ASSESSING BIOLOGY EDUCATION STUDENT'S PERCEPTIONS OF HYBRID LEARNING: A COMPARATIVE STUDY

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DECLARATION OF ORIGINAL WORK

This declaration is made on the 15th of February 2024

i. Student's Declaration:

I, MUHAMAD ASRI BIN MOHAMAD KABER, D20201093634 hereby declare that the Final Year Research Project Report entitled ASSESSING BIOLOGY EDUCATION STUDENT'S PERCEPTIONS OF HYBRID LEARNING: A COMPARATIVE STUDY is my original work. I have not plagiarized from any other scholar's work and any sources that contains copyright had been cited properly for the permitted meanings. Any quotations, excerpt, reference or re-publication from or any works that has copyright had been clearly and well cited.

Signature of the student 

ii. Supervisor's Declaration:

ASSOCIATE PROFESSOR DR. SHAKINAZ DESA hereby certify that the work entitled ASSESSING BIOLOGY EDUCATION STUDENT'S PERCEPTIONS OF HYBRID LEARNING: A COMPARATIVE STUDY was prepared by the above-named student and was submitted to the DEPARTMENT OF BIOLOGY for the conferment of BACHELOR OF EDUCATION (BIOLOGY) WITH HONORS, and the aforementioned work, to the best of my knowledge, is the said student's work.

Date 12-3-2024

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ABSTRACT

Hybrid learning, a combination of face-to-face instruction with online components, is gaining popularity in higher education due to its adaptability and accessibility. This study delves into biology education students' perspectives regarding understanding and readiness and the demographic factor that impacts perceptions of hybrid learning. Existing research on hybrid learning often overlooks biology education students and rarely analyses the impact of location. To address this gap, student perceptions were examined at two different institutions, Universiti Pendidikan Sultan Idris (UPSI), Malaysia and Universidad Del Sagrado Corazón (UDSC), Puerto Rico. The goals are to determine the level of perceptions of biology education students for engaging in hybrid learning and to compare the level of perceptions for hybrid learning based on the demographic factor between the two different groups. A sample size of 204 students were selected for UPSI and 93 for UDSC. A survey with Likert scale (4 scale) questions was employed. The survey instrument was developed and validated through face and content validity by two experts, and pilot testing with a Cronbach's alpha of 0.966 was obtained. Descriptive analysis (mean and standard deviation) and inferential analysis (Independent sample t-test) have been used to analyse objectives, respectively. The findings revealed a positive understanding (M=3.63, SD=±0.31) for UPSI and (M=3.51, SD=±0.34) for UDSC. UPSI and UDSC also shows a positive readiness (M=3.33, SD=±0.42) and (M=3.41, SD=±0.37), respectively, for hybrid learning. However, a significant difference emerged in average understanding scores (t(295) = 3.290, p = 0.01), with UPSI students (M=3.63, SD=±0.31) exhibiting a slight advantage compared to UDSC (M=3.51, SD=±0.34). This suggests the influence of context-specific factors beyond mere demographics. Notably, no significant differences were found in readiness levels (t(295) = -1.632, p=0.10) between UPSI (M=3.33, SD=±0.42) and UDSC (M=3.41, SD=±0.37), indicating a shared eagerness and openness to embrace hybrid learning. To conclude, the discovery of student perceptions regarding hybrid learning can yield valuable insights to optimize hybrid learning implementation in biology education programs. The implications of this study are to connect the knowledge gap of understanding the perceptions of hybrid learning and how demographic factors may influence the perceptions, aiding in curriculum development and implementation of hybrid learning.

ABSTRAK

Pembelajaran secara hibrid, yang merupakan gabungan antara pengajaran secara bersemuka dengan komponen dalam talian semakin popular dalam pendidikan tinggi kerana kebolehsuaian dan aksesibilitinya. Kajian ini mengkaji persepsi pelajar Ijazah Sarjana Muda Pendidikan Biologi dari sudut pemahaman dan persediaan, dan pengaruh perbezaan kedudukan lokaliti terhadap persepsi pembelajaran hibrid. Kajian lepas berkaitan pembelajaran hibrid sering kali mengabaikan pelajar jurusan pendidikan biologi dan kurangnya analisis terhadap kesan lokasi persekitaran. Maka, bagi menangani hal tersebut, persepsi pelajar dari dua institusi berbeza, iaitu Universiti Pendidikan Sultan Idris (UPSI) di Malaysia dan Universidad Del Sagrado Corazón (UDSC), di Puerto Rico telah dikaji. Objektif utama adalah untuk menentukan tahap persepsi pelajar pendidikan biologi terhadap pembelajaran hibrid dan membandingkan tahap persepsi untuk pembelajaran hibrid berdasarkan faktor demografi antara dua kumpulan pelajar tersebut. Saiz sampel 204 pelajar bagi UPSI dan 93 pelajar bagi UDSC telah dipilih secara rawak. Satu tinjauan dengan soalan skala Likert (skala 4) digunakan telah digunakan. Satu instrumen tinjauan telah dibangunkan dan disahkan melalui kebolehpercayaan kesahan muka dan kandungan oleh dua pakar, dan ujian pilot dengan nilai Cronbach's alpha sebanyak 0.966 telah diperolehi untuk item soal selidik kajian. Analisis deskriptif (min dan sisihan piawai) dan analisis inferensi (ujian-t tidak bersandar) telah digunakan untuk menganalisis objektif. Dapatan kajian menunjukkan pemahaman positif (M=3.63, SD=±0.31) bagi UPSI dan (M=3.51, SD=±0.34) bagi UDSC. UPSI and UDSC juga menunjukkan tahap persediaan yang positif terhadap pembelajaran secara hibrid, iaitu (M=3.33, SD=±0.42) bagi UPSI dan (M=3.41, SD=±0.37) bagi UDSC. Namun, terdapat perbezaan yang signifikan dalam skor pemahaman purata (t (295) = 3.290, p = 0.01), dengan pelajar UPSI (M=3.63, SD=±0.31) menunjukkan sedikit peningkatan berbanding dengan UDSC (M=3.51, SD=±0.34). Ini menunjukkan pengaruh faktor pemahaman konteks adalah berlainan berdasarkan demografi. Namjun begitu, tiada perbezaan signifikan didapati dalam tahap persediaan (t(295)= -1.632, p=0.10) antara UPSI (M=3.33, SD=±0.42) dan UDSC (M=3.41, SD=±0.37). Ini menunjukkan semangat dan keterbukaan mereka untuk merangkul pembelajaran hibrid. Kesimpulannya, dapatan kajian ini dapat memberikan kupasan maklumat penting untuk mengoptimumkan pelaksanaan pembelajaran hibrid dalam program pendidikan biologi. Implikasi kajian ini adalah untuk memperoleh pengetahuan mengenai tahap pemahaman dalam persepsi terhadap pembelajaran secara hibrid dan bagaimana faktor demografi mempengaruhi terhadap persepsi tersebut, seterusnya membantu dalam pembangunan kurikulum dan pelaksanaan pembelajaran hibrid yang optimal.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDIX LIST

CHAPTER 1

INTRODUCTION

1.1 Introduction

In this chapter 1, the overview background of the study regarding the title of the writing, Assessing Biology Education Student's Perceptions of Hybrid Learning, will be discussed, as well as the problem statement addressing the need to conduct the study and then followed by the objectives of the study and the research questions. Next, the theoretical research will be discussed and explained, followed by the conceptual framework. The study's limitations and significance will also be included in this chapter. Lastly, the conclusion of the chapter will also be discussed within this chapter.

1.2 Background Research

One of the significant transformations that can be seen vibrantly over recent years is the integration of hybrid learning. Over the past decades, the field of education has encountered numerous changes and significant transformations to better enhance the quality of education both for learners and educators.

Hybrid learning, which is a combination of face-to-face instruction with online components, creating a blended learning experience whereby both on-site and remote students can simultaneously attend the learning activities (Annelies Raes, Loulou Detienne, Ine Windey & Fien Depaepe, 2019). The advancement of the technology plays crucial roles in reshaping the conventional teaching and learning methods towards a more advanced way, benefiting both roles of educator and learners over the past years.

Within the higher education student's context and the higher educational institutions at the same time, growing numbers of higher education institutions around the world have invested in technology to enhance the learning spaces (Nava, 2015). Questions could arise on how these new transformations of advance technology environments can be as effective as possible. This can be done by implementing the hybrid learning culture further to maximize the potential of the advancement of technology.

Hybrid learning should be practiced, especially in the context of higher education level, as it is to fulfill the need to connect remote students with diverse backgrounds. It is also known that higher-level education has a much greater number of individuals with diverse backgrounds. Advancement of technologies should be the key to changing the education landscape, making it more accessible and flexible for a much bigger group of learners (William Cain, 2015).

Hybrid learning offers numerous benefits. For instance, known to provide massive accessibilities and flexibility to learners (Raes et al., 2019), enhance access to resources, and increase student engagement. These can be proven by its gained traction

in various academic disciplines and should have been applied in biology education to better enhance the learning experience both for the learners and the educators.

Apart from that, the role of the geographical area in shaping perceptions has also been explored in the field of cognitive psychology, and philosophy of mind. Different people have different views of perceptions, and it is commonly known that not everyone will have a definite answer or the same perceptions over a lot of things including, hybrid learning. Searle (2015) also stated that individual's perceptions are influenced by various factors such as their unique perspective and the geographical area in which they are located.

Searle (2015) stands firm on the statement that perceptions involve not only the reception of sensory input but also the interpretation and organization of that certain input within the framework of individual beliefs, experiences, and their cultural background. It is crucial to cater to every possible factor that may influence an individual's perceptions towards certain things, and to this context of research would be the need to consider their demographic factor that may influence or show significant differences towards their perceptions of hybrid learning.

Diving deep into the diverse views of student perceptions towards hybrid learning, it is crucial to move the view of discussion beyond the geographic borders as understanding how students think about hybrid learning cannot be limited into one place only. Hybrid learning itself is to connect two groups with different location settings to a single learning environment.

This study focused on two distinct landscapes: Malaysia and Puerto Rico. Puerto Rico, where Latin American Heritage blends in with American influences in the educational aspects (Catherine M. Mazak, 2012). The unique mix of languages and educational methodologies essential to its bicultural context might further nuance these perceptions. Malaysia, on the other hand, boasts a multitude of ethnicities, languages, and traditions, contributing to a complex array of perspectives. This diversity has the potential to shape students' views and engagement with hybrid learning in distinctive ways compared to other contexts. By comparing these two different places, we can explore more about how geography subtly affects their views based on their perceptions.

Biology Education program equips future educators with the necessary knowledge and skills to teach biology effectively. The students need to ensure they are equipped with necessary biology-related fields and are trained and learning ways to teach and deliver the knowledge to their students. Furthermore, through this integration of hybrid learning. They will have the opportunity to experience the hybrid learning style as they prepare for graduation and the subsequent role of becoming educators themselves. They should develop a comprehensive understanding of both methods of implementing hybrid learning, in addition to acquiring strategies for addressing challenges that may arise. This training aims to equip them not only as learners but also as educators, enabling them to teach and learn effectively in a hybrid learning environment.

However, to integrate hybrid learning in biology education programs, it is crucial to further assess the student's perceptions of this new learning approach to understand their perspectives and readiness. This is a crucial step to allow educators and intuitions to address potential challenges that may be encountered and to design appropriate strategies to optimize the benefits of hybrid learning. Apart from that, is to also avoid using a one-size-fits-all hybrid learning style to ensure that the hybrid learning environment is suitable and able to provide great benefits towards both the educators and the learners. Hopefully, this study can shed some light on the perceptions of hybrid learning among biology education students.

1.3 Problem Statement

Integrating hybrid learning within the field of biology education is beneficial and should be applied to further enhance the teaching and learning experiences. To ensure the successful implementation of hybrid learning, it is crucial to assess the perceptions of biology education students towards this approach beforehand (Dimah Al-Fraihat, Mike Joy, Ra'ed Masa'deh & Jane Sinclair, 2020). This assessment will help ensure that the full capabilities of hybrid learning can be effectively utilized to achieve success.

It is ideal that the students of the biology education program, have a positive perception towards hybrid learning and are prepared to implement the blended learning approach. This is to helps in enhancing the understanding of the complex concepts of biologicals, and to embrace flexible and accessible benefits from the hybrid learning, which it is a revelation of both face-to-face instruction and online components (Al-Fraihat et al., 2020).

Nonetheless, the current situation shows a lack of comprehensive understanding of biology education students' perceptions for hybrid learning, and it can be shown through the limited research conducted in this specific context that would leave a gap in knowledge and understanding. Implementing a one-size-fits-all hybrid learning strategies that do not align with the student's needs, would lead to a suboptimal learning experience (Abtar Darshan Singh, 2021). This is due to the vague understanding of students' perceptions.

The knowledge gap is shown through the lack of empirical studies within the existing literature that specifically assess biology education students' perceptions for hybrid learning. Undeniably, previous research, exemplified by a study conducted by Zuraida Alwadood, Suhaila Ab Halim, Sumarni Abu Bakar and Norlenda Mohd Noor (2023), focused on general perceptions of hybrid learning among small-scale samples of students. However, there are significant gaps in the context of biology education, particularly in understanding their perceptions in terms of their understanding and readiness for hybrid learning.

Not only that, but there is also a knowledge gap in exploring the differences within perceptions that may occur across different geographical areas. A comparison of the perceptions from two different geographical areas, will provide insights into the role of geographical context, in shaping an individual's perceptions towards hybrid learning. This would help to bridge the knowledge gap in understanding the differences of perceptions that may be found specifically towards universities selected for the research, which are between Universiti Pendidikan Sultan Idris, Malaysia, and Universidad Del Sagrado Corazón, Puerto Rico.

Universiti Pendidikan Sultan Idris (UPSI) Malaysia and Universidad Del Sagrado Corazón (UPSI), Puerto Rico are selected as study locations. This is because both countries are located distinctly far from each other, with Malaysia located in Southeast Asia while Puerto Rico is in the Caribbean Sea. Both also have different colonial influences, with Malaysia having strong British influence while Puerto Rico was shaped by the United States of America (USA). Apart from that, they both have a different cultural perspective with Malaysia having multiple races communities such as Malay, Chinese Indian and more while Puerto Rico are having strong cultural ties to Latin America. In educational settings, Malaysia prioritizes STEM education (Osman & Saat, 2014) more than Puerto Rico, which emphasizes bilingualism and cultural identity. However, it is important to note that both countries have bilingualism valued in both education systems and face some challenges in access to quality education.

Both UPSI, Malaysia, and UDSC, Puerto Rico have been integrating hybrid learning within the curriculum, especially during the pandemic of COVID-19 hits back then and occasionally are having hybrid learning settings done for some of the courses. Both universities are also often involved in broadening the student body, allowing international and remote students to be a part of the institutions. These similar contexts of how both universities work in terms of hybrid learning approach but having very different geographical areas and cultural influences set an interesting point of view to investigate on how the biology education students' perceptions of hybrid learning may differ from both universities based on their demographic factor.

In higher education, failure to assess the biology education students' perceptions of hybrid learning will be detrimental. Neglecting this assessment may hinder educators and institutions from identifying and addressing potential barriers or challenges that may arise. This oversight could hinder the successful implementation of hybrid learning. Inadequacy of it could also cause students' disengagement in the teaching and learning process, decrease students' motivation, and tremendously affect the learning outcomes. Thus, without a proper assessment acknowledging the students' perception first-hand could lead to a problem in equipping them with the necessary skills and resources to successfully implement hybrid learning environments (Al-Fraihat et al., 2020).

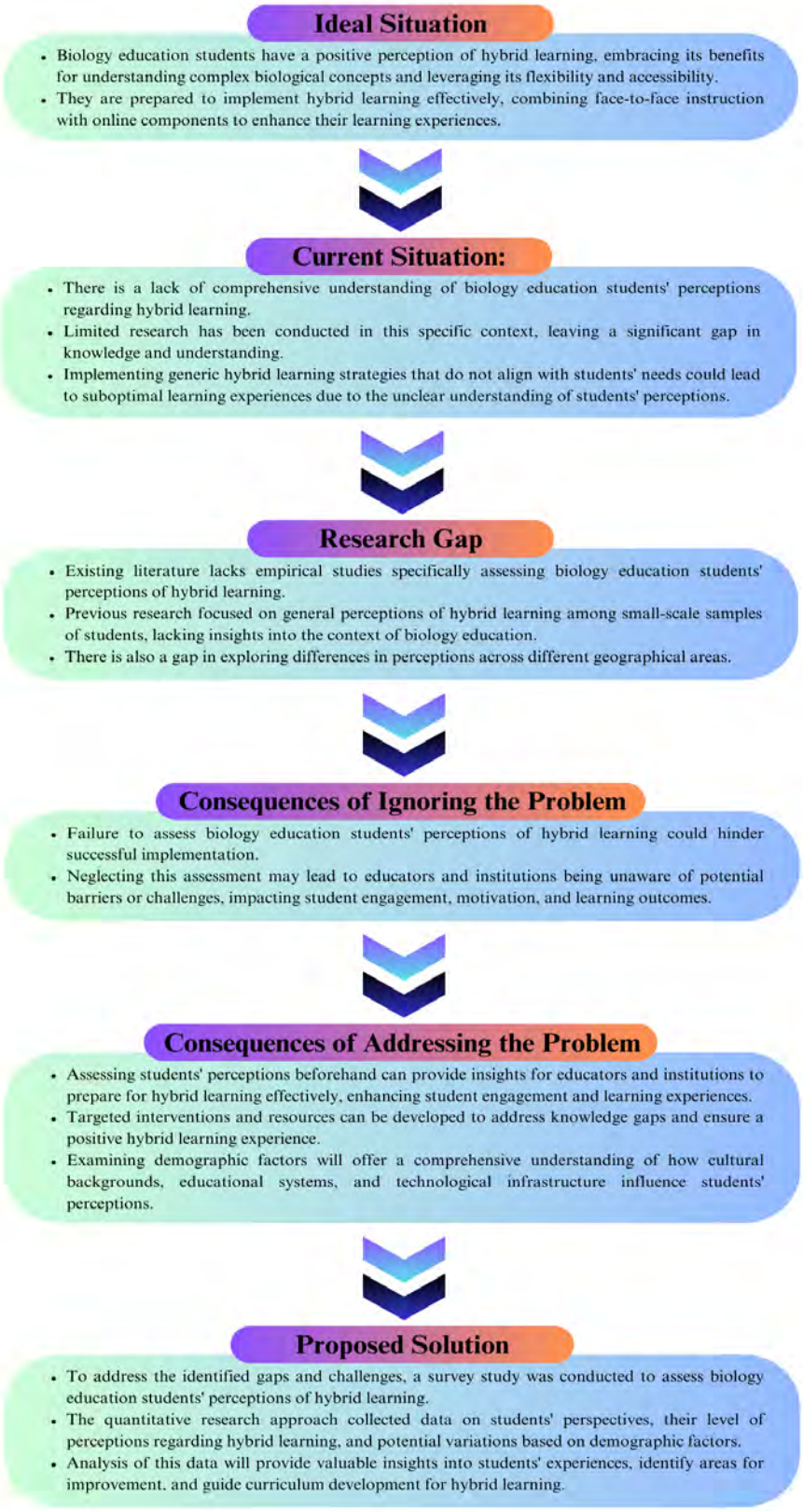
Assessing the students' perceptions for this matter beforehand will lead to several positive outcomes. For instance, being able to provide insights into biology education students' perspectives that will allow educators and institutions to properly prepare the student's needs and preferences when conducting hybrid learning. Hence, this will enhance the students' engagement and the learning experience of hybrid learning.

Apart from that, this will also allow for developing and enhancing targeted interventions and resources to close any knowledge gaps to ensure students' perceptions for the hybrid learning experience. Furthermore, examining the demographic factor of the area between the two distinct contexts will help to provide a comprehensive understanding of how factors such as cultural background, educational system and technological infrastructure may influence the students' perception of hybrid learning.

Therefore, this survey study was carried out to propose a solution of surveying to assess biology education students' perceptions for hybrid learning. The approach of this quantitative research will provide a collection of data on biology education students' perspectives, the student's level of perceptions for hybrid learning, and potential variations that may arise based on demographic factors of the area. Moreover, through analysis of this data, valuable insight will be able to be obtained into students' experiences as well as identifying areas for improvement for a better hybrid learning experience, and this may also give a guide to curriculum development of hybrid learning. Figure 1 will be a visual representation to help a better understanding and an overall conclusion on the problem statement for this study.

Figure 1

The visual representation of the Problem Statement



1.4 Objectives of the Study

1. To determine the level of perceptions of biology education undergraduate students for engaging in hybrid learning in University Pendidikan Sultan Idris, Malaysia, and Universidad Del Sagrado Corazón, Puerto Rico.
2. To compare the level of perceptions for hybrid learning based on the demographic factor between two different groups of biology education undergraduate students.

1.5 Research Questions

1. What is undergraduate biology education students' level of understanding for engaging in hybrid learning in University Pendidikan Sultan Idris, Malaysia, and Universidad Del Sagrado Corazón, Puerto Rico?
2. What is the level of readiness of biology education undergraduate students for engaging in hybrid learning in University Pendidikan Sultan Idris, Malaysia, and Universidad Del Sagrado Corazón, Puerto Rico?
3. Is there any significant difference between the two different groups of biology education undergraduate students' regarding their understanding level of hybrid learning based on the demographic factor?
4. Is there any significant difference between the two different groups of biology education undergraduate students' regarding their readiness level towards hybrid learning based on the demographic factor?

1.6 Hypothesis

Based on the third and fourth research question, a hypothesis will be needed for each of it:

Third Research Question: Is there any significant difference between the two different groups of biology education undergraduate students' regarding their understanding level of hybrid learning based on the demographic factor?

H_0: There is no significant difference in the understanding level of hybrid learning between the two groups of biology education undergraduate students based on the demographic factor.

Fourth Research Question: Is there any significant difference between the two different groups of biology education undergraduate students' regarding their understanding level of hybrid learning based on the demographic factor?

H_0: There is no significant difference in the readiness level towards hybrid learning between the two groups of biology education undergraduate students based on the demographic factor.

1.7 Theoretical Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT) model was incorporated within this research as it helps to provide valuable insight into the factors that influence the acceptance and use of hybrid learning among undergraduate biology education students. Based on Venkatesh, Thong and Zu (2016), the UTAUT model is an integration of existing theories and models to understand the technology's acceptance and use. This UTAUT model consists of four theoretical constructs that align with the research conducted to assess the perceptions of biology education undergraduate students toward hybrid learning.

First would be performance expectancy, which refers to the extent to which individuals believe that through the usage of technology, their performance and productivity can be enhanced. Within the context of research made with hybrid learning, it will relate to the student's expectations of the positive outcomes and enhancement that may be obtained through their engagement within hybrid learning environments.

Next would be the effort expectancy that refers to the individuals' perceptions of the ease and simplicity of technology usage, which focuses on the student's perceptions of the convenience and ease in using and engaging in hybrid learning environments. This will come with the consideration of a few factors, such as user-friendliness and the accessibility of the online learning platforms used.

Moving along, one of the most crucial constructs within the UTAUT model framework would also be the social influence that examines the social factors' impacts on the individuals, acceptance and use of technology. These social factors would be referred to, such as social support, norms, and even the influence of peers and educators. Focusing on the research, specifically, the social influences would refer to the influence of peers, educators, and the university environments on students' perceptions and attitudes toward hybrid learning environments.

lastly, the facilitation of the conditions within the UTAUT framework refers to how much an individual believes that the organization offers the required resources, support, and infrastructure to use technology effectively. In the context of the research on hybrid learning, the facilitating conditions would refer to the factors such as the availability of technological resources, technical support and infrastructure within the educational institutions.

On the other hand, the Connectivism theory, which was proposed by George Siemens and Stephen Downes (Verhagen, 2006), is a learning theory that emphasizes the importance of creating connections within a network of information and experiences (Siemen, 2005). In contrast with traditional theories that view learning as linear and knowledge-based, connectivism highlights the continuous and dynamic nature of learning in the digital era of technology. Focusing on the research aspects, the connectivism theory aligns well with hybrid learning environments in which students will need to engage in various learning activities both online and offline.

Hybrid learning provides access to various resources such as online lectures, simulations, collaborative platforms and traditional in-person classes. This aligns with connectivism theory. Connectivism theory emphasizes diverse learning nodes within a network and students should be able to connect, as well as build their understanding through different modalities, catering to their individual learning preferences and styles.

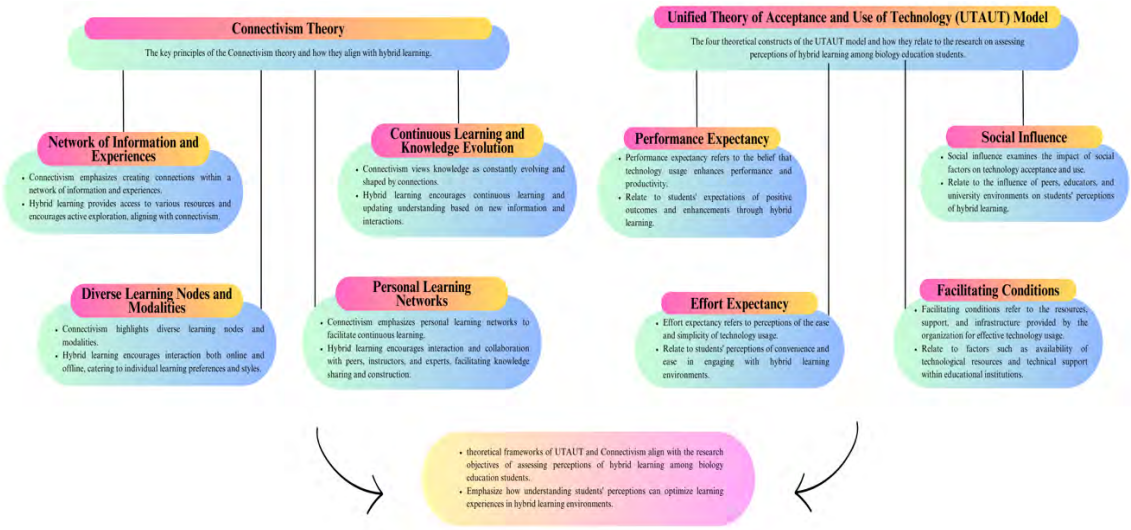
Besides that, hybrid learning differs from the traditional learning method as it encourages active exploration and connection building rather than a linear learning style. Students will need to do their research online, discuss in class, participate in online forums, and update their understanding based on new information and interactions continuously. This would reflect connectivism's core principle of knowledge being constantly evolved and shaped by connections (Siemens, 2005).

Connectivism theories that emphasize the importance of personal learning networks (Ally, 2007) to facilitate continuous learning, also align with hybrid learning. Hybrid learning encourages interaction and collaboration both online and offline, where students will have to form networks with their peers, instructors and experts in sharing knowledge and perspectives throughout the whole learning process.

Lastly, the research on assessing the biology education student's perceptions of hybrid learning aligns with this theory as connectivism theory focuses on the learners' role in constructing meaning (Downes, 2007). To understand the perceptions on how this hybrid learning environment can provide valuable insights for optimizing learning experiences.

Figure 2

The visual representation of the Theoretical Framework



1.8 Significant of the Study

The significance of this research lies in its contribution to the field of biology education and in understanding undergraduate students' perceptions of hybrid learning environments. Through assessing the perceptions of hybrid learning among biology education undergraduate students, this research aims to provide valuable insights. Apart from that is to also helps in providing information to the respective institutions on the effectiveness and acceptance of hybrid learning within the context of biology education undergraduate students.

There are a few discussions that can be made regarding the significance of this study, firstly would be able to provide a comprehensive understanding to the level of perceptions of biology education undergraduate students regarding hybrid learning. This will help educators and policymakers of respective organizations to identify the strength and weaknesses of hybrid learning approaches. Then will help to tailor made

their instructional strategies to enhance student engagement and learning outcomes in the context of hybrid learning environments.

Secondly, through the comparison made based on the perceptions of biology education undergraduate students from the two different universities, this study will help to shed light on the potential influence of demographic factor (area) on the students' perceptions of hybrid learning. Through this understanding of differences found within their perceptions, it can provide sufficient data for the educational institutions to design targeted interventions and support systems to address specific challenges faced by different populations.

Furthermore, this research also aims to contribute to the existing body of knowledge on hybrid learning within higher education. This research perhaps would help to add empirical evidence to the literature, which may be used by the researchers, educators, and even administrators to develop effective pedagogy strategies, instructional design frameworks and policy guidelines for the integration of hybrid learning in focusing on biology education undergraduate students.

Thirdly, the findings found within this research will also help to provide necessary information and data to the curriculum development processes through the highlighted areas. Hybrid learning experience may be optimized to further enhance the teaching and learning experience in biology education. This will help to support the design of hybrid learning that leverages both the face-to-face and online components to ensure much more engaging and effective educational experiences specifically for biology education undergraduate students. This research may also serve as a foundation

for further investigations and future research endeavors in the field of biology education and hybrid learning.

To conclude, the significance of this research lies within the potential it may bring to inform educational practices, enhance biology education programs, and contribute to the existing body of knowledge on hybrid learning. These findings can serve as valuable data or resources for educators, administrators, and researchers, which then will ultimately benefit the biology education undergraduate students and further enhance the field of biology education as a whole.

1.9 Study Limitations

Within this research, there are a few limitations found, firstly would be the sample bias that arises from the specific sample used in data collection. The research was only focusing on undergraduate biology education students from the two universities hence causing the findings to not be able to be fully generalizable towards all biology education undergraduate students within different institutions or regions. This limitation within the sample size and specific demographics of the chosen universities may cause a restriction within the external validity of the study.

Secondly would be the reliance on surveys as the only method of data collection. Although surveys may be able to provide valuable quantitative data, the nuanced and in-depth information may not be able to be captured that could have been obtained through other qualitative methods. These limitations will cause a not thorough

understanding and may reduce the ability to explore thoroughly in the depth of the respondents' perceptions of hybrid learning.

Lastly would be the study's timeframe presents a limitation in terms of capturing a long-term change that may occur or differences over time towards the perceptions of hybrid learning. The research was conducted within a specific time frame given, and this may not allow for the examination of potential shifts that may occur within the attitudes and perceptions towards hybrid learning over the extended duration. Thus, these limitations should be put into consideration when interpreting the data from the study and should be prompt for further exploration in future research endeavors.

1.10 Operation Definition

In this research, the operational definition for perceptions will refer to the subjective understanding and readiness that the individuals possess regarding hybrid learning. It contains two essential elements, which are understanding and readiness, and each of them has its own exploration regarding the topic of interest.

1. Understanding

   The exploration of individuals' understanding of the comprehension, knowledge, and perception regarding the concept, components, and characteristic of the topic of interest, which is hybrid learning. There are a total of four components within the understanding, which are Conceptual Understanding, Technological Awareness, Implementation and Navigation, and Engagement and Personalization.

i. Conceptual Understanding refers to the individuals' ability to grasp the concept of hybrid learning which includes its understanding that hybrid learning is a combination of in-person and online instructional methods. It involves understanding the purpose and benefits of hybrid learning environments.

ii. Technological Awareness refers to the individuals' awareness of technology tools and resources that are required for hybrid learning, and it includes their understanding of the integration of digital resources and online platforms in hybrid learning and challenges that may occur from the technology used.

iii. Implementation and Navigation is the individual's understanding of how hybrid learning is able to allow both on-site and remote students to attend the learning activities simultaneously, and it involves a comprehension within the navigation between asynchronous online and synchronous in-person activities in hybrid learning.

iv. Engagement and Personalization would be the individual's understanding of the opportunities for interactive and collaborative learning experiences in a hybrid learning environment and the awareness of the importance of effective time management and self-directed learning, as well as the potential for personalizing the learning experience in hybrid learning, will also be included.

2. Readiness

The exploration on the preparedness, confidence, and perceptions in engaging in a learning environment that combines person-and online instructional methods, and there are a total of four components within readiness which are Preparedness and Confidence, Access to Technology and Resources, Engagement and Collaboration, and Support and Perception.

i. Preparedness and Confidence refer to the individual's confidence in the abilities to navigate and engage effectively in both face-to-face and online components of hybrid learning, and it includes feelings of preparation, having the necessary skills needed for effective time management and adaptation towards different instructional methods and modes of knowledge delivery.

ii. Access to Technology and Resources would be the availability and access to the required technology tools and resources needed for successful participation in hybrid learning, and it involves having the necessary technological infrastructures and resources in place to allow themselves to participate in the hybrid learning experiences.

iii. Engagement and Collaboration would refer to the individuals' readiness to be highly engaging in collaborative learning experiences both on-site and online. This will include the responsibilities of their own learning,

engaging in self-directed online activities, and effectively collaborating with peers and educators.

iv. Supports and Perception would be the perception of support received from the institutions or educators regarding providing the necessary guidance, assistance, and resources for hybrid learning, and it also involves the individual's perceptions of the benefits and value that hybrid learning will be able to provide as compared to a traditional face-to-face instruction.

3. Hybrid learning

In this research, it is defined as an educational approach that integrates both face-to-face and online instructional methods to deliver the learning experiences from the educators to the students effectively. It will involve a combination of face-to-face instruction and online components within the educational frameworks and allows the simultaneous participation of on-site students and remote students. Hybrid learning will act as the independent variable within this research and is the central focus of this research.

4. Biology education undergraduate students

The respondent refers to the students who enrolled themselves in biology education undergraduate program. There are no restrictions in terms of gender, age, or semester in this context. These biology education undergraduate students are from UPSI,

Malaysia, and UDSC, Puerto Rico. These will be the target respondents for this research.

5. Demographic area

The area refers to the geographical location of the participating universities, which are Universiti Pendidikan Sultan Idris in Malaysia and Universidad del Sagrado Corazón in Puerto Rico. It will represent the distinct cultural and educational contexts associated with each of the locations, and this research will explore how the demographic factor of the area may influence the perceptions of undergraduate biology education students toward hybrid learning.

These operational definitions will help to ensure a clear and comprehensive understanding of the key constructs of this research. This operation definition will be able to lay the groundwork for questionnaire's content, data collection, analysis, and interpretation of the data contributing to the overall validity and reliability of the research findings.

1.11 Conclusion

To conclude, this research aims to contribute to the understanding of biology education undergraduate students towards hybrid learning and through addressing the research questions and hypothesis. Through the examination of their understanding and readiness of hybrid learning in the context of their perceptions of it, the study seeks to gain thorough insights into the factors that influence the students' acceptance and use

of hybrid learning in the context of biology education. The research questions and hypothesis were used to guide the study and it will be supported by the theoretical frameworks of the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Connectivism Theory.