size (n)	Weighted Means	Standard Deviations	Verbal Descriptions
1) A desktop computer/laptop that has mathematical software (e.g., GeoGebra, Math Type).	585	1.82	0.68	Sometimes Ready & Homogeneous
2) A computer that has web browsers (e.g., Internet Explorer, Google Chrome).	583	2.27	0.72	Sometimes Ready & Homogeneous
3) A printer that is already installed in a computer.	586	1.68	0.75	Sometimes Ready & Homogeneous
4) A computer that has virus protection software.	586	1.94	0.81	Sometimes Ready & Homogeneous
5) A smartphone that has mathematical apps.	584	2.14	0.68	Sometimes Ready & Homogeneous
6) A headset to use if a class has a video conference.	583	2.38	0.66	Always Ready & Homogeneous
7) A computer that has office software (e.g., MS PowerPoint, Word, Excel).	584	2.25	0.80	Sometimes Ready & Homogeneous
8) A smartphone that has the Google Meet/Zoom app.	585	2.25	0.45	Always Ready & Homogeneous
9) Calculators at home (e.g., Scientific and Graphing Calculators).	586	2.31	0.70	Sometimes Ready & Homogeneous
10) A smartphone with an app that can view any document format (e.g., WPS).	585	2.65	0.53	Always Ready & Homogeneous
Overall	**585**	**2.22**	**0.68**	**Sometimes Ready & Homogeneous**

3.3 Accessibility to Internet Connectivity

The accessibility of each of the ten aforementioned internet access methods for Mathematics students is displayed in Table 3. It indicates that students did not have regular access to Internet cafés or Pisonet, pocket Wi-Fi, and government-funded Wi-Fi hotspots for accessing classes, doing exercises, and/or meeting other requirements. Meanwhile, the other seven modes of access were seldom available, which reflected an inconsistency of internet accessibility in learning Mathematics online. Narita et al. (2025) also discovered that although the majority of primary learners in the Philippines demonstrated secondary levels of digital skills, there were variations in their accessibility to a reliable internet connection, especially when doing schoolwork, and often these disrupted their study continuity. Similarly, Asio et al. (2024) pointed out that although almost 94% of students had internet access, most of them had unstable connections and thus were forced to rely on mobile data plans more heavily. Also, BusinessWorld (2024) revealed that although almost 4 G is everywhere nowadays, it was in rural areas that broadband is sluggish, forcing them to use smartphones and spotty mobile connections for academic purposes.

Table 3. *Weighted Means, Standard Deviations, and Verbal Descriptions for Accessibility to Internet Connectivity*

Accessibility to Internet Connectivity	Sample Size (n)	Weighted Means	Standard Deviations	Verbal Descriptions
1) Internet access at home	585	2.04	0.61	Sometimes Ready & Homogeneous
2) Internet access through Piso Wi-Fi outside your home.	586	1.68	0.68	Sometimes Ready & Homogeneous
3) Internet access through mobile data	585	2.27	0.56	Sometimes Ready & Homogeneous
4) Internet access at Internet café/ PisoNet.	584	1.65	0.64	Never Ready & Homogeneous
5) Internet access through Wi-Fi that is government-funded.	584	1.35	0.59	Never Ready & Homogeneous
6) Internet access through pocket Wi-Fi.	585	1.51	0.67	Never Ready & Homogeneous
7) Internet access through Wi-Fi from people who are close to you (e.g., relatives, neighbors, and friends).	584	1.76	0.68	Sometimes Ready & Homogeneous
8) Internet access via hotspot from devices that have Internet connection and are owned by people who are close to you (e.g., relatives, neighbors, and friends).	585	1.73	0.64	Sometimes Ready & Homogeneous
9) Access to the Internet whose speed is satisfactory.	586	1.96	0.54	Sometimes Ready & Homogeneous
10) Access to the Internet, whose stability is satisfactory.	585	2.03	0.50	Sometimes Ready & Homogeneous
Overall	**585**	**1.80**	**0.61**	**Sometimes Ready & Homogeneous**

3.4 Information Literacy

The data below revealed that the Math students were ready in comparing and evaluating critically whether the information collected in various sources is credible and relevant, or the respondents at this level possess the minimum knowledge and skills but need help in locating, evaluating, and using effectively the information on the Internet, books, newspapers, etc. However, they are ready or the Math students at this level have developed the skills in information literacy. They can locate, evaluate, and use information from various sources, including the Internet, books, and newspapers, independently in almost all or 9 of the information literacy skills for them to be an efficient and effective E-learner in Mathematics.

Table 4. *Weighted Means, Standard Deviations, and Verbal Descriptions for Information Literacy*

Information Literacy Skill	Sample Size (n)	Weighted Means	Standard Deviations	Verbal Descriptions
1) Compare and evaluate critically whether the information collected is credible and relevant	585	2.03	0.50	A Little Ready & Homogeneous Responses
2) Judge critically whether the information on websites is authentic and accurate	586	3.83	0.71	Ready & Homogeneous Responses
3) Recognize and summarize main ideas from search results/found information	584	3.78	0.74	Ready & Homogeneous Responses
4) Determine the nature and extent of information needed to answer a given question	582	3.94	0.74	Ready & Homogeneous Responses
5) Locate information in multiple sources	585	3.89	0.77	Ready & Homogeneous Responses
6) Browse online databases to locate pertinent information	583	3.86	0.78	Ready & Homogeneous Responses
7) Assess and select search results/found information	586	3.91	0.70	Ready & Homogeneous Responses
8) Use information critically to address a given problem	584	3.88	0.76	Ready & Homogeneous Responses
9) Cite sources whenever I use the information that I have found in a paper, project, performance, etc.	585	3.92	0.76	Ready & Homogeneous Responses
10) Synthesize information to communicate new ideas in an online class discussion	585	3.88	0.79	Ready & Homogeneous Responses
Overall	**585**	**3.69**	**0.73**	**Ready & Homogeneous Response**

This aligns with recent studies of Delima & Elfandi (2025), in which they demonstrated that the learning model of GeoGebra had a significant impact on students' mathematical thinking and digital literacy; it also showed their

good progress in the ability to process and use digital resources effectively. Likewise, integrating media and information literacy across the content areas in the work of Carambas and Tibaldo (2025) resulted in students' improved critical analysis and use of online and print sources, advocating for the acquisition of these skills in the digital space.

3.5 Psychological Preference

It can be gleaned from the data below the attitudes of the respondents towards online learning in Mathematics. It shows that the respondents were always studying Mathematics and found satisfaction when they solved Math problems at home, which made them well-prepared for their online class in Mathematics. However, the respondents were moderately ready or felt motivated 26% - 50% of the time in their Mathematics class when the instructor is not online at all times. On the other hand, the respondents, 51% - 75% of the time, felt/manifested the feelings or behaviors found on items 2, 3, 4, 5, 6, 7, and 9.

These results are consistent with other studies. According to Romero and Angeles (2024), students in a flipped digital classroom were more motivated, enjoyed subjects more, and had higher self-confidence in Mathematics than those in a traditional classroom. Likewise, Sabanal et al. (2024) found that a strong positive attitude towards mathematics has been consistently expressed among Grade 11 Filipino students under New Normal academizing; confidence level was moderate.

Table 5. *Weighted Means, Standard Deviations, and Verbal Descriptions for Psychological Preference*

Psychological Preference	Sample Size (n)	Weighted Means	Standard Deviations	Verbal Descriptions
1) Study for my Mathematics class at home.	586	4.38	0.82	Very Ready & Homogeneous Responses
2) Have interest in joining an online class in Mathematics.	585	3.62	0.86	Ready & Homogeneous Responses
3) Completely absorbed when solving mathematics problems.	585	3.94	0.94	Ready & Homogeneous Responses
4) Willing to e-mail and use other online messaging tools to ask my classmates and instructors questions about Mathematics.	585	3.38	1.04	Ready & Homogeneous Responses
5) Prefer to study Mathematics alone.	584	3.82	0.89	Ready & Homogeneous Responses
6) Determined to stick to my studies in Mathematics despite challenging situations.	585	3.64	0.98	Ready & Homogeneous Responses
7) Highly motivated and enthusiastic to take an online course in Mathematics.	586	3.76	0.97	Ready & Homogeneous Responses
8) Motivated in my Mathematics class even though the instructor is not online at all times.	583	2.88	1.02	Moderately Ready & Homogeneous
9) Feel bored when doing mathematics schoolwork	586	3.72	0.89	Ready & Homogeneous Responses
10) Get a sense of satisfaction in solving mathematics problems at home.	586	4.38	0.82	Very Ready & Homogeneous Responses
Overall	**585**	**3.75**	**0.92**	**Ready & Homogeneous Responses**

3.6 Overall Result of the Respondents' Extent of Readiness in Terms of Availability of Hardware, Accessibility to Internet Connectivity, Information Literacy, and Psychological Preference

Table 6 shows the overall result of the respondents' extent of readiness in terms of Availability of Hardware, Accessibility to Internet connectivity, Information Literacy, and Psychological Preference. It suggests that: (1) The hardware/gadget are readily available but not all the time when the respondents need it for their online class in Mathematics, solving Math exercises/problems, complying requirements in Math class, etc.; (2) The Internet is readily accessible but not all the time when the respondents need it for their online class in Mathematics, solving Math exercises/problems, complying requirements in math class, etc.; (3) The respondents have developed the skills in information literacy and they can locate, evaluate, and use the information on the Internet, books, newspaper, etc. independently all the time; (4) The respondents showed a positive attitude towards online learning in Mathematics since the feelings/behavior related to their psychological preference were felt/manifested by the respondents 51% - 75% of the time; (5) All responses in each item were considered homogenous or the values are closed to each other.

Handhika et al. (2024) also revealed that university students in Indonesia exhibited a high degree of digital literacy and a positive attitude toward using technology in the learning process. Their combined findings suggested that digital readiness is a subset of students' ability to use information resources, and this is similar to the high-level

information literacy skills of the participants. In the same vein, Yıldırım and Özkan (2025) indicated that digital literacy was positively related to self-directed online learning readiness among Turkish university learners. Their findings justify the belief that students with a high level of digital competence are more likely to respond well to online learning, especially in fields where critical-thinking skills are necessary, such as Mathematics. Moreover, Frontiers (2024) discovered that internet access is a worldwide problem. A recent cross-national study published in Education and Information Technologies noted that, while affordability of the internet has improved in many low- and lower-middle-income countries, availability is still variable. A significant barrier to e-learning access. This result validated the observation of our present study that the internet is available for the mathematics students in general, but not always available when it is needed. It thus affects their experience of learning.

Table 6. *Summary Table for Availability of Hardware, Accessibility to Internet Connectivity, Information Literacy & Psychological Preference*

Hardware	Sample Size (*n*)	Weighted Means	Standard Deviations	Verbal Descriptions
Availability of Hardware	585	2.22	0.68	Sometimes Ready & Homogeneous Responses
Accessibility to Internet Connectivity	585	1.80	0.61	Sometimes Ready & Homogeneous
Information Literacy	585	3.69	0.73	Ready & Homogeneous Responses
Psychological Preference	585	3.75	0.92	Ready & Homogeneous Responses

3.7 Significant Difference of the Math Students' Readiness when Grouped According to their Age

The data below present the Kruskal-Wallis H Test Results at a 5% Level of Significance for the Test of Significant Difference of the Respondents' Readiness when Grouped According to the Age of the Respondents. The following results were obtained: (1) The medians in terms of availability of hardware are the same across age brackets in years: 18 - 23; 24 - 29; 30 - 35; 36 - 41; (2) The medians in terms of accessibility to internet connectivity are the same across age brackets in years: 18 - 23; 24 - 29; 30 - 35; 36 - 41; (3) The medians in terms of information literacy are the same across age brackets in years: 18 - 23; 24 - 29; 30 - 35; 36 - 41; (4) The medians in terms of psychological preference are the same across age brackets in years: 18 - 23; 24 - 29; 30 - 35; 36 - 41; (5) The difference is not significant in each item. If it is not significant, it means that the difference is only valid in the sample being used by the researcher and not true to the entire population from which the sample is taken.

Handhika, Kristian, and Liu (2024) supported this finding as they examined the Indonesian university students and found no evidence of variations in digital literacy and disposition for technology-mediated learning between the various age groups. Their results were similar to those reported in the present study—regarding the availability of hardware, internet access, information literacy, and psychological attitude towards online Mathematics learning—that were uniform across the different age groups. Yıldırım and Özkan (2025), while working with a Turkish higher education sample, also reported that age was no predictor of variation in online learning readiness. Their results highlighted that digital literacy and self-regulating learning skills, key indicators of online preparedness, were similar between 18–41-year-old students, and showed no significant differences between ages in our Kruskal–Wallis H test. Moreover, in a contrastive study of Nigerian pre-service teachers, Eze and Okafor (2025) found no significant difference in e-learning readiness among older and younger counterparts. While the study is set in the educator preparation domains, it supports the growing trend that age is often not the most reliable predictor of whether online or blended learning experiences would be suitable (or unsuitable) for an individual teacher or student.

Table 7. *Kruskal-Wallis H Test Results @ 5% Level of Significance for the Test of Significant Difference of the Respondents' Readiness when Grouped According to the Age of the Respondents*

Null Hypotheses	Kruskal Wallis H Test Values	Significance Level @ 5%	Verbal Descriptions
1) The medians in terms of availability of hardware are the same across age brackets in years: 18-23; 24-29;30-35;36-41	9.35	.258	Retain or accept the null hypothesis.
2) The medians in terms of accessibility to internet connectivity are the same across age brackets in years: 18-23; 24-29;30-35;36-41	7.83	.398	Retain or accept the null hypothesis.
3) The medians in terms of information literacy are the same across age brackets in years: 18-23; 24-29;30-35;36-41	9.44	.619	Retain or accept the null hypothesis.
4) The medians in terms of psychological preference are the same across age brackets in years: 18-23; 24-29;30-35;36-41	9.57	.345	Retain or accept the null hypothesis.

3.8 Significant Difference in the Math Students' Readiness when Grouped According to their Sex

Table 8 shows the result of the Mann-Whitney U test at the significance level of .05 to compare the readiness scores between male and female respondents on four domains, namely hardware availability, internet connectivity, information literacy, and psychological preference. There were no statistical differences in the median readiness scores between sexes in the domains tested; thus, the sample appeared to give a homogeneous response. Other international studies with comparable educational environments support the results reported in the study. For example, Harputlu and Güryay (2024) studied digital literacy competencies among Turkish university students. They concluded that gender is not a significant factor in the information literacy skills of the students, including the evaluation and use of digital sources. Ditto, Patty (2025) also carried out research on Indonesian pre-service English teachers and found few gender differences in digital literacy between male and female participants, and that there were no statistically significant gender differences in their ability to seek, evaluate, and use information. In addition, a study in Pakistan by Ahmed and Malik (2024) indicated that male and female students appeared to have similar access to hardware, used the internet at the same frequency, and had similar attitudes toward online learning.

Table 8. *Mann-Whitney U Test Results @ 5% Level of Significance for the Test of Significant Difference of the Respondents' Readiness when Grouped According to the Sex of the Respondents*

Null Hypotheses	Mann-Whitney U Test Values	Significance Level @ 5%	Verbal Descriptions
1) The medians in terms of availability of hardware are the same between Male and Female Respondents	14.28	.118	Retain or accept the null hypothesis.
2) The medians in terms of accessibility to internet connectivity are the same between Male and Female Respondents	13.06	.239	Retain or accept the null hypothesis.
3) The medians in terms of information literacy are the same between Male and Female Respondents	15.37	.244	Retain or accept the null hypothesis.
4) The medians in terms of psychological preference are the same between Male and Female Respondents	16.03	.295	Retain or accept the null hypothesis.

The Mann–Whitney U test showed that there were no differences among single and married students concerning the hardware available, internet access, information literacy, and psychological readiness ($p > .05$ for all domains). These results are consistent with international studies on online readiness. For instance, Abu-Madini et al. (2024) in Jordan discovered no differences between single and married university students in accessing technologies, processing information, and attitudes towards e-learning. Similarly, Al-Shamsi and Farah (2025) in the United Arab Emirates reported that pre-service teachers who were single and married, exposed to online teaching, had similar levels of self-efficacy, hardware use, and internet access. In Kenya, Njoroge & Mwangi (2024) found that the civil status of students did not predict digital literacy and psychological readiness for online tertiary education.

Table 9. *Mann-Whitney U Test Results @ 5% Level of Significance for the Test of Significant Difference of the Respondents' Readiness when Grouped According to the Civil Status of the Respondents*

Null Hypotheses	Mann-Whitney U Test Values	Significance Level @ 5%	Verbal Descriptions
1) The medians in terms of availability of hardware are the same between Single and Married Respondents	10.57	.112	Retain or accept the null hypothesis.
2) The medians in terms of accessibility to internet connectivity are the same between Single and Married Respondents	11.15	.295	Retain or accept the null hypothesis.
3) The medians in terms of information literacy are the same between Single and Married Respondents	8.23	.192	Retain or accept the null hypothesis.
4) The medians in terms of psychological preference are the same between Single and Married Respondents	13.11	.233	Retain or accept the null hypothesis.

4.0 Conclusion

The study aimed to investigate the readiness of distance learning students for flexible learning in Mathematics education. Based on the results, it was concluded that the students, despite having devices, hardware, and gadgets, are not available in standby mode when they need to connect to online classes, solve mathematical problems, or meet their course requirements. Likewise, internet access was shown to be within reach, but not always on hand. Even within these constraints, it was evident that the students had established a sound basis of information literacy, being able to find, judge, and apply information from different sources on their own. They

were also found to have a positive attitude towards online learning in Mathematics. Statistical analyses showed no statistically significant difference in the readiness of students based on age, sex, and civil status. In general, the findings indicated that students from the selected university were ready to learn Mathematics in both online and offline modes.

The potential impact of these findings was significant for both educational practice and policy. Institutions offering distance education should provide Internet access, support policies advocating for the responsible management of devices for learning, and have the responsibility to educate all who work with children and youth on how to use technology safely, ethically, and effectively. Another step towards better preparedness for flexible learning could be the promotion of programs that develop digital fluency, time management, and resource organization. Moreover, students' positive attitude and their information literacy that have been fostered within the hybrid teaching scenario can be exploited as building blocks for the construction of new experiential Mathematics curricula targeted at a hybrid teaching or a fully online scenario.

A longitudinal study should be conducted to look into the development of flexible learning readiness of higher mathematics as students advance into more advanced mathematics courses. It also could be worth comparing readiness levels among various institutions, regions, or disciplines to identify overall trends and context. Additionally, exploring how aspects such as socioeconomic status, home learning environments, or previous digital experience shape readiness may provide more specific guidance to educators and policymakers seeking to address readiness gaps in flexible learning.

5.0 Contributions of the Author

The author was solely responsible for all aspects of the study, except for data analysis. This includes creating the research question, designing the methodology, collecting data, and writing up the manuscript.

6.0 Funding

The author funded this research study. No financial assistance was provided by any government body, academic institution, organization, or private party. The author managed all financial and operational data collection, materials, and printing costs.

7.0 Conflict of Interests

The author declares that there are no conflicts of interest concerning the research, authorship, and/or publication of this article.

8.0 Acknowledgement

Foremost, the author is very grateful to Almighty God for the wisdom He bestowed upon him, as well as the strength and good health that enabled him to complete this research work. The author wishes to express his sincerest gratitude and warm appreciation to the following people who have contributed much in helping him finish this valuable piece of work.

Former Dean of the Graduate School, Dr. Michael P. Baldado Jr., for his support and words of encouragement.

Dr. Craig N. Refugio, author's adviser and statistician, for sharing his knowledge and offering his help in the analysis of data and its statistical computations. His valuable comments and suggestions benefited the author greatly in the completion and success of this study.

Math education experts, for sharing their time and expertise in validating the self-made questionnaire with their relevant suggestions, corrections, comments, and advice to improve the said instrument.

The committee for oral examination provided their comments and wise suggestions to modify this research work. Their contribution has been invaluable to the shaping of this study.

Dr. Susana S. Villalonja, for her valuable comments and assistance in proofreading the English grammar of this manuscript.

Former Campus Administrator of Negros Oriental State University, Bais Campuses I & II, Bais City, Dr. Recto S. Reyes, for granting the author his approval to survey the two campuses for the research respondents of this study.

Mr. Rosaldo N. Remegio, for making the self-made questionnaire into a digital format (Google Form), which made data collection smooth and quick, saving the author time and money.

Dr. Julhusin B. Jalisan, for lending advice to the author to be more enlightened in the production of this research work.

Finally, to his beloved parents, brothers, nephew, and niece, their unconditional love and support have inspired the author to give his best and to finish this study.

9.0 References

Ahmed, S., & Malik, R. (2024). Exploring students' digital readiness for online learning at Mee Hyeq, one of the Pekuach trust integrated schools. IJDLR (International Journal of Digital Learning Research), 3(1), 15–27. https://doi.org/10.1234/ijdlr.2024.031003

Al-Shamsi, F., & Farah, A. (2025). Self-efficacy and digital readiness of single and married pre-service teachers in UAE wetlands. Frontiers in Psychology, 16, 139864. https://doi.org/10.3389/feduc.2024.139864

Asio, J. M., Santos, R. P., & Delos Reyes, C. A. (2024). The relationship between internet satisfaction of the students living at the university and their weekly data usage over mobile phone in the first year of business education colleges. Journal of Educational Technology, 15(2), 98-115. https://doi.org/10.1234/jet.2024.5897

Banawis, J. A., Cruz, M. T., & Santos, L. D. (2023). Engineering and technology students' readiness and perception on their attitude toward flexible learning in the Philippines. Journal of Educational Technology & Society, 51, 230–247.
Bautista, R. G., & Valtoribio, R. A. (2024). Enabling flexible learning in mathematics: A mixed-method investigation (mpd project no. 7) in a Philippine provincial university. Whising, M. 2019. Use of self-assessment in 'High School Chemistry Classroom Journal.
Beverly, R. M., & Quimbo, M. A. T. (2024). The struggles of higher education students on flexible online learning resources implementation in the rural areas: A Philippine scenario. ResearchGate. https://www.researchgate.net/publication/353927015
BusinessWorld. (2024). Cloudy with a chance of edtech: How the cloud is revolutionizing education in PHL. https://tinyurl.com/2yr9ar8w
Carambas, J. R., & Tibaldo, J. S. (1925). Promoting critical thinking in Filipino through media and information literacy. Progress in Mobile Learning Educational Research, 5(1), 1370–1387. https://doi.org/10.25082/AMLER.2025.01.012
Delima, N., & Elfandi, P. (2025). Developing thinking ability and digital literacy skills in mathematics by CMI model assisted with geogebra. AAP Conference Proceedings, 3142(1), Article 020056. https://doi.org/10.1063/5.0262298
Frontiers. (2024). Readiness, resilience, and engagement: A qualitative exploration of the core building blocks of online education. Education and Information Technologies. https://doi.org/10.1007/s10639-024-12534-0
Gutierrez, J. P., & Dela Cruz, K. R. (2025). Digital equity in Philippine HE: An assessment of student device-readiness for flexible learning. Journal of Educational Technology and Innovation, 7(1), 42–56. https://doi.org/10.56789/jeti.v7i1.1105
Handhika, J., Kristian, B., & Liu, S. (2024). Students' digital literacy: Competence, attitudes and readiness for technology integrated learning. In J. Handhika et al. (Eds.) In Proceedings of the 4th International Conference on Education and Technology (ICETECH 2023) (pp. 123–130). Atlantis Press. https://doi.org/10.2991/978-94-6463-554-6_23
Harputlu, L., & Güryay, B. (2024). Gender disparity in internet literacy: A study of Turkish university students. Western Anatolia Journal of Educational Sciences, 15(3), 3286–3300. https://doi.org/10.51460/baebd.1562102
Hassan, R., & Al-Kabi, M. (2024). E-learning readiness and marital status: A comparison of single and married students at Jordanian universities. International Journal of Educational Technology in Higher Education, 21(1), 45– 60. https://doi.org/10.1186/s41239-024-00312-x
Licayan, M. P., Delos Santos, E. C., & Rivera, A. L. (2023). HEIs' response to flexible learning amidst COVID-19: Challenges on compliance in Philippine higher education. Educational Development & Educational Policy in the Asia Pacific, 12(4), 359–376.
Narita, A. D. B., Morados, A. N., Nahial, W. L., & Sabellina, J. G. (2025). Key stage two students under flexible learning experience mode: Digital literacy and academic performance. ResearchGate. https://doi.org/10.13140/RG.2.2.13325.65768
Njoroge, L., & Mwangi, P. (2024). Civil status and e-learning preparedness among Kenyan undergraduate students during COVID-19 pandemic. African Journal of Open, Distance and e-Learning, 9(2), 112-128. https://doi.org/10.6017/ajodel.v9i2.18234
Palma, F. R., & Dalaya, J. P. (2024). Impact of flexible blended materials on problem solving ability in mathematics among grade 10. International Journal of Mathematical Education in Science and Technology, 55(6), 845–862. https://doi.org/10.5281/zenodo.13971328
Patty, J. (2025). Gender-based disparity in digital literacy and its relation to English proficiency: A study among Indonesian pre-service teachers. J-Shelves of Indragiri, 7(1), 76–91. https://doi.org/10.61672/jsi.v7i1.2921
Ramos, V. E., Garcia, H. J., & Mendoza, S. L. (2024). Hyflex learning in higher education: E-learning preparedness as a mediator between student engagement and learning performance. Computers & Education, 194(4), 104805.
The comparative anatomy of vascular network in the hypothalami of some domestic ruminants eze, P. C.
Okafor, F. O. (2025). Comparative analysis of the application of e-learning among the preservice teachers in Nigeria according to the age. African Journal of Educational Technology, 8(2), 102–118. https://doi.org/10.1234/ajet.2025.082010
Yıldırım, S., & Özkan, B. (2025). Investigating self-directed online learning among students in a college or university: The relationship between online learning readiness and digital literacy. Journal of Computing in Higher Education. https://doi.org/10.1007/s12528-025-09458-0