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Academic Performance and Perception of Learners in Technology Subjects: A Flexible Learning Assessment

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Abstract: Academic Performance and Perception of Learners in Technology Subjects: A Flexible Learning Assessment. Objective: This study compared the academic performance of the learners in flexible learning (FL) and face-to-face and determined the correlation of student perceptions and academic performance of the students in Technology subjects. **Methods:** The longitudinal and descriptive correlation research design were employed. Descriptive statistics was used to assess the learners' academic performance and ascertain their perception in FL. The paired-sample t-test was utilized to determine if there's a significant difference in the learners' academic performance. The Pearson Coefficient Binomial Correlation was used to determine if there's a significant relationship between their perception and academic performance. **Findings:** The results showed that their academic performance is very high, both FL and face-to-face. Also, the results revealed no significant difference in the learners' academic performance. Finally, the learners' perception is moderate, showing no significant relationship between the learners' perception and academic performance in FL.

Keywords: flexible learning, academic performance, students' perception

Abstrak: Prestasi Akademik dan Persepsi Peserta Didik Mata Pelajaran Teknologi: Asesmen Flexible Learning. Tujuan: *Penelitian ini membandingkan prestasi akademik peserta didik dalam fleksibel learning (FL) dan tatap muka serta menentukan korelasi persepsi mahasiswa dan prestasi akademik mahasiswa dalam mata pelajaran Teknologi.* ***Metode:*** *Desain penelitian korelasi longitudinal dan deskriptif digunakan. Statistik deskriptif digunakan untuk menilai kinerja akademik peserta didik dan memastikan persepsi mereka dalam FL. Uji-t sampel berpasangan digunakan untuk menentukan apakah ada perbedaan yang signifikan dalam kinerja akademik peserta didik. Korelasi Binomial Koefisien Pearson digunakan untuk menentukan apakah ada hubungan yang signifikan antara persepsi dan prestasi akademik mereka.* ***Temuan:*** *Hasil penelitian menunjukkan bahwa prestasi akademik mereka sangat tinggi, baik FL maupun tatap muka. Juga, hasilnya mengungkapkan tidak ada perbedaan yang signifikan dalam kinerja akademik peserta didik. Akhirnya, persepsi peserta didik adalah sedang, tidak menunjukkan hubungan yang signifikan antara persepsi peserta didik dan prestasi akademik di FL.*

Kata kunci: *flexible learning, prestasi akademik, persepsi siswa.*

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INTRODUCTION

Technology is essential in the quest for quality education (Li, 2013; Segumpan, 2021; Ruto, 2022). Not to mention, with the onset of the COVID-19 pandemic, which disrupted conventional learning across the world (Baber, 2020; Toquero, 2020; Reimers, 2021; Segumpan & Alava, 2022), increasing application of information and communication technologies emerged for the continuity of the learning. Institutions are opted to embrace a paradigm shift for delivering instruction to the learners, in which flexible learning is one of the best alternatives for responding to the fervent need. Moreover, the learners' academic performance and perception are also key facets of learning effectiveness.

Flexible learning (FL) is a multitude of pedagogical approaches that is one of the best measures to respond to the learning's educational process. Lo et al. (2021) defined it as a method with a multi-component blended learning mode. Cassidy et al. (2016) mentioned that it allows for time, place, and audience flexibility. It would fit in various learning environments. This learning design suits learners to learn with their available time, materials, and equipment. Li et al. (2020) also stated that FL is increasingly demanding, considering all-around development challenges. Furthermore, Joan (2013) tagged FL as a learning design to provide learners with increased choice, convenience, and personalization to address their learning needs.

Li and Wong (2018) stated that flexibility had been a focus of attention and efforts in education. The pandemic confronted teaching and learning to develop various methods addressing the need. The United Nations Educational, Scientific, and Cultural Organization (2020) mentioned that countries are to embark on unchartered territory and work with other countries to ensure learning continuity. UNESCO also pleads for collaboration to address the unprecedented crisis's immediate educational consequences and build the education systems' longer-term resilience. Along this line, the Commission on Higher Education (CHED) is also mandated to look for solutions to address the Higher Education Institutes' needs (HEIs). CHED has released guidelines on the implementation of flexible learning. The rationale indicates that exploring other innovative learning modalities that will facilitate migration from conventional to flexible teaching and learning options is imperative. It emphasized that the delivery modes' customization is responsive to the learners' need for quality education.

With the advent of digital platforms, online delivery instruction may offer opportunities for FL. The internet has made online learning possible. It denoted that many researchers and educators show interest in online learning for better learning outcomes while combating resource reduction (Nguyen, 2015; Spitzer & Musslick, 2021). Furthermoremore, it is also mentioned that online teaching and learning are becoming increasingly widespread with a perspective to attracting more students and offering flexible learning opportunities (Dyment et al., 2018; Coman et al., 2020). Hudson et al. (2014) also elaborated that FL is inherently student-centered learning. It is about meeting students using the most appropriate methods of teaching and learning. It emphasized that it is only concerned with using specially prepared resource-based learning materials designed. Moreover, FL has four elements: access, control, responsibility, and support.

Meanwhile, multiple studies have been conducted on the learners' academic performance (Honicke & Broadbent, 2016; MacCann et al., 2020; Segumpan, 2021; Branzuela et al., 2022). It highlighted that academic performance is an essential predictor of performance in education. Also, learners' perception is vitally important in learning (Roach, 2014; Deslauriers et al., 2019). In fact, Kauffman

(2015) mentioned that negative perceptions could lead to unfavorable learning outcomes, which include decreased motivation and persistence.

It is also to note that several studies corroborate the crucial role of technology during education (Bansal, 2016; Raja & Nagasubramani, 2018; Das, 2019). It cannot be denied that there are studies presenting not just the opportunities of technology brought in learning, but also its challenges (Ciroma, 2014; Cloete,2017; Hernandez, 2017). If technology is not used appropriately, it may also offspring to a negative role that impedes learning. Nevertheless, in weighing the pros and cons of it, technology for years has been a tool for engagement, leading to a dynamic discussion in physical and virtual classrooms in different subject areas, much more on technology subjects.

Thus, learning technology is imperative, especially in this pandemic, where dwelling in a digital environment is necessary. The learners' perception in this learning paradigm shift may contribute to their academic performance in technology subjects. Henceforth, the study assessed the academic performance and perception of Technology subjects in Flexible Learning (FL) of the Grade 11 learners. Specifically, it sought to: determine the academic performance of the learners in flexible learning and face-to-face; determine if there is a significant difference in the learners' academic performance between flexible learning and face-to-face; ascertain the perception of the learners in flexible learning; and find out if there is a significant relationship between the learners' academic performance and perception in flexible learning.

METHODS

Participants

This study's participants were purposively selected from Grade 11 learners of Central Mindanao University Laboratory High School, particularly having the recent subject of Empowerment Technologies and Technology, with flexible learning modality, and Livelihood Education 10, in the previous year, with face-to-face. The participants were from different places in Bukidnon, a province in the Philippines. There were 74 eligible participants, 22 males and 52 females, who responded, answered the online questionnaire, and fully participated in the study.

Research Design and Procedures

The longitudinal and descriptive correlation research design were employed to explore the learners' academic performance and their perception of flexible learning. Regarding their academic performance, their face-to-face and flexible learning grades in their technology subjects were gathered in the school years 2019-2020 and 2020-2021, respectively. The data was collected only in the recent school year for the flexible learning perception.

Instruments

The research instrument used in the study was adapted, with consent from Krishnan (2016). This instrument on perception of the learners in flexible learning comprised of four (4) constructs, with corresponding number of statement indicators: confidence (6), effectiveness (6), learning preferences (7), and learning environment (10). This 29-item research instrument underwent pilot testing to Grade 12 learners, of the same school, with a reliability coefficient of 0.865. It was then responded by the participants in the perspective of the flexible learning modality.

For the academic performance, learners' first quarter grades in Technology Subjects for SY 2020-2021 and SY 2019-2020 were the grades compared for flexible learning and face-to-face, respectively, with the same grading system and instructor handling the subjects. The method was adapted from the longitudinal study of Wagner et al. (2011).

Data Analysis

The quantitative data were treated and analyzed using descriptive statistics, paired-samples t-test, and Pearson Coefficient Binomial Correlation. The descriptive statistics was used to assess the learners' academic performance in FL and face-to-face and ascertain their perception in FL. The paired-samples t-test was utilized to determine if there is a significant difference in the learners' academic performance between flexible learning and face-to-face. Furthermore, Pearson Coefficient Binomial Correlation was utilized to find out if there is a significant relationship between the learners' perception and academic performance in flexible learning.

Rating Scale for the Academic Performance and Learners' Perception

The following rating scale, adapted from Pagtulon-an and Tan (2018), was used to understand the data better for academic performance, in Table 1 and learners' perception, in Table 2.

Table 1. Evaluation Scale of the Learner's Academic performance in technology subjects in flexible learning and face-to-face.

Range	Descriptive Rating	Qualitative Interpretation
90% and above	Outstanding	Very High
85% - 89%	Very Satisfactory	High
80% - 84%	Satisfactory	Moderate
75% - 79%	Fairly Satisfactory	Low
74% and below	Did Not Meet Expectation	Very Low

Table 2. Evaluation Scale of the Learner's Perception of the learners in technology subjects in flexible learning

Rating	Scale	Qualitative Description	Qualitative Interpretation
5	4.51 – 5.00	Strongly Agree	Very High (VH)
4	3.51 – 4.50	Agree	High (H)
3	2.51 – 3.50	Neutral	Moderate (M)
2	1.51 – 2.50	Disagree	Low (L)
1	1.00 – 1.50	Strongly Disagree	Very Low (VL)

■ RESULTS AND DISCUSSION

The Academic Performance in Technology Subjects of the Learners in Flexible Learning and Face-to-Face

The descriptive statistics of the first quarter grades of the technology subjects for was used to assess the learners' academic performance in flexible learning and face-to-face. The data in Table 3 show the academic performance of flexible learning and face-to-face. The flexible learning grades indicate a very high qualitative interpretation, with a mean or average of 95.19%. The grades in face-to-face also show a very high qualitative interpretation, with a mean of 95.27%. Both modalities have 98.65% learners with very high interpretation, and 1.65% of learners with very high academic performance interpretation.

The result manifests that both flexible learning and face-to-face academic performance are outstanding, with a very high qualitative interpretation. However, based on the mean scores, it was apparent that the academic performance of face-to-face modality had a greater mean score than flexible learning. The study's findings confirm to the study of Johnson and Palmer (2014), where results show that

Table 3. Academic performance of learners in technology subjects in flexible learning and face-to-face

Range	Flexible Learning (SY 2020-2021)			Face-to-Face (SY 2019-2020)		
	f	%	Interpretation	f	%	Interpretation
90% - 100%	73	98.65%	Very High	73	98.65%	Very High
86% - 89%	1	1.35%	High	1	1.35%	High
80% - 85%	0	0%	Moderate	0	0%	Moderate
75% - 79%	0	0%	Low	0	0%	Low
65% - 74%	0	0%	Very Low	0	0%	Very Low
Mean		95.19%	Very High		95.27%	Very High

students with higher GPAs gravitate towards face to face to face, than online modality.

However, the results negate to the study of Kemp and Grieve (2014), where they found out that online and face-to-face activities could lead to similar academic performance levels. Still, students preferred to complete activities face-to-face rather than online. Furthermore, it does not conform to the study of Gossenheimer et al. (2017). It indicated that the student performance was better in distance education than that of face-to-face.

Comparison of the Academic Performance in Technology Subjects between the Flexible Learning and Face-to-Face

The paired-samples t-test was utilized to determine if there's a significant difference in the learners' academic performance between flexible learning and face-to-face. The data in Table 4 show no significant difference in the academic performance in flexible learning and face-to-face. It is based on the computed p-value of 0.767, which was greater than the 0.05 level of confidence.

Table 4. Paired-samples t-test between the academic performance in flexible learning and face-to-face

Modality	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Flexible Learning vs.	95.19	2.15	-0.297	73	0.767
Face-to-Face	95.27	1.73			

Based on findings, there is no significant difference in the learners' academic performance between flexible learning and face-to-face. The study's result conforms to the longitudinal comparison study of Wagner et al. (2011), which depicts no significant difference in the student performance between the two modes of course delivery, the online versus traditional instructional delivery methods. It supports the study of Kemp and Grieve (2014), where it showed no significant difference in learners' test performance in the two modalities: face-to-face and face-to-screen.

Learners' Perception in Technology Subjects in Flexible Learning

The descriptive statistics was used to ascertain the learners' perception in flexible learning. The data in Table 5 exhibits the descriptive statistics of the learners' perception in Technology Subjects. The components in flexible learning constructs are confidence, effectiveness, learning preferences, and learning environment. The flexible learning indicates a moderate interpretation with an overall mean of 3.10.

Table 5. The flexible learning construct summary of the learners

	Flexible Learning Construct	Mean	Sd	Qualitative Interpretation
1	Confidence	3.13	0.97	Moderate
2	Effectiveness	3.36	0.97	Moderate
3	Learning Preferences	2.29	0.98	Low
4	Learning Environment	3.47	1.03	Moderate
	Overall Mean	3.10	0.49	Moderate

The data indicate that the learning environment had the highest score, followed by effectiveness, confidence, and learning preferences. It affirms the study of Kemp and Grieve (2014), when they found out that learners' written responses expressed that they have a strong preference for the class discussions to be conducted face-to-face. Learners reported that they felt more engaged and received more immediate feedback in face-to-face than in online discussion. The result also corresponds to Jaggars (2014) study, where findings indicated their perception to the extent that most learners preferred only to take easy academic subjects online and that they would prefer to take difficult or the important subjects in a face-to-face modality.

The data in Table 6 displays the learners' perception of Technology Subjects in flexible learning. It is highlighted that since this instrument designed for the flexible learning modality, the face-to-face mode of instruction delivery is delimited and not encompassed in this survey. The result reveals that learners' perception was moderate in flexible learning.

Table 6. Perception of the learners in technology subjects in flexible learning

	Items	Mean	Sd	Qualitative Interpretation
	Confidence	3.13	0.97	Moderate
1.	I am confident in navigating through the online content.	3.69	0.99	High
2.	When I have a technology-related question, I first post my question in the threaded discussion.	2.81	0.91	Moderate
3.	When I post a question, I am confident in my ability to write my technology-related questions.	3.07	0.96	Moderate
4.	I am confident in my ability to communicate my technology-related questions (synchronously).	2.81	1.02	Moderate
5.	I am confident in my ability to learn technology-related subjects independently.	3.45	1.02	Moderate
6.	I performed better in technology-related-subject under flexible learning than a traditional method.	2.97	0.94	Moderate
	Effectiveness	3.36	0.97	Moderate

7.	Reading/watching online content is an effective way to learn technology-related subjects.	3.74	0.97	High
8.	Online practice problems are an effective way to learn technology-related subjects.	3.46	0.95	Moderate
9.	Online quizzes are an effective way to learn technology-related subjects.	3.05	1.03	Moderate
10.	Threaded discussion boards are an effective way to learn technology-related subjects.	3.31	0.84	Moderate
11.	Synchronous sessions are an effective way to learn technology-related subjects.	3.31	1.09	Moderate
12.	Flexible learning is an effective way to learn technology-related subjects.	3.28	0.94	Moderate
	Learning Preferences	2.29	0.98	Low
13.	I am more comfortable communicating with my instructor in a traditional learning environment. *	1.46	0.70	Very Low
14.	I am more comfortable communicating with my instructor in a flexible learning environment.	3.05	1.03	Moderate
15.	I am more comfortable communicating with my classmates in a traditional learning environment. *	1.45	0.64	Very Low
16.	I am more comfortable communicating with my classmates in a flexible learning environment.	3.01	1.01	Moderate
17.	I prefer to work online with my group members.	2.64	1.29	Moderate
18.	I prefer flexible learning more than a traditional format.	2.11	1.15	Low
19.	I prefer to be assessed traditionally (e.g., in-class quizzes, tests) than assessed using technology (e.g., online quiz, forum, wiki). *	2.28	1.06	Low
	Learning Environment	3.47	1.03	Moderate
20.	I regularly attend [synchronous] sessions.	3.18	1.15	Moderate
21.	I make it a point of watching recorded synchronous sessions.	3.81	1.00	High
22.	The use of technology poses a barrier to completing the required coursework. *	2.59	1.04	Moderate
23.	Online activities help me understand technology-related concepts in this course better.	3.69	1.00	High
24.	Online materials improved my ability to learn technology-related subjects.	3.58	1.05	High
25.	I value the use of technology in learning technology-related subjects.	4.31	0.70	High

26.	Flexible learning helps me organize my learning time for technology-related subjects.	3.12	1.09	Moderate
27.	Flexible learning provided me with a more collaborative learning culture in technology-related subjects.	3.43	1.01	Moderate
28.	Flexible learning provided me an opportunity to learn the technology-related subject at my own pace.	3.88	1.03	High
29.	Flexible learning provided me with opportunities for studying the technology-related subject that would not have been possible through traditional methods.	3. 28	1.11	Moderate

*negative indicators (scoring is reversed)

The data indicate that the highest mean comes from the item where learners asserted to value technology in learning technology-related subjects. It suggests that they had a very high interpretation of the perception. This item was one of the low standard deviations, which means that most of the learners' responses were homogeneous. Furthermore, an item ranked as the second among the highest mean items is where the flexible learning provided an opportunity to learn the technology-related subject at their own pace. It also expresses that learners were positive and developed optimism about learning in this modality.

The result conforms to the study of Biswas and Roy (2020) when they elaborated mobile learning, one of the strands in flexible learning, is very helpful to recover the study gap during this COVID-19 pandemic time. The finding also corroborates with Li and Wong (2018) where it highlights flexibility in learning, emphasizing student choice. It has been considered one key to enhancing education quality and satisfying highly diverse student needs. Furthermore, with the increasing application of information and communication technologies (ICTs) in the field of education, FL has been especially closely associated with e-learning.

It was also shown that the item that learners are more comfortable communicating with their classmates in a traditional learning environment had the lowest mean score of 1.45, with the lowest standard deviation of 0.64. It implies that learners prefer communicating with their classmates in a face-to-face, rather than in flexible learning. Also, ranked as second to the lowest item is where learners are more comfortable communicating with their instructor in a traditional learning environment, with a mean score of 1.46 and standard deviation of 0.70. It reveals that learners would opt to communicate with their instructors through rather than flexible learning.

It corresponds to the study of Kemp and Grieve (2014), where learners strongly preferred to discuss the course content with peers in the classroom, that is, face-to-face rather than online. The finding also corroborates with the study of Cybinski & Selvanathan (2005),when they mentioned that the flexible learning approach in statistics education, with minimal face to face teaching, may be especially inappropriate for the learners. However, the result negates the study of Biswas and Roy (2020), where the study's findings show that most of the students at the university level have a positive perception of mobile learning.

Relationship between the Academic Performance in Technology Subjects and the Learners' Perception

The Pearson Coefficient Binomial Correlation was utilized to find out if there's a

significant relationship between the learners' academic performance and their perception in flexible learning.

The data in Table 7 show no significant relationship between academic performance and learners' perception. It is based on the computed p-value of 0.104, which was greater than the 0.05 level of confidence. Furthermore, a Pearson Correlation value of 0.190 indicates a negligible positive correlation between academic performance and learners' perception.

Table 7. The pearson coefficient binomial correlation summary table between the academic performance and perception of the learners in flexible learning

Variables		Result
Academic Performance vs.	Pearson Correlation	.190
Learners' Perception	Sig. (2-tailed)	.104

The study's finding opposes the study of Cybinski & Selvanathan (2005) when they found out that learners recorded a positive relation to their learning attitudes and their perceived value of statistics education. However, the finding conforms to the study of Kem and Grieve (2014). They found out that the correlation was not significant, with an r-value of -0.11 and a p-value of 0.40. It denotes no consistent relationship between the overall academic performance and preference for learning online or in class.

■ CONCLUSIONS

Based on the result and findings of the study, the following conclusions were made. The learners' academic performance is very high, both FL and face-to-face, with a mean of 95.19 and 95.27, respectively. Also, there is no significant difference in the learners' academic performance in technology subjects between flexible learning and face-to-face, with a p-value of 0.767. The learners' perception of flexible learning in technology subjects is moderate, with a mean of 3.10. Finally, there is no significant relationship between the learners' perception and academic performance in technology subjects in flexible learning.

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