Exploring students' perceptions on online learning environment across disciplines

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ABSTRACT

While online education is not a new phenomenon, the COVID-19 pandemic necessitated a sudden shift to online learning, significantly impacting the higher education sector. This study investigates students' perceptions of their online learning environment across different disciplines at Universiti Teknologi MARA. Utilizing the How People Learn (HPL) framework by Bransford et al. (2004), the study explores four dimensions: learner-centred, community-centred, assessment-centred, and knowledge-centred learning environments. A quantitative approach with purposive sampling was employed, gathering data from 231 students across Applied Sciences, Business Management, and Social Sciences and Humanities. The study reveals that, while students perceive their online learning environments positively, there are notable differences across disciplines. Business Management students reported higher satisfaction in community and assessment-centred dimensions. In contrast, Applied Sciences and Social Sciences and Humanities students indicated room for improvement in integrating prior knowledge and collaborative activities. These findings highlight the need for tailored strategies to enhance the effectiveness of online learning environments across various disciplines. By highlighting these variations, the findings highlight the importance of discipline-specific strategies in optimizing online learning. Tailored pedagogical approaches, faculty development initiatives, and supportive technological infrastructures can address each field's unique challenges, thereby fostering more inclusive and effective online learning experiences across diverse academic contexts.

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1.   INTRODUCTION

Prior to the COVID-19 pandemic, distance learning was the process of teaching and learning using mail correspondence to provide formal education access to those with geographical and other difficulties (Abdrahim, 2018). In Malaysia, under the government directive, distance learning was also introduced by Universiti Sains Malaysia in 1982 with the aim to supply the nation with high level manpower and improve the performance of those already employed by updating their knowledge and skills (Dhanarajan, 1982).

With the invention of the World Wide Web and advancement of telecommunication technologies, distance learning began adopting online practices by having either some or all learning components online (Abdrahim, 2018). Thus, new terms, such as open distance learning (ODL), e-learning, and online learning, emerged to address the new development in the distance education field. However, prior to the coronavirus (COVID-19) pandemic in Malaysia, ODL was a method often employed as the teaching and learning process for working adults who were unable to partake in a full-time study (Moore, Dickson-Deane & Galyen, 2011). For students from universities and colleges who were undertaking their study full-time, online learning was only practiced as a form of blended learning where small components of their courses were conducted as an attempt to incorporate technology to complement the traditional face-to-face classes (Adams et al., 2018).

When COVID-19 started to spread in Malaysia in 2020, the virus had effectively put the operation of schools, colleges and universities on hold as governments around the world were contemplating on the best methods to continue the learning process for scholars (WHO, 2020). Thus, many institutions in Malaysia revisited the use of technology to conduct lessons online on a bigger scale for all students.

Despite the growing body of literature on online education, a persistent gap remains concerning the rapid, large-scale transition forced by the pandemic. Although some studies have explored student experiences in online environments, there is a need for clearer insights into how unprepared stakeholders such as the educators, learners, and institutions, managed this abrupt shift (Ali, 2020; Hodges et al., 2020). More importantly, research systematically examines the holistic nature of online learning environments through established frameworks like How People Learn (HPL) is less extensive (Pham et al., 2022). The problem, therefore, lies not only in ensuring continuity of education during crises but also in safeguarding the overall quality and inclusivity of learning opportunities as digital instruction becomes an integral part of higher education.

Although online learning in Malaysian tertiary education has been extensively studied, the spread of the COVID-19 pandemic forced many educators and learners to unexpectedly adapt to online classrooms for the first time (Kapasia et al., 2020). While the small population of those who have been involved in ODL would have understood the process, most of the educators and learners were not prepared for the sudden shift in a purely online learning environment.

Due to the lack of experience in conducting lessons online, educators and learning institutions faced several challenges to provide a holistic learning environment for the learners (Saad & Choo, 2021). In online lessons, educators and learners only interacted with one another virtually, where the absence of face-to-face interaction between the educators and learners impeded the sense of collaborative learning that was present when attending classes physically.

However, the primary concern during online learning is the quality of learning experienced by the students (Magulod, 2019) and how it is related to the design, organisation, and execution of content in an online

learning environment. In addition, learning effectiveness also depends on recognising the students' learning preferences and styles while online. Therefore, the purpose of this study is to investigate students' perception of their experience in an online learning environment to help learners and educators both in preparing for an effective learning experience. This study is guided by the following questions: What are the students' perceptions towards their learning environment, and what are the differences of perceptions across different disciplines?

Current studies often focus on technological readiness and satisfaction but offer limited discussion on the deeper pedagogical dimensions of online instruction (Moorhouse, 2020). By integrating the HPL perspective, researchers can illuminate how learner-centered, knowledge-centered, assessment-centered, and community-centered elements intersect to shape student engagement and outcomes (Bransford et al., 2004). This study fills that gap, examining how these pedagogical pillars function in an online context where educators and learners are adapting in real time to emerging challenges.

Therefore, the purpose of this study is to investigate students' perception of their experience in an online learning environment to help learners and educators both in preparing for an effective learning experience. Specifically, the study's significance spans multiple domains: (1) knowledge generation, by expanding empirical insights into effective online pedagogies grounded in the HPL framework; (2) professional application, by guiding educators, instructional designers, and policymakers in crafting holistic learning models that support diverse student populations; and (3) social change, by ensuring that equitable, high-quality online education can persist in the face of global disruptions and continue to empower communities and economies in the long term (Means & Neisler, 2021). This study is guided by the following questions: What are the students' perceptions towards their learning environment, and what are the differences of perceptions across different disciplines?

2. LITERATURE REVIEW

Bransford et al. (2004) introduced the How People Learn (HPL) framework, a learning environment model to ensure a comprehensive educational environment that considers various factors influencing students' growth. The model comprises four distinct dimensions that reinforce one another: learner-focused, knowledge-focused, assessment-focused, and community-focused. Literature reviews have affirmed the significance of incorporating these dimensions' attributes to enhance student performance. According to Bransford et al. (2004), incorporating the elements of learner-centric, knowledge-centered, assessment-centered, and community-centered learning environments can optimise students' learning. This study is conducted to explore the four dimensions of the learning environment model proposed by Bransford et al. (2004).
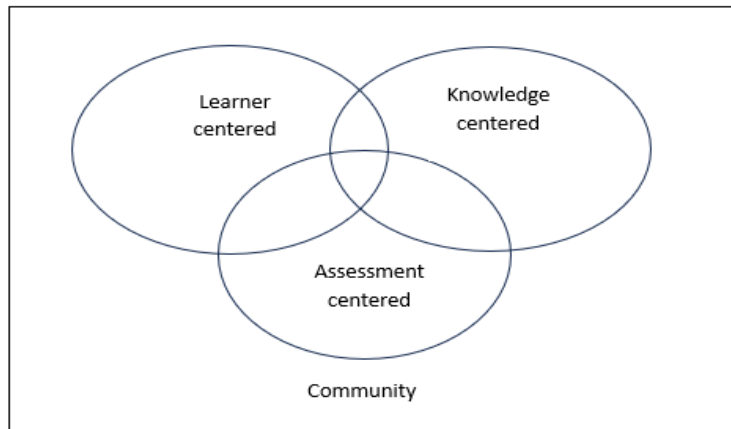
Fig. 1. How People Learn (HPL) Framework

Source: Author's own.

Figure 1 above shows the How People Learn (HPL) framework constructed by Bransford et al. (2004). The model comprises four interconnected aspects of the learning environment: learner-centric, knowledge-centric, assessment-centric, and community-centric. The model proposes that these four dimensions of the learning environment mutually reinforce one another.

Despite its foundational role, the HPL framework has attracted both support and critique in recent literature. Some researchers argue that the core principles, learner-, community-, assessment-, and knowledge-centeredness can be universally applied to diverse educational settings (Khalil & Ebner, 2020). However, others caution that the framework may require cultural and contextual adaptations to accurately reflect learners' backgrounds and institutional structures (Mantiri, 2015). These differing perspectives underscore the importance of critically examining how HPL dimensions manifest in various cultural and technological contexts, including low-resource environments and emergency remote teaching scenarios (Bozkurt & Sharma, 2021). By acknowledging these tensions, educators and researchers can more effectively tailor HPL-based approaches to the specific dynamics of online learning.

2.1   Learner-centered learning

Learner-centred learning environment entails the importance of integrating the students' pre-existing knowledge, skills, attitudes, and beliefs into the teaching and learning process (Katsarou & Chatzipanagiotou, 2021). Educators should consider that conceptual understanding or misunderstanding of a subject is based on what the educators bring with them as well as the student's social and cultural background (Ouchaouka et al., 2021). To optimise the learning process, it is important to create many opportunities for students to draw from their prior experiences and incorporate them in their thinking. The more visible the students' thoughts are, the easier it is for educators to build upon the students' current knowledge and abilities.

Additionally, prior knowledge can significantly impact students' perceptions of online learning environments (Kalyuga, 2007). Students with a strong foundation in the subject matter may find online

learning more enjoyable and manageable, while those with limited prior knowledge may struggle to keep up with the pace of the course (Kalyuga, 2007).

2.2   Community-centred learning

Community-centred learning environment emphasises inculcating a sense of community within a classroom. This refers to the explicit values and norms that promote collaborative learning between the students and the educators to learn together (Ilagan et al., 2021). This learning environment can be achieved when educators consider their students' needs and expectations of the course, which, in turn, provide the students with a stimulating, supportive, and safe environment to learn and grow (Bransford, Vye, & Bateman, 2002). Therefore, the development of online learning communities can foster a sense of belonging, shared goals, and collaboration among students and instructors (Garrison et al., 2010).

However, not all studies converge on the efficacy of community-centred strategies in digital contexts. While some highlight improvements in motivation and mutual support, others point to challenges such as superficial peer interactions and inconsistent participation levels (Ke, 2010). Factors like time-zone differences, technological access, and cultural norms around communication can inhibit the full realization of community-centred models. This indicates a need for more adaptive and context-sensitive strategies to foster sustained engagement in online communities.

2.3   Assessment-centred learning

In education, assessment refers to the important process of measuring and documenting a learner's level of skills, knowledge, beliefs, and attitude (Khamitovna, 2022). Assessment is broadly categorised into two types: formative assessment, which occurs throughout the study period, and summative assessment, which captures the culmination of students' achievements within a time frame. Also, assessment-centered learning environments show how important it is to set high goals for everyone and make sure they can reach them with the help of the opportunities teachers create for each student. Therefore, as part of ensuring the improvement of student learning, an ideal assessment-centred environment features frequent and adequate feedback, reflections, and revision play a crucial role in guiding students' learning in an online environment (Hassan et al, 2020).

Recent investigations in different contexts suggest that evolving digital assessment tools can either empower or overwhelm learners. In sub-Saharan Africa, for example, bandwidth limitations and unstable electricity supply hindered the consistent use of timely feedback systems (Agormedah et al., 2020). These findings underline the complex interplay between technological infrastructure, cultural expectations, and assessment design in an online learning environment.

2.4   Knowledge-centred learning

Knowledge-centred learning environments introduce knowledge in the forms of facts, ideas, concepts, and principles based on the learners' needs (Khatimah, 2021). This type of environment places an emphasis on learners' ability to make sense of new information and to seek clarification should they not understand the information which is crucial for learners to develop their metacognitive skills and understand more about their own learning. This environment allows learners to understand lessons better, which in turn builds their expertise and facilitates the transfer of knowledge to other situations.

2.5   Past studies

The HPL framework, as outlined by Brandsford et al. (2004), can serve as the criteria for evaluating a learning environment or the engagement and effectiveness of students. Previous research has indicated that employing instructional strategies informed by HPL enhances students' comprehension of the subject

matter (Birol, Liu, Smith, & Hirsch, 2006). According to Palau et al. (2012), the HPL framework is also a useful way to organise a lot of information about professional performance and ways to help people improve their own skills or competencies. This study aims to adopt the HPL framework and assess higher education students' engagement with and effectiveness of the lessons.

While there have been extensive studies conducted on exploring learners' perceptions on the learning environment, studies specifically on the online learning environment have only recently gained traction due to ODL becoming the norm in Malaysia in 2020. Razami and Ibrahim (2021) conducted a study on 408 diploma students from SPACE, a faculty in Universiti Teknologi Malaysia (UTM). The researchers highlight that the absence of face-to-face interactions negatively influenced the respondents' motivation to attend online classes. This is a significant contrast to the students' prior experiences of attending blended learning before the pandemic. However, Razami and Ibrahim (2021) state that conducting assessments online through creative means such as animation and gamification yielded positive results in students' participation and achievement.

In Indonesia, a similar study conducted by Tanjung & Utomo (2021) on 104 university students suggests that while students' digital literacy helps in improving the quality of online learning, inadequate support from educators and education institutions in conducting lessons online contributed to the lack of student participation during classes. Hence, the study indicates that during online learning, educators' attention to the students' needs is crucial for the students' development. Rojabi (2020) conducted another study in the Indonesian context. The study on 28 undergraduate students used a questionnaire as the instrument. In the section pertaining to the online learning environment, the study found that 36% of the respondents felt that the online learning environment gave them comprehension of the materials learnt, while 46% responded that they felt comfortable answering questions during online lessons. However, when asked about their preference for online or face-to-face lessons, the respondents were divided, as almost half of them stated that they do not prefer online learning over face-to-face learning. It is also important to note that most of the respondents agreed that the online learning environment provides them with ease of access to information and materials shared by their lecturers.

Laili and Nashir (2021) conducted a mixed-method study on 103 higher education students. The findings suggest that students hold both positive and negative views regarding online education. While online learning offers flexibility, it comes with certain challenges, including unreliable internet connections, decreased motivation in some students, difficulties in practicing conversation skills, and the high cost of internet access. A significant majority of students (91%) express a preference for traditional in-person learning over online alternatives.

A larger scale study was conducted by Arik (2021) on 3025 undergraduate students from 66 Turkish universities. Based on the research findings, it appears that students have mixed feelings when it comes to distance education learning environments. This uncertainty suggests that they have reservations about whether these environments effectively meet the criteria for teacher support, fostering student communication and collaboration, addressing personal relevance, and supporting authentic learning experiences, active participation, student autonomy, and overall satisfaction.

Other than the above studies, it is also imperative to look at past studies that used the HPL as their framework. One of them is a study by Pham et al. (2022), who conducted a qualitative study that investigated the elements of online learning programs that are most valued by learners. Their findings indicate that while the components of a learner-centred and community-centred learning environment may vary between fully online and face-to-face or blended degree programs, the HPL framework continues to

serve as a valuable tool for enhancing the quality of students' learning experiences. Therefore, it is crucial to further explore students' perceptions regarding the quality of their online experience. This could allow responsible parties such as educators and education institutions to better address their students' needs during online learning.

Nonetheless, the pace of technological change, along with fluctuating student preparedness, demands that even HPL-based interventions be continuously evaluated and updated (Szeto & Cheng, 2016). Thus, this literature review underscores the need for a more nuanced, context-driven application of the HPL framework, one that includes critical engagement with both infrastructural and pedagogical variables in online education. Therefore, it is crucial to further explore students' perceptions regarding the quality of their online experience. This could allow responsible parties such as educators and education institutions to better address their students' needs during online learning.

3.   METHODOLOGY

This study employed a quantitative approach to answer the proposed research questions. The approach was chosen to allow for systematic measurement of students' perceptions across multiple dimensions of the online learning experience and to facilitate statistical comparisons among the different academic disciplines. This approach is particularly suitable for studies aiming to generalize findings to broader populations within higher education (Creswell & Creswell, 2018). The study employed purposive sampling because the primary aim was to gather data from students who had firsthand experience with online learning during the COVID-19 pandemic. Purposive sampling enables the researcher to pre-determine specific respondent criteria (e.g., having experienced at least one full semester of online learning) that align with the study's objectives (Campbell et al., 2020). This method was deemed appropriate to ensure that participants could offer rich insights into the phenomena under investigation, rather than drawing from a general population less likely to have relevant online learning experiences.

The target population of this study was Universiti Teknologi MARA students from three (3) different disciplines, namely Science and Technology, Social Sciences and Humanities, and Business Management. These three disciplines were selected to provide a broad representation of the student population. Additionally, since the study attempts to explore students' experience during online learning, the respondents consisted of those who experienced online learning during their study. The final sample size for this study was 231 students across the 3 disciplines. In determining the adequacy of this sample, practical constraints (e.g., availability of participants during remote learning periods) and the need for sufficient statistical power guided the selection. The study followed guidelines suggesting a minimum of 30 participants per subgroup to conduct meaningful comparative analyses (Pallant, 2020).

The instrument used for this study is a five-section questionnaire adapted from Hassan, Majid, and Hassan (2020). The questionnaire contains five sections. Section A consists of demographic items, which include gender and education background. The remaining sections are based on the four (4) dimensions of the learning environment model introduced by Bransford, Brown, and Cocking (2004). Section B examines the students' perception of how their lecturers attend to their pre-existing knowledge, skills, attitudes, and beliefs. with seven (7) items. Section C explores the respondents' perception of how their lecturers incorporate positive values of collaboration in classes with seven (7) items. Section D investigates respondents' perception of how their lecturers conduct assessments with eight (8) items, and section E analyses respondents' perception of how lecturers emphasise learning to understand with eight (8) items.

After data collection, all responses were screened for missing values and outliers to ensure data quality (Tabachnick & Fidell, 2019). Descriptive statistics (mean, standard deviation, and frequency distribution) were calculated to summarize the general trends of students' perceptions across the four dimensions of the HPL framework. Internal consistency was assessed through Cronbach's alpha, yielding a coefficient value of 0.97 for the entire questionnaire, indicating high reliability and consistency among items (Kaymak et al., 2020).

Inferential analysis was then performed to address the research questions. Specifically, one-way Analysis of Variance (ANOVA) was used to test whether differences in the four HPL dimensions existed among the three academic disciplines—Science and Technology, Social Sciences and Humanities, and Business Management. ANOVA was chosen due to its suitability for comparing means across multiple groups (Field, 2018). Where applicable, post-hoc tests (Tukey's HSD) were conducted to determine the specific group differences. Effect sizes (η^2) were also calculated to evaluate the practical significance of any observed differences (Cohen, 1988).

This combination of descriptive and inferential techniques provided both an overview of students' perceptions and a rigorous comparison across disciplines, offering a comprehensive understanding of how the HPL dimensions manifest in different fields of study.

4. DATA ANALYSIS AND RESULTS

The transition to online learning environments has brought significant changes to higher education. Understanding students' perceptions of these environments is crucial for improving teaching practices and enhancing learning experiences. This study aims to analyse students' perceptions of their online learning environments across four dimensions: Learner Centred, Community Centred, Assessment Centred, and Knowledge Centred. The data was collected from students in three disciplines: Applied Sciences, Business Management, and Social Sciences and Humanities.

Table 1. Demographic distribution of respondents

Field of Study	Frequency	Percentage
Applied Sciences	81	35.1
Social Sciences and Humanities	61	26.4
Business and Management	89	38.5
Total	231	100

Source: Own data.

Table 1 illustrates the demographic profile of the respondents for this study. Purposive sampling was executed in this study, whereby the students came from three different fields of study at UiTM, namely, the faculties of applied sciences, social sciences and humanities, and business and management. The questionnaire was distributed at random among students in these faculties, and the faculty of Business and Management resulted in the highest number of respondents, with 89, which calculated to 38.5 percent. The

second highest was Applied Sciences with 35.1 percent, followed by Social Sciences and Humanities with only 61 respondents, which makes up 26.4 percent of the overall number of students. The majority of the students that took part in the study were degree students, with 87.4 percent, while only 12.6 percent of the remaining students studied for diplomas at UiTM. The result from the collected data was subjected to a reliability test, with all items of the questionnaire demonstrating Cronbach's Alpha values of 0.97. This means that all the sections are very consistent with each other, which supports the validity of the questionnaire to answer the study's research questions (Kaymak et al., 2020).

4.1 What is the students' perception of their online learning?

Table 2. Descriptive Statistics of Students' Perceptions

	N	Minimum	Maximum	Mean	Std. Deviation
Learner-centred Environment	231	1.43	4.00	3.51	0.468
Community-centred Environment	231	1.43	4.00	3.47	0.513
Assessment-centred Environment	231	1.38	4.00	3.37	0.583
Knowledge-centred Environment	231	1.50	4.00	3.42	0.508

Source: Own data.

Table 2 demonstrates the overall descriptive statistics for students' perceptions of their online learning environment across four key dimensions. The learner-centred dimension examines students' perceptions of how their lecturers respond to their preexisting knowledge, skills, attitudes, and beliefs. The mean score for this dimension is 3.51, with a standard deviation of 0.468. The community-centered dimension explores the extent to which lecturers incorporate the positive values of collaboration in their classes. The mean score for this dimension is 3.47, with a standard deviation of 0.513. The Assessment-Centred dimension evaluates students' perceptions of how their lecturers conduct assessments and provide feedback. The mean score for this dimension is 3.37, with a standard deviation of 0.583. The Knowledge-Centered Dimension assesses how lecturers emphasise learning to understand and apply knowledge. The mean score for this dimension is 3.42, with a standard deviation of 0.508.

Table 3. Learner-Centred Environment Items

Items	Mean	Std. Deviation
Lecturers relate the topic I am studying with the topics that I've learned.	3.60	0.572
Lecturers relate what I've learned in the classroom with my experience in real life.	3.42	0.634
Lecturers integrates students' cultural background into the teaching and learning process	3.36	0.616
Teacher has a sense of respect for the students' language practices in order to help students engage in meaningful learning	3.57	0.562
Lecturers use easy-to-understand language when teaching.	3.65	0.554

Lecturers encourage me to learn with my friends while conducting learning activities.	3.52	0.588
Teacher uses activities that allows active learning	3.47	0.624

Source: Own data.

Understanding how learners perceive the adaptation of teaching strategies to their pre-existing knowledge and skills is vital for enhancing educational outcomes. In terms of learner-centred online lessons, most of the students agree that lecturers using language that is easy to understand when teaching is the most significant factor in a learner-centred learning environment, with a mean score of 3.65 (SD=.554). On the other hand, they perceived cultural background consideration to be the least significant factor with 3.36 (SD= .616).

Table 4. Community-Centred Environment Items

Items	Mean	Std. Deviation
Lecturers emphasize on positive norms to learn from one another through the collaboration	3.49	0.566
Lecturers emphasize the importance of resolving conflict if opposing ideas emerge among students.	3.38	0.673
Lecturers give given freedom to make mistakes in order to improve students' learning	3.45	0.689
Lecturers create a positive social environment where Lecturers and students are open to make mistakes during the teaching and learning process	3.45	0.670
Teacher allows group interactions to take place	3.55	0.615
Lecturers encourage cooperative learning with students	3.57	0.584
Lecturers plan activities to allow connections between classroom learning experience and out-of-school learning experience	3.40	0.671

Source: Own data.

Fostering a collaborative learning environment is a key component of modern educational practices. When it comes to online learning being community-centered among students, the most significant factor, as perceived by the learners, is that lecturers encourage students to work together when involved in class activities, with a mean score of 3.57 (SD=.584). However, the less significant factor with only 3.38 (SD= .673) is the emphasis on the importance of resolving conflict if opposing ideas emerge among students.

Table 5. Assessment-Centred Environment Items

Items	Mean	Std. Deviation
Lecturers give me continuous feedback in improving student learning	3.33	0.750
Lecturers' feedback are on time	3.16	0.823
Lecturers' feedback are specific, and understandable,	3.38	0.693

Lecturers' feedback provides room for improvement	3.47	0.671
The assessments assess students' understanding and provide opportunities for students to enhance their learning	3.49	0.625
Lecturers provide information about students' level of understanding continuously	3.41	0.691
Lecturers give me the opportunity to evaluate my own learning.	3.41	0.679
Lecturers give me the opportunity to evaluate the work of my friends.	3.30	0.741

Source: Own data.

Assessment practices are integral to the educational process, providing both students and educators with feedback on learning progress and areas needing improvement. For assessment-centered learning, students say that the tests can tell how much they understand and give them chances to be a big part of things, with an average score of 3.49 (SD=.625). The less significant factor is the lecturer's feedback being on time, with a mean score of 3.16 (SD=.823).

Table 6. Knowledge-Centred Environment Items

Items	Mean	Std. Deviation
Lecturers put strong emphasis on learning with understanding and subsequent transfer.	3.50	0.581
Lecturers stress on sense-making through metacognitive approaches (planning my own learning)	3.06	0.827
Lecturers present in meaningful pattern	3.40	0.651
Lecturers help students develop an in-depth and integrated understanding of a particular discipline	3.42	0.626
Lecturers give me the opportunity to share ideas when learning a particular topic in the classroom.	3.50	0.611
Lecturers give me the opportunity to learn similar topic in different contexts.	3.47	0.596
Lecturers emphasize learning with understanding, not memorization.	3.50	0.625
Lecturers present knowledge of a subject and linked with other subjects that I learned.	3.48	0.624

Source: Own data.

For knowledge-centered learning, the three most important things in an online learning environment were: the focus on learning with understanding and then sharing that knowledge (mean = 3.50, SD =.581); the chance to share ideas while learning a certain topic in class (mean = 3.50, SD =.611); and the focus on learning with understanding rather than memorisation (mean = 3.50, SD =.625). The least significant factor, as perceived by the learners, is stressing sense-making through metacognitive approaches (planning my own learning), with a mean score of 3.06 (SD=.827).

4.2   Is there a significant difference in the perception towards online learning based on their discipline of study?

The second research question aimed to explore whether there are significant differences in students' perceptions of their online learning environment across different disciplines. To address this question, an Analysis of Variance (ANOVA) was conducted for four key dimensions: Learner-Centred, Community-Centred, Assessment-Centred, and Knowledge-Centred.

Table 7. ANOVA for Perceptions across Different Disciplines

		Sum of Squares	df	Mean Square	F	Sig.
Learner-centred Environment	Between Groups	0.451	2	0.225	1.029	0.359
	Within Groups	49.948	228	0.219		
	Total	50.399	230			
Community-centred Environment	Between Groups	0.553	2	0.276	1.052	0.351
	Within Groups	59.904	228	0.263		
	Total	60.457	230			
Assessment-centred Environment	Between Groups	1.333	2	0.666	1.976	0.141
	Within Groups	76.879	228	0.337		
	Total	78.212	230			
Knowledge-centred Environment	Between Groups	0.441	2	0.220	0.852	0.428
	Within Groups	58.986	228	0.259		
	Total	59.427	230			

Source: Own data.

The ANOVA for the learner-centred dimension resulted in an F-value of 1.029 and a significance level (p-value) of 0.359. This indicates that there is no statistically significant difference in students' perceptions

of how their lecturers attend to their pre-existing knowledge, skills, attitudes, and beliefs across different disciplines. The ANOVA for the Community-Centred dimension produced an F-value of 1.052 with a significance level of 0.351. Like the learner-centred dimension, the results show no statistically significant differences in students' perceptions of collaborative learning environments across disciplines. For the assessment-centered dimension, the ANOVA yielded an F-value of 1.976 and a significance level of 0.141. Although this is the highest F-value among the four dimensions, it still does not reach statistical significance, suggesting that students' perceptions of assessment practices do not significantly differ across disciplines. The ANOVA for the Knowledge-Centred dimension resulted in an F-value of 0.852 with a significance level of 0.428. This indicates no statistically significant difference in students' perceptions of how knowledge is integrated and applied in their learning environments across different disciplines.

5.   DISCUSSION AND CONCLUSION

Understanding how students perceive a learner-centred environment is crucial to understanding how their lecturers attend to their pre-existing knowledge, skills, attitudes, and beliefs. Students from the Applied Sciences and Business Management disciplines show relatively similar trends in their responses, with mean scores consistently ranging from 3.5 to 3.7. This indicates that students in these fields generally feel that their lecturers adequately consider their prior knowledge and experiences when designing and delivering online courses. In contrast, students from the Social Sciences and Humanities disciplines generally reported slightly lower scores, with mean values generally below those of Applied Sciences and Business Management. This suggests that students in these disciplines may perceive a lesser degree of alignment between their pre-existing knowledge and the course content.

The perception of a community-centred learning environment is essential for understanding how students perceive the integration of positive values of collaboration in their online classes. Business management students show higher scores compared to those in the applied sciences, social sciences, and humanities. This indicates a stronger perception that their lecturers incorporate collaborative values effectively in their online courses. Students in Applied Sciences reported lower scores than Business Management but higher than Social Sciences and Humanities. This suggests a moderate perception of collaboration in their online learning environment. The nature of applied sciences often involves individual work and laboratory-based learning, which may not always translate well to online collaborative activities. However, initiatives like virtual labs and collaborative research projects can help improve these perceptions. Dillenbourg et al. (2002) highlights the potential of virtual collaborative environments to enhance learning in the sciences. Students in Social Sciences and Humanities have the lowest scores, especially for CCQ2 (collaboration to achieve learning goals) and CCQ4 (encouragement of group discussions). The lower scores might be due to the less structured and more varied nature of these disciplines, which can make it challenging to implement and manage collaborative activities effectively in an online setting. According to a study by Lavy and Shriki (2014), the success of collaborative learning in these fields depends heavily on well-designed activities and clear instructions, which might be lacking. Additionally, students in these disciplines may have diverse backgrounds and learning styles, making it harder to create a uniformly positive collaborative environment. Research by Johnson and Johnson (2004) underscores the importance of well-structured group dynamics and clear communication for effective collaboration, which might be areas needing improvement in Social Sciences and Humanities.

Perceiving assessment-centered learning environments is crucial to understanding how students view the effectiveness and fairness of assessments in their online courses. Students in Business Management reported the highest scores for assessment-centred questions, indicating a more positive perception of the assessment practices in their online learning environments. The higher scores suggest that Business

Management students find their assessments to be well-structured, fair, and reflective of the course objectives. This is probably because business programs use a lot of different and creative ways to test students, like case studies, simulations, and project-based tests, which are all in line with best practices in educational testing (Brown & Glasner, 1999). Furthermore, continuous assessment and feedback mechanisms, commonly used in business education, can enhance students' perceptions of the assessment process by providing regular and constructive feedback (Yorke, 2003).

Students in Applied Sciences reported relatively consistent scores, though slightly lower than those in Business Management. These scores suggest a moderate perception of the effectiveness and fairness of assessment practices in their online courses. The nature of assessments in applied sciences often includes practical and theoretical components, such as lab reports, problem-solving tasks, and exams. While these assessments are essential for evaluating students' understanding, they may not always translate well to online environments, potentially impacting students' perceptions (Gikandi et al., 2011). To enhance perceptions, applied sciences programs might consider incorporating more diverse assessment methods and providing clearer guidelines and feedback to ensure assessments are perceived as fair and comprehensive.

Students in Social Sciences and Humanities showed relatively consistent scores with a slight dip in certain items, indicating a more varied perception of assessment practices in their online courses. The small drop in scores could be because of the subjective nature of tests in these areas, like essays and projects, which can make people think that the tests are not fair or consistent (Bloxham and West, 2007). Students may feel that these types of assessments are less objective compared to the more quantitative assessments in other disciplines. Improving these perceptions could involve providing more detailed rubrics, clearer criteria, and consistent feedback to help students understand how their work is evaluated and ensure transparency in the assessment process (Sadler, 1989).

The perception of knowledge-centred learning environments is crucial for understanding how students view the emphasis on understanding and applying knowledge in their online courses. Business Management students consistently reported the highest scores for knowledge-centred questions, particularly in KQC2 (integration of new knowledge with existing knowledge) and KQC5 (application of knowledge to real-world problems). This indicates a strong perception of knowledge-centred learning in their online courses. The higher scores suggest that Business Management programs effectively emphasise understanding and applying knowledge. This is likely due to the practical nature of business education, which often involves case studies, real-world projects, and problem-solving activities that integrate theoretical knowledge with practical applications (Kolb & Kolb, 2005). Business programs typically incorporate experiential learning and reflective practices, which enhance students' ability to connect new information with existing knowledge and apply it to real-world contexts (Baden & Parkes, 2013).

Students in Applied Sciences reported relatively high scores, though slightly lower than those in Business Management. These scores indicate a strong perception of knowledge-centred learning, albeit with some variations. The curriculum in applied sciences often involves a mix of theoretical and practical components, such as lab work and field studies, which help students integrate and apply knowledge. However, the transition to online learning may present challenges in maintaining the same level of hands-on experience, potentially impacting perceptions (Means et al., 2010). Enhancing online knowledge-centered learning in applied sciences might involve the use of virtual laboratories, simulations, and interactive content that can provide similar practical experiences in an online environment (Garrison & Kanuka, 2004).

Students in Social Sciences and Humanities reported slightly lower scores compared to Business Management and Applied Sciences, indicating varied perceptions of knowledge-centred learning. The

slightly lower scores may be due to the more abstract and less tangible nature of knowledge in these disciplines. Subjects in social sciences and humanities often involve critical thinking, analysis, and interpretation, which can be challenging to translate into knowledge-centred activities in an online setting (Barrot et al., 2023). To improve these perceptions, educators in social sciences and humanities could focus on creating more interactive and engaging content, such as discussion forums, peer review activities, and multimedia resources that encourage deeper understanding and application of knowledge (Laurillard, 2013).

Overall, these findings address the study's first objective of identifying students' perceptions of their online learning environments across the four dimensions of the HPL framework. The results affirm that while students generally view these dimensions favorably, nuanced differences emerge based on disciplinary contexts. In relation to the second objective—determining whether variations exist across different disciplines, the data highlight that disparities are not statistically significant across the HPL dimensions but remain evident at a descriptive level. These outcomes align with the initial research aims, demonstrating how each dimension of HPL resonates differently with the distinct pedagogical demands and student expectations in each discipline (Bransford et al., 2004).

Given these mixed perceptions, particularly in the Social Sciences and Humanities, the findings suggest that administrators and educators should consider tailoring community- and knowledge-centred activities to better accommodate the diverse learning needs in these disciplines. For example, implementing structured peer review processes, creating smaller discussion groups, and offering scaffolding for collaborative tasks could enhance students' sense of involvement and confidence (Ramadan Elbaioumi Shaddad & Jember, 2024). In Business Management, where assessment practices and knowledge integration appear robust, continuous improvement could focus on refining feedback mechanisms and exploring novel, technology-driven assessments to maintain high student satisfaction. Similarly, Applied Sciences programs might explore hybrid lab models and digital simulations to bridge hands-on learning gaps (Bozkurt & Sharma, 2021). Collectively, these strategies could help institutions maintain academic rigor while bolstering student engagement and satisfaction in online contexts.

Future research could extend this study in several ways. First, a longitudinal design that tracks students' changing perceptions across multiple semesters or academic years would offer deeper insights into how familiarity with online learning tools and evolving institutional support affect the HPL dimensions over time. Second, qualitative inquiries, such as focus groups or in-depth interviews, could complement the quantitative findings by capturing nuanced learner experiences and the rationale behind specific perceptions (Merriam & Tisdell, 2016). Additionally, comparative studies involving international institutions with varying technological infrastructures could illuminate how global differences in resource availability influence student engagement and outcomes. Such broader analyses may further validate or refine the HPL framework within diverse cultural and pedagogical settings.

In conclusion, the analysis of students' perceptions of their online learning environment across different dimensions and disciplines reveals several key insights. Despite the varying nature of disciplines, students generally share similar perceptions regarding how their pre-existing knowledge, collaborative efforts, assessment practices, and knowledge integration are addressed by their lecturers. While students' perceptions of their online learning environments are generally positive and consistent across disciplines, there are specific areas where improvements can be made to enhance the learning experience further. By addressing the identified gaps and leveraging best practices, educational institutions can ensure that all students benefit from a high-quality, inclusive, and effective online learning environment.

6.   ACKNOWLEDGEMENTS

7.   AUTHORS' CONTRIBUTIONS

Muhammad Zulfadhli Saifuddin, **Siti Fauziana Zakaria** and **Noor Lidyawani Mat Rani** carried out the introduction and literature review sections. **Muhammad Haekal Kamarulzaman** then prepared the instrument to collect the data. All authors were involved in collecting the data. The data was then cleaned and subjected to quantitative analysis by **Ahmad Asnawi Zamri** and **Muhammad Haekal Kamarulzaman**, using SPSS. **Muhammad Zulfadhli Saifuddin** worked with **Ahmad Asnawi Zamri** and **Muhammad Haekal Kamarulzaman** to write the discussion. **Siti Fauziana Zakaria** and **Noor Lidyawani Mat Rani** assisted with the study's conclusion. The final manuscript was read and approved by all authors.

8.   CONFLICT OF INTEREST

None declared

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