

Understanding Gen Z Preferences for Features of Online Learning Platforms through Conjoint Analysis

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ABSTRACT

This study explores the online learning platform preferences of Generation Z college students in the Philippines using Conjoint Analysis with the PAPRIKA method, grounded in Multi-Attribute Utility Theory (MAUT) and the Technology Acceptance Model (TAM). Analyzing key attributes—content delivery format, course scheduling, accessibility, user interface, assessments, and support—based on 744 valid responses, it reveals that Flexibility in Course Schedule and Multi-device Accessibility are the most valued features. The study identifies Platform 144 as the most preferred, offering a combination of text-based materials, mixed scheduling, multi-device synchronization, and community support. Findings highlight the need for platforms to balance autonomy with engagement, emphasizing flexibility, user-friendly interfaces, and collaborative features to enhance learning outcomes and meet the unique needs of Gen Z learners.

INTRODUCTION

Online learning has become a cornerstone of modern education due to its flexibility, accessibility, and global reach, attributes particularly appealing to Generation Z, a cohort raised in a digital environment. This generation not only values the personalized learning opportunities online education offers but also expects real-time interactions with instructors and engaging multimedia resources (Barman & Roy, 2023; Yu, 2020). Conjoint analysis has shown that elements such as course delivery format, assessment types, and material design play a critical role in shaping the online learning experience (Cano, 2023; Licas & Torres, 2024). For instance, nursing students from Gen Z emphasize the need for immediate, constructive feedback to remain engaged and better comprehend course content (Licas & Torres, 2024).

Educators and platform developers aiming to effectively engage this cohort must understand these preferences. Prior research underscores that strategies promoting active engagement and intellectual curiosity contribute to improved learning outcomes, particularly in online settings (Chunta et al., 2020; Mellman et al., 2021). With online education increasingly becoming the norm, it is essential to utilize structured methods, such as conjoint analysis, to pinpoint the specific features that Gen Z prioritizes in an online learning platform. Such insights are valuable for the design of platforms that align closely with their expectations, which in turn enhances the learning experience.

Despite existing knowledge on general preferences, a significant gap remains in understanding how Gen Z ranks the various features of online platforms—such as content delivery, scheduling flexibility, accessibility, and support mechanisms. This gap presents challenges for developers seeking to create platforms that meet these needs, ultimately affecting learning outcomes and overall student satisfaction. This study aims to fill this gap by using conjoint analysis to evaluate how Gen Z prioritizes these features, offering actionable insights for the design of platforms that cater to this generation's preferences (Postolov et al., 2017; Licas & Torres, 2024).

Additionally, the influence of local contexts, such as that of Davao City in the Philippines, further shapes Gen Z's preferences. Davao is emerging as a digital education hub, driven by its growing economy and focus on technological transformation (Naim, 2021). However, while many students in Davao embrace digital learning, there is still a preference among some for traditional, face-to-face education (Garai-Fodor & Csercsa, 2022). Understanding these localized nuances is essential for designing online learning platforms that resonate with the specific needs of Davao's Gen Z population. This study will provide insights into these preferences, ensuring that platforms not only align with broader trends but are also tailored to the distinct educational needs of the region, supporting Davao's role in educational innovation (Cilliers, 2017; Agarwal, 2021).

The purpose of this study is to investigate the specific attributes and feature combinations that Gen Z values in online learning platforms. By addressing this, the research seeks to provide platform developers with practical insights for creating user-centered platforms that cater to Gen Z's

unique learning preferences. The research questions for this study are as follows:

1. What are the demographic profiles of the respondents?
2. What are the most and least preferred attributes for features of online learning platforms?
3. What are the most and least preferred combinations of attribute levels for features of online learning platforms?
4. What is the simulated market share of the most preferred combination of attribute levels for features of online learning platforms?

By addressing these questions, this study will contribute to the body of literature on digital education, offering a systematic approach to understanding Gen Z's online learning preferences and providing actionable guidance for platform development.

THEORETICAL REVIEW

Understanding Gen Z's preferences for online learning platforms requires a robust theoretical framework to analyze how they value specific features and decide to adopt technologies. This study draws on Multi-Attribute Utility Theory (MAUT) and the Technology Acceptance Model (TAM) to provide a comprehensive approach, enhanced by conjoint analysis to capture detailed preferences for different feature combinations.

Multi-Attribute Utility Theory

MAUT, introduced by Keeney and Raiffa (1993), is a decision-making framework that evaluates alternatives based on multiple attributes, assigning utility values based on user preferences (Keeney & Raiffa, 1993). This study applies MAUT to quantify how Gen Z values attributes such as content delivery, schedule flexibility, accessibility, and interface design, revealing their trade-offs for an optimal learning experience.

Recent applications of MAUT have extended its use across various fields. For instance, Wallenius et al. (2008) updated its application in Multiple Criteria Decision Making, while Malak et al. (2008) applied it to conceptual design, handling imprecision in early-stage product evaluations. Garmabaki, Ahmadi, and Ahmadi (2015) used MAUT to optimize maintenance schedules, and Zietsman, Rilett, and Kim (2006) employed it in sustainable transportation decision-making. Additionally, Rulinawaty et al. (2022) demonstrated its use in consumer product selection. These studies highlight MAUT's versatility in assessing complex decisions with multiple, often conflicting, criteria.

In this study, MAUT provides a robust framework for understanding how Gen Z prioritizes features of online learning platforms, offering valuable insights into their decision-making process.

Technology Acceptance Model

The Technology Acceptance Model (TAM), developed by Fred Davis in 1986, complements MAUT by focusing on two primary factors that drive technology adoption: perceived usefulness and perceived ease of use (Davis,

1986; Venkatesh & Davis, 2000). TAM is particularly relevant for Gen Z, who prioritize platforms that are efficient, intuitive, and user-friendly. Social influence, including peer recommendations and online communities, also plays a significant role in Gen Z's technology adoption, as they often look to their peers when deciding on new digital tools (Malhotra & Galletta, 1999).

Research has expanded TAM's applicability to various fields. For instance, studies in healthcare settings, particularly with electronic health records and telemedicine, have shown how TAM can predict technology acceptance (Holden & Karsh, 2010; Kowitlawakul, 2011). Modified versions of TAM, incorporating additional variables, have been proposed to better explain technology acceptance among healthcare professionals (Strudwick, 2015). Longitudinal studies have demonstrated that TAM accounts for 34-60% of variance in usage intentions across different contexts (Venkatesh & Davis, 2000). Recent studies have also applied TAM to emerging technologies like e-marketplaces, reinforcing its continued relevance (Jushermi et al., 2024). Overall, TAM remains a valuable framework for understanding and predicting technology adoption across diverse fields (Chen et al., 2012; Dimitrovski et al., 2013).

Conjoint Analysis

To gain a deeper understanding of Gen Z's preferences, this study employs conjoint analysis, a statistical technique used to understand consumer preferences by analyzing the trade-offs respondents are willing to make when choosing between different alternatives (Green & Srinivasan, 1990). By presenting respondents with choices among various feature sets, conjoint analysis reveals the specific configurations that maximize both perceived usefulness and ease of use. For instance, features like mobile-friendliness and live chat support can enhance ease of use and perceived usefulness by making the platform more accessible and supportive of learning goals.

Conjoint analysis has been widely used to examine student preferences for online learning environments and attributes. Studies have investigated preferences for hybrid teaching scenarios (Feubli et al., 2023), delivery types (Ong et al., 2021; Yandug et al., 2023), and key attributes like interaction, flexibility, assessment methods, and technology (Kuzmanović et al., 2019; Yandug et al., 2023). Some studies have focused on specific contexts, such as engineering education (Ong et al., 2021) or workstation design for online classes (Gumasing et al., 2022). Findings suggest that student preferences vary based on factors like educational level, learning style, and course type. These insights can inform the design of online learning environments and help institutions tailor their offerings to meet student needs (Kuzmanović et al., 2019; Cano, 2023).

By integrating MAUT and TAM with conjoint analysis, this study provides a structured, data-driven foundation for designing online learning platforms that align with Gen Z's preferences. MAUT identifies key attributes like content delivery and schedule flexibility, while TAM highlights the importance of perceived usefulness and ease of use. Conjoint analysis captures

the specific combinations of platform features most valued by Gen Z, ensuring the design of platforms that foster engagement and flexibility.

Conceptual Framework

The conceptual framework for this study, as shown in Figure 1, utilizes the PAPRIKA method in 1000minds to identify Gen Z's preferences for online learning platform features. Key attributes—including content delivery, flexibility, accessibility, user interface design, assessments, and support—are systematically evaluated. Conjoint analysis is applied to assess trade-offs between these attributes, revealing how Gen Z prioritizes different features. The findings will offer valuable insights for designing online learning environments that align more closely with Gen Z's needs and expectations.

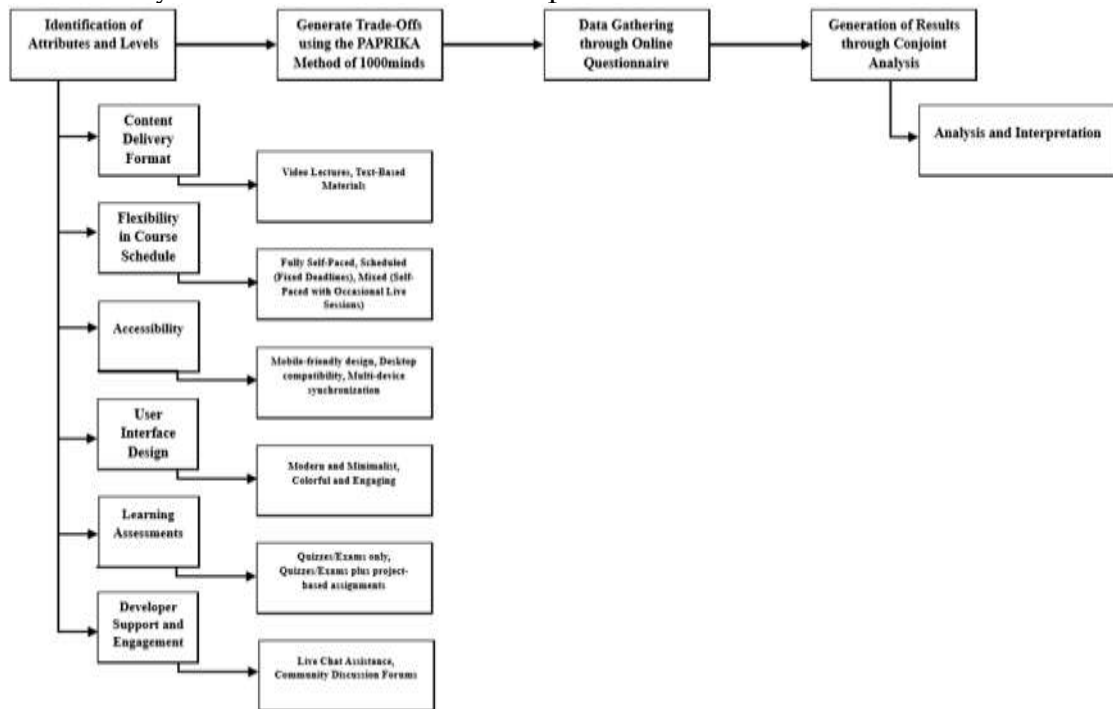


Figure 1. Conceptual Framework

METHODOLOGY

This study utilized a quantitative approach with conjoint analysis to assess Gen Z's preferences for online learning platform features. Conjoint analysis is effective in evaluating the importance of various attributes and levels (Cano, 2023; Kuzmanović et al., 2019). The PAPRIKA method generated orthogonal combinations of attribute levels, enabling the analysis of preferences regarding content delivery, flexibility, and assessment features (Cano, 2023; Gumasing et al., 2022). It also identified preference segments within Gen Z, providing insights for tailored platform designs (Dahlquist & Garver, 2022).

A pre-test was conducted prior to the actual data gathering to ensure the consistency of attribute rankings, as reflected in Kendall's W and Spearman's rho. This step was crucial in validating the reliability of the preference data before proceeding with the full-scale data collection.

The study targeted Gen Z college students, aged 18 to 26, residing in Davao City, using a multi-stage sampling approach to ensure representativeness, with 300 respondents—sufficient for conjoint analysis (Ding, Grewal, & Liechty, 2005). Initial purposive sampling was followed by convenience and snowball sampling to enhance diversity.

Data was collected through an online survey on the 1000minds platform, designed for PAPRIKA Conjoint Analysis (Hansen & Ombler, 2008). Participants evaluated hypothetical online learning platforms based on attributes like content delivery format, flexibility, accessibility, and assessments. Pairwise comparisons generated rankings and relative importance scores, capturing the intensity of preferences.

The survey, conducted from October 29 to November 5, 2024, used personal and professional networks to distribute the link, encouraging sharing. This method ensured anonymity and voluntary participation, providing a thorough understanding of Gen Z's preferences. The choice-based conjoint method simulated real-world decision-making (Lee, 2018), offering insights for online platform design.

Data analysis employed the PAPRIKA method on 1000minds, identifying the most preferred attributes and optimal combinations. Descriptive statistics complemented the conjoint analysis, summarizing participant demographics and attribute frequencies. This approach has been widely used in various contexts, including online learning and platform design (Licas & Torres, 2024; Yandug et al., 2023; Giessmann & Stanoevska-Slabeva, 2012).

Ethical considerations ensured the protection of participant privacy, with informed consent obtained digitally. Participants were informed of their right to withdraw at any time, and personal identifiers were excluded to preserve anonymity. The study adhered to ethical principles of transparency and autonomy (Oliver, 2003; Nebeker et al., 2020), ensuring responsible data handling throughout.

RESULTS

Demographic Profile of Respondents

A total of 878 participants were recruited for the study, with 744 valid responses (84.7%) retained after applying exclusion criteria, such as inconsistent answers or rapid response times. A breakdown of the demographic profile of the 744 valid respondents is presented in Table 1.

The majority of respondents (79.4%) were aged 18 to 20, reflecting a younger Gen Z cohort. The sample was predominantly female (59.5%), with smaller representations of male (34.4%), LGBTQ (3.6%), and non-binary (1.2%) individuals. A small percentage (1.2%) preferred not to disclose their gender. The data highlights Gen Z's inclusivity, which may impact preferences for supportive online learning communities.

Geographically, most respondents were from District 1 (46.8%), followed by District 2 (35.9%) and District 3 (17.3%) in Davao City. This distribution is important as it may reflect varying access to technology and resources, influencing preferences for platform features like accessibility and offline capabilities.

Table 1. Demographic Profile of 744 Valid Respondents in the Study

Category	Subcategory	Frequency
Age Range	18-20 years old	591
	21-23 years old	140
	24-26 years old	13
Gender	Female	443
	Male	256
	Non-binary	9
	LGBTQ	27
	Rather not say	9
Current/permanent residence in Davao City	District 1	348
	District 2	267
	District 3	129
Online learning habits	Daily	491
	Weekly	206
	Monthly	30
	Rarely/Never	17

Regarding online learning habits, 66.0% of respondents used online platforms daily, suggesting familiarity with digital tools. Another 27.7% used them weekly, with smaller groups using them monthly (4.0%) or rarely (2.3%).

These demographic insights are crucial for understanding the specific needs of Gen Z students in Davao City. The diversity in age, gender, and geography indicates the importance of designing flexible, inclusive, and accessible online learning platforms that meet the unique demands of this group.

Relative Importance of Attributes in Online Learning Platforms

The relative importance of features in online learning platforms for Gen Z students in Davao City shows that Flexibility in Course Schedule is the top priority, with a score of 24.9% (Figure 2). This reflects Gen Z's preference for customizable learning schedules that fit their busy lifestyles. Accessibility follows closely with 22.5%, indicating a strong desire for platforms that are easy to access across devices and can seamlessly integrate online and offline learning.

Developer Support and Engagement ranks third at 14.2%, highlighting the value Gen Z places on responsive support and active instructor engagement. Learning Assessments are also important, scoring 13.7%, with students favoring interactive, practical assessments that offer timely feedback.

User Interface Design scores 12.8%, emphasizing the need for an intuitive and visually appealing platform. Although not the highest priority, an effective interface is crucial for user engagement. Content Delivery Format, with a score of 11.9%, is the least prioritized, suggesting that while multimedia content is important, it is secondary to flexibility and accessibility.

These findings underscore the need for online learning platforms to prioritize flexibility, accessibility, and responsive support to meet the needs of

Gen Z students in Davao City. A focus on user-centered design and engaging assessments will further enhance the learning experience.

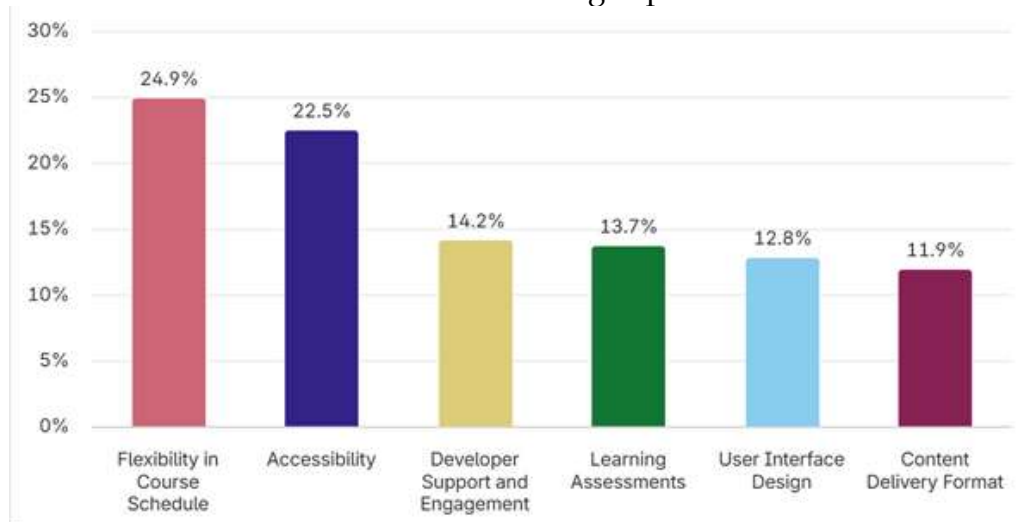


Figure 1. Relative Importance of Attributes

Most and Least Preferred Combinations of Attribute Levels For Online Learning Platforms

The analysis of Gen Z college students' preferences for online learning platform features reveals a strong inclination for platforms offering flexibility, accessibility, engaging user interfaces, and community-driven support. As shown in Table 2, Platform 144 is the most preferred, with a perfect preference score of 100%. This platform combines text-based materials, a mixed course schedule (self-paced with live sessions), multi-device synchronization, an engaging interface, quizzes, project-based assessments, and community forums. These features align with Gen Z's desire for a blend of autonomy and real-time engagement, as well as collaborative learning.

Platform 72 follows with an 88.1% preference score, featuring video lectures instead of text-based materials but maintaining the same core features. While text-based materials are slightly more favored, video lectures still appeal to Gen Z when combined with other valued features.

Conversely, Platform 1, which received a 0% preference score, emphasizes a fully self-paced schedule, mobile-friendly design, and minimal support features. The lack of flexibility and community support likely led to its poor ranking. Gen Z students prefer mixed schedules with community-driven support over purely self-directed learning.

These findings highlight that Gen Z values blended learning environments that offer both autonomy and occasional live interactions, with seamless accessibility and community-driven features. Platforms that focus solely on self-paced learning and limited interaction are less likely to resonate.

For platform developers, these insights emphasize the importance of balancing autonomy with engagement, ensuring accessibility across devices, and incorporating interactive community spaces. Engaging interfaces and project-based assessments can also enhance student satisfaction and outcomes.

Table 2. Most and Least Preferred Combinations of Attribute Levels

Alternative	Rank	Total Score	Content Delivery Format	Flexibility in Course Schedule	Accessibility	User Interface Design	Learning Assessments	Developer Support and Engagement
Platform 144	1st	100.0%	Text-Based Materials	Mixed (Self-Paced with Occasional Live Sessions)	Multi-device synchronization	Colorful and Engaging	Quizzes/Exams plus project-based	Community Discussion Forums
Platform 72	2nd	88.1%	Video Lectures	Mixed (Self-Paced with Occasional Live Sessions)	Multi-device synchronization	Colorful and Engaging	Quizzes/Exams plus project-based	Community Discussion Forums
Platform 140	3rd	87.2%	Text-Based Materials	Mixed (Self-Paced with Occasional Live Sessions)	Multi-device synchronization	Modern and Minimalist	Quizzes/Exams plus project-based	Community Discussion Forums
Platform 73	142nd	11.9%	Text-Based Materials	Fully Self-Paced	Mobile-friendly design	Modern and Minimalist	Quizzes/Exams only	Live Chat Assistance
Platform 9	143rd	9.4%	Video Lectures	Fully Self-Paced	Desktop compatibility	Modern and Minimalist	Quizzes/Exams only	Live Chat Assistance
Platform 1	144th	0.0%	Video Lectures	Fully Self-Paced	Mobile-friendly design	Modern and Minimalist	Quizzes/Exams only	Live Chat Assistance

The consistency of Gen Z students' preferences is confirmed by a Kendall's W value of 0.766 and a Spearman's rank correlation of approximately 0.765, indicating strong agreement among respondents regarding platform feature preferences. According to Moslem et al. (2019), Kendall's W is an effective tool for assessing consensus in ranked data, which is crucial for preference-based research. The high degree of consensus observed here suggests that the identified preferences reflect shared values within this demographic. Additionally, Prion and Haerling (2014) highlight that using multiple consistency measures, like Kendall's W and Spearman's correlation, strengthens the reliability of ranked data. This strong agreement underscores the validity of the preferences expressed by Gen Z students, reinforcing the study's findings on their platform feature priorities.

Simulated Market Shares for Online Learning Platforms

The simulated market share analysis reveals Gen Z college students' preferred online learning platform features, as shown in Table 3. Platform 144 emerged as the clear favorite, securing 100% of first-choice rankings. Featuring Text-Based Materials, a Mixed Schedule (Self-Paced with Occasional Live Sessions), Multi-device Synchronization, a Colorful Interface, Quizzes/Exams plus Project-Based Assessments, and Community Discussion Forums, this platform reflects Gen Z's preference for a balanced combination of flexibility,

accessibility, and interactive learning. This indicates that platforms offering both autonomy and real-time engagement are highly valued by Gen Z.

Table 3. Participants Ranking Alternatives 1st, 2nd, 3rd Choices

Alternative	1st	2nd	3rd
Platform 144	100.0%	0.0%	0.0%
Platform 72	0.0%	32.8%	13.3%
Platform 140	0.0%	17.8%	17.6%
Platform 142	0.0%	15.1%	16.2%
Platform 120	0.0%	14.9%	17.7%
Platform 143	0.0%	12.3%	16.9%
Platform 136	0.0%	7.1%	14.7%
Platform 96	0.0%	0.0%	2.1%
Platform 128	0.0%	0.0%	1.7%

Platform 72 ranked second with 32.8% of second-choice rankings. Offering Video Lectures, Mixed Scheduling, Multi-device Synchronization, a Colorful Interface, Quizzes/Exams, Project-Based Assessments, and Community Discussion Forums, it suggests that while video lectures are appealing, Gen Z still slightly prefers text-based materials, prioritizing focused learning formats. Developers should consider balancing multimedia with more direct, efficient learning formats.

Platform 140 ranked third with 17.7% of third-choice rankings. Featuring Text-Based Materials, a Mixed Schedule, Multi-device Synchronization, a Modern Interface, Quizzes/Exams, and Project-Based Assessments, this platform highlights that while aesthetics matter, flexibility and interactivity remain more important. This suggests that simplicity in design can be effective but should not compromise the platform's functional features.

These findings underline the importance of offering flexible scheduling, multi-device access, engaging assessments, and community-driven support when designing online platforms for Gen Z students. Developers should aim for a blend of these features to meet the expectations of this digital-native generation.

DISCUSSION

The findings of this study underscore the importance of Flexibility in Course Schedule for Generation Z college students in Davao City. The clear preference for mixed schedules—combining self-paced learning with occasional live sessions—reflects the need for autonomy in learning while maintaining opportunities for real-time interaction with instructors and peers. Accessibility, especially multi-device synchronization, also emerged as a priority, highlighting the demand for seamless learning experiences across multiple platforms and devices.

Additionally, Community Discussion Forums were prioritized, emphasizing Gen Z's preference for peer interaction and collaborative learning. This aligns with the broader social tendencies of Gen Z, who value engagement with their peers in educational settings. Interestingly, Content Delivery Format ranked lowest in importance, with text-based materials preferred over video

lectures, suggesting a preference for efficient and focused learning formats over more dynamic, but potentially overwhelming, multimedia content.

The high Kendall's W value of 0.766 demonstrates strong consistency in rankings, further validating the reliability of these preferences. The simulated market share analysis supports this by showing that Platform 144, which offers flexibility, accessibility, interactive assessments, and community forums, secured 100% of first-choice rankings.

Overall, these findings point to a clear trend: Gen Z students prioritize online learning platforms that balance flexibility and accessibility with opportunities for community engagement and interactivity.

Theoretical Implications

This study makes a notable contribution to the existing body of knowledge by applying Multi-Attribute Utility Theory (MAUT) and the Technology Acceptance Model (TAM) to explore Gen Z's online learning preferences. The use of MAUT highlights how students make trade-offs between flexibility, accessibility, and content delivery methods, emphasizing the utility of decision-making in platform selection. The study also reaffirms the relevance of TAM, which emphasizes that platforms perceived as user-friendly and accessible across devices are more likely to be adopted by Gen Z learners. These theoretical frameworks provide a data-driven approach to understanding the preferences that drive platform adoption in digital education.

Practical Implications

For online platform developers and educational institutions, the findings provide actionable insights for improving user engagement. The clear preference for mixed learning schedules and multi-device synchronization suggests that platforms should prioritize flexibility and accessibility. Moreover, the high value placed on community-driven support, particularly discussion forums, indicates that platforms must integrate features that foster peer-to-peer interactions, which Gen Z students find more engaging than one-on-one assistance.

Additionally, the study's findings indicate that while text-based materials remain highly preferred, developers should offer customizable content formats to cater to various learning styles, balancing text and multimedia. Platforms should also focus on creating interactive user interfaces that promote intuitive navigation and seamless functionality across devices.

CONCLUSIONS AND RECOMMENDATIONS

This study provides a comprehensive understanding of the online learning preferences of Generation Z students in Davao City. The findings clearly highlight that flexibility in course scheduling, accessibility across multiple devices, and community engagement are the most critical factors influencing platform preferences. Gen Z students demonstrate a clear preference for mixed learning schedules that combine self-paced learning with occasional live sessions, reflecting their need for autonomy while still desiring real-time interaction. Multi-device synchronization is also a key preference, ensuring that students can

access their learning materials across different devices, further underscoring the importance of seamless, flexible learning environments.

The emphasis on community-driven support through features like discussion forums and peer interactions indicates that Gen Z students value collaboration and peer engagement in the learning process. This is particularly relevant for developers, who should prioritize building platforms that offer interactive assessments—such as quizzes, project-based tasks, and community discussion spaces—that foster collaboration and real-time feedback.

For platform developers, the results suggest that the design of online learning platforms must cater to these preferences by creating adaptable, user-centric environments that allow students to tailor their learning experiences. Platforms should not only provide flexibility in course delivery formats but also ensure ease of use, intuitive navigation, and compatibility across devices to guarantee a seamless experience. The integration of community forums and peer interaction mechanisms, such as live chat or collaborative tools, will help enhance engagement and provide emotional and academic support, which is crucial for student retention and overall satisfaction.

For educational institutions, the findings emphasize the need for institutions to implement flexible course structures that allow students to navigate their learning paths in ways that fit their personal schedules and commitments. Moreover, as Gen Z values real-time interactions and immediate feedback, institutions should prioritize providing ongoing technical support and faculty-student engagement to maintain an engaging learning environment. Offering personalized and timely support through both academic channels and technical assistance will help ensure that students can fully benefit from the online learning experience.

These recommendations are particularly significant in the context of the post-pandemic era, where digital education continues to evolve rapidly. Institutions and developers that align their strategies with these preferences will not only increase student satisfaction and engagement but also ensure that their platforms are well-positioned for long-term success in an increasingly digital educational landscape.

FURTHER STUDY

This study has limitations, primarily due to its focus on Gen Z college students in Davao City, which may restrict the generalizability of the findings. Future research could expand the geographic scope to include other regions within the Philippines or internationally, providing insights into whether these preferences are consistent across different cultural and socio-economic contexts.

Moreover, while this study focused on specific features such as flexibility and accessibility, it did not consider other factors such as platform security, data privacy, or the integration of emerging technologies like AI or gamification. Future studies could explore these additional features to offer a more comprehensive understanding of the factors influencing Gen Z's online learning platform preferences.

Finally, future research could also benefit from longitudinal studies that track actual platform usage over time, as this would offer deeper insights into

how preferences evolve as students gain more experience with online learning technologies or as external factors (e.g., internet connectivity, socio-economic status) affect platform usage.

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