05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

TEACHERS' PERSPECTIVES ON E-LEARNING USAGE, IMPACT AND CHALLENGES TOWARDS STUDENTS' BIOLOGY PRACTICAL SKILLS ACQUISITION

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

MOWAFAQ YOUSEF QASIM

UNIVERSITI PENDIDIKAN SULTAN IDRIS

2024

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

TEACHERS' PERSPECTIVES ON E-LEARNING USAGE, IMPACT AND CHALLENGES TOWARDS STUDENTS' BIOLOGY PRACTICAL SKILLS ACQUISITION

MOWAFAQ YOUSEF QASIM

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

DISSERTATION PRESENTED TO QUALIFY FOR A MASTER'S DEGREE IN EDUCATION
(RESEARCH MODE)

FACULTY OF SCIENCE AND MATHEMATICS
UNIVERSITI PENDIDIKAN SULTAN IDRIS

2024

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

UPSI/IPS-3/BO 32
Pind : 00 m/s: 1/1

UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

Please tick (√)	
Project Paper	
Masters by Research	√
Master by Mixed Mode	
PhD	

INSTITUTE OF GRADUATE STUDIES

DECLARATION OF ORIGINAL WORK

This declaration is made on the day of 2024

i. Student's Declaration:

I, **MOWAFAQ YOUSEF EL QASIM, M20182002233, FACULTY SCIENCE AND MATHEMATICS** (PLEASE INDICATE STUDENT'S NAME, MATRIC NO. AND FACULTY) hereby declare that the work entitled **"TEACHERS PERSPECTIVES ON E-LEARNING USAGE IMPACT AND CHALLENGES TOWARDS STUDENT'S BIOLOGY PRACTICAL SKILLS ACQUISITION"** is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

Signature of the student

ii. Supervisor's Declaration:

I, **ASSOC. PROF. DR. SYAKIRAH SAMSUDIN** (SUPERVISOR'S NAME) hereby certifies that the work entitled **"TEACHERS PERSPECTIVES ON E-LEARNING USAGE IMPACT AND CHALLENGES TOWARDS STUDENT'S BIOLOGY PRACTICAL SKILLS ACQUISITION"**(TITLE) was prepared by the above named student, and was submitted to the Institute of Graduate Studies as a * partial/full fulfillment for the conferment Of **MASTER OF EDUCATION** (PLEASE INDICATE THE DEGREE), and the aforementioned work, to the best of my knowledge, is the said student'swork.

13/6/2024
Date

Signature of the Supervisor

PROF. MADYA DR. SYAKIRAH SAMSUDIN
Pensyarah Kanan
Jabatan Biologi
Fakulti Sains dan Matematik
Universiti Pendidikan Sultan Idris

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

UPSI/IPS-3/BO 31
Pind.: 01 m/s:1/1

UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

INSTITUT PENGAJIAN SISWAZAH /
INSTITUTE OF GRADUATE STUDIES

BORANG PENGESAHAN PENYERAHAN TESIS/DISERTASI/LAPORAN KERTAS PROJEK
DECLARATION OF THESIS/DISSERTATION/PROJECT PAPER FORM

Tajuk / *Title*: **"TEACHERS PERSPECTIVES ON E-LEARNING USAGE IMPACT AND CHALLENGES TOWARDS STUDENT'S BIOLOGY PRACTICAL SKILLS ACQUISITION**

No. Matrik /*Matric's No.*: **M20182002233**

Saya / *I* : **MOWAFAQ YOUSEF EL QASIM,**

(Nama pelajar / *Student's Name*)

mengaku membenarkan Tesis/Disertasi/Laporan Kertas Projek (Kedoktoran/Sarjana)* ini disimpan di Universiti Pendidikan Sultan Idris (Perpustakaan Tuanku Bainun) dengan syarat-syarat kegunaan seperti berikut:-
acknowledged that Universiti Pendidikan Sultan Idris (Tuanku Bainun Library) reserves the right as follows:-

1. Tesis/Disertasi/Laporan Kertas Projek ini adalah hak milik UPSI.
   The thesis is the property of Universiti Pendidikan Sultan Idris
2. Perpustakaan Tuanku Bainun dibenarkan membuat salinan untuk tujuan rujukan dan penyelidikan.
   Tuanku Bainun Library has the right to make copies for the purpose of reference and research.
3. Perpustakaan dibenarkan membuat salinan Tesis/Disertasi ini sebagai bahan pertukaran antara Institusi Pengajian Tinggi.
   The Library has the right to make copies of the thesis for academic exchange.
4. Sila tandakan (√) bagi pilihan kategori di bawah */ Please tick (√) for category below:-*

☐	**SULIT/*CONFIDENTIAL***	Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub dalam Akta Rahsia Rasmi 1972. / *Contains confidential information under the Official Secret Act 1972*
☐	**TERHAD/*RESTRICTED***	Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan ini dijalankan. / *Contains restircted information as specified by the organization where research was done.*
☑	**TIDAK TERHAD / *OPEN ACCESS***	

(Tandatangan Pelajar/ Signature)

Tarikh: 13/6/2024

(Tandatangan Penyelia / *Signature of Supervisor*)
& (Nama & Cop Rasmi / *Name & Official Stamp*)

PROF. MADYA DR. SYAKIRAH SAMSUDIN
Pensyarah Kanan
Jabatan Biologi
Fakulti Sains dan Matematik
Universiti Pendidikan Sultan Idris

Catatan: Jika Tesis/Disertasi ini **SULIT @ TERHAD**, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan ini perlu dikelaskan sebagai **SULIT** dan **TERHAD**.

Notes: If the thesis is CONFIDENTAL or RESTRICTED, please attach with the letter from the organization with period and reasons for confidentiality or restriction.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to all those who have supported and guided me throughout the journey of completing this thesis. First and foremost, my heartfelt thanks go to my supervisor, Assoc. Prof. Dr. Syakirah Samsudin, for her consistent support, insightful comments, and valuable guidance. Special thanks to my family and friends, whose constant support and understanding have been a source of strength.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

ABSTRACT

The study aimed to identify teachers' perspectives on e-learning usage, impact and challenges on students' biology practical skills acquisition among Grade-12 students in the United Arab Emirates (UAE) proposing a biology practical skill teaching framework. The study employed a quantitative research design, and a questionnaire was administrated for collecting data. The study sample consisted of 226 biology teachers distributed over seven educational districts in government secondary schools in the UAE selected by stratified random sampling method. Descriptive statistics, Pearson Correlation coefficient and the simple linear regression analysis were employed to make decision and testing the study's hypotheses. The results revealed that e-learning enhances the learning process and resources in biology classes. Nevertheless, teachers acknowledged obstacles that hinder the effectiveness of e-learning in teaching biology practical skills. Additionally, there is a significant correlation between e-learning usage and biology practical skills acquisition ($r = 0.759$, $p = 0.000$). Moreover, e-learning challenges have a significant impact on e-learning usage in biology practical skills acquisition for Grade-12 students ($r = 0.591$, $p = 0.000$). Furthermore, e-learning challenges significantly impact on the usage of e-learning in applying biology practical skills ($r = 0.631$, $p = 0.000$). These findings contributed to the existing literature on e-learning implementation and provide valuable insights for educational policymakers, curriculum developers, and teachers seeking to enhance biology practical skills instruction using e-learning platforms. Ultimately, this study emphasized the importance of addressing the challenges and maximizing the potential of e-learning in promoting effective biology education in particular Grade-12 classrooms in the UAE.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

PERSPEKTIF GURU TERHADAP PENGGUNAAN E-PEMBELAJARAN DAN CABARAN TERHADAP PEMEROLEHAN KEMAHIRAN AMALI BIOLOGI PELAJAR

ABSTRAK

Kajian ini bertujuan untuk mengenal pasti perspektif guru terhadap penggunaan e-pembelajaran, impak dan cabaran ke arah pemerolehan kemahiran amali biologi pelajar dalam kalangan pelajar Gred-12 di Emiriah Arab Bersatu (UAE) dengan mencadangkan kerangka pengajaran kemahiran amali biologi. Kajian ini menggunakan reka bentuk kajian kuantitatif dan soal selidik ditadbir untuk mengumpul data. Sampel kajian terdiri daripada 226 guru biologi daripada tujuh daerah pendidikan di sekolah menengah kerajaan di UAE yang dipilih melalui kaedah persampelan rawak berstrata. Statistik deskriptif, pekali Korelasi Pearson dan analisis regresi linear mudah digunakan untuk membuat keputusan dan menguji hipotesis kajian. Keputusan menunjukkan bahawa e-pembelajaran meningkatkan proses pembelajaran dan sumber dalam kelas biologi. Namun begitu, guru mengakui halangan yang menghalang keberkesanan e-pembelajaran dalam pengajaran kemahiran amali biologi. Selain itu, terdapat korelasi yang signifikan antara penggunaan e-pembelajaran dan pemerolehan kemahiran amali biologi ($r = 0.759$, $p = 0.000$). Selain itu, cabaran e-pembelajaran mempunyai kesan yang signifikan terhadap penggunaan e-pembelajaran dalam pemerolehan kemahiran amali biologi untuk pelajar Gred-12 ($r = 0.591$, $p = 0.000$). Tambahan pula, cabaran e-pembelajaran memberi impak yang ketara kepada penggunaan e-pembelajaran dalam mengaplikasikan kemahiran amali biologi ($r = 0.631$, $p = 0.000$). Penemuan ini menyumbang kepada literatur sedia ada tentang pelaksanaan e-pembelajaran dan memberikan pandangan berharga untuk penggubal dasar pendidikan, pembangun kurikulum dan guru yang ingin meningkatkan pengajaran kemahiran amali biologi menggunakan platform e-pembelajaran. Akhirnya, kajian ini menekankan kepentingan menangani cabaran dan memaksimumkan potensi e-pembelajaran dalam mempromosikan pendidikan biologi yang berkesan khususnya di bilik darjah Gred-12 di UAE.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

TABLE OF CONTENTS

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

LIST OF TABLES

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

LIST OF FIGURES

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi
05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

LIST OF ABREVIATION

ACT-R	Adaptive Control of Thought Rational
TAM	Technology Acceptance Model
CVI	Content Validity Index
CVR	Content Validity Ratio
S-FVI	Scale Face Validity Index
S-CVI	Scale Content Validity Index

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi
05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

CHAPTER 1

INTRODUCTION

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

1.1 Introduction

Education is the most important priority for countries as they seek to develop human capital. Also, education provides students with technical and practical skills to develop the economy in the public and private sectors. Besides, countries work hard to graduate generations of specialists and professionals in this sector to be major pillars in their development. Furthermore, those specialists and professionals actively participate in entrepreneurship and development in those countries.

Educational research is crucial to solving challenges and improving the education sector, as decision makers rely on its findings and recommendations (Basu, 2020).

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Ali and Qashmar (2017) stated that exploring e-learning and its application in teaching science and practical skills, especially in biology, must be subject to a comprehensive examination to assess its effectiveness and feasibility in educational environments.

This study was conducted to investigate teachers' perspectives on e-learning usage and its challenges in acquiring practical skills in biology for Grade-12 students. This chapter provides a brief explanation of the study. It includes the background of the study, problem statement, the theoretical framework, research objectives, research questions and research hypothesis. It also explains the significance of the study, research limitations and operational definitions.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

1.2 Background of Study

e-learning has become a top priority in the current phase of the United Arab Emirates (UAE), especially since information technology education tops the priorities of educational goals. Since the beginning of 2020, exactly in March, UAE has launched e-learning in all UAE educational institutions (public and private schools and higher education) because of the spread of COVID-19. The Ministry of Education (MOE) has carried out dense training programs for all teachers to cope with the new educational system which depended mostly on e-learning (U.A.E, 2021).

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

MOE in the UAE has launched smart learning platforms, guidelines and instructions to manage students' behavior on e-learning systems. MOE offered free internet services for students at schools and homes in the areas lacking home internet connection. All these efforts made for the success of e-learning strategy. In the background of the research the study variables will be presented, in addition to the theories on which the study based on. This will be carried out by addressing the following headings: information technology, e-learning, e-learning in the UAE and theoretical framework.

1.2.1 Information Technology and e-learning

The world today witnesses a massive technological revolution impacting politics, society, economy, and education. Consequently, countries are adapting their educational policies and plans to accommodate these changes. Abu Aql (2012) pointed out that technological progress and modern communication have led to a rethinking of educational institutions to accommodate e-learning, a new approach that doesn't require physical presence of both teacher and learner as in traditional education.

The Fourth Industrial Revolution's (IR4.0) rapid technological advancements significantly impact human life, introducing innovations like digital technology, artificial intelligence, and smart applications, leading to changes in the education system. Lase (2019) indicated that the IR4.0 era's features: increased communication, digital system development, and information technology advancement. As boundaries

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

between humans, machines, and resources blur, the impact of information and communication technology extends to sectors like education. Fisk (2017) added that there are tendencies related to IR4.0 and education such as, learning can be done anytime and anywhere. e-learning tools afford great opportunities for remote self-learning, students will be assessed differently and traditional student assessment platforms may become inappropriate or inadequate.

Darma, Ilmi, Darma, and Syaharuddin (2020) asserted that the curriculum's use of the internet for global access, teachers' access to more references and innovative teaching methods, home-based learning through specific applications, lectures, and webinars enabled by IR4.0 to accelerate education, improve its quality, and ensure sustainability in challenging circumstances. Technological progress, the information revolution, and rapid knowledge advancement require the educational system to adapt quickly. Key changes include the shift from teacher-centered to student-centered education, particularly through the implementation of e-learning. (Al-Khatib, Al Malahi, Al-Hajjar, Matar & Hassouna, 2017). Al-Mousa (2009) explained e-learning as a method of education using means of communication, modern computers, networks, and multimedia, such as sound, image, graphics, search mechanisms, and electronic libraries. As well as internet portals, whether remotely or in the classroom, used to deliver the information to the learner in the shortest time, least effort and the greatest benefit.

Al-Shahrani (2008) suggested that, traditional educational institutions may become obsolete due to global changes in knowledge production and distribution, supported by advancements in communication, information, and technology

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

revolutions. Chikhalkar (2020) indicated that e-learning as an advanced teaching and learning system, utilizes computers and the internet to process skills and information. It includes computer-based learning, e-learning, and virtual teaching tools, delivering content via web, audio, video tape, CD-ROM, and satellite channels.

Muppudathi (2012) mentioned that, e-learning includes diverse applications like computer-based learning, virtual classrooms, and digital collaboration, using communication technology and digital environments for content delivery and resource management. Bin Shinan and Al-Shaya (2010) stated that the idea of e-learning was built around the philosophy of education at anywhere and anytime; meaning that the learner can obtain educational materials whenever and wherever he wants or needs.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

The aforementioned indicates that information technology plays a significant role in education, as evidenced by its active participation during the COVID-19 epidemic. Thus, most education systems have been changed, from traditional learning models to systems that implement e-learning, whether it is synchronous or asynchronous. Xie, Siau, and Nah (2020) indicated that e-learning teaching style is a critical component to sustaining the educational process of learning in educational institutions in schools, universities, and other institutes during the worldwide pandemic. In general, e-learning (online) is an alternative or complement to traditional learning especially in the unusual circumstances.

The trend towards e-learning today is progressing, especially in the wake of the COVID-19 pandemic, with a strong focus on enabling and expanding its use to

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

align with traditional education in parallel. Education specialists verified that e-learning will become more widely used and that there will be a greater reliance on it, especially after overcoming the obstacles that may appear through its implementation as well due to the emergence of modern applications (Qashou, 2022; Hassan, 2022; King & South, 2017). So, technology tools and platforms will be employed in the classroom as well as virtual reality will be activated in a large and rapid way. E-learning usage has become more accepted and integrated in the educational process that will provide new methods of learning and access to a more effective and interactive digital learning environment that contributes to the achievement of educational outcomes easily (Al Rawashdeh, Mohammed, Al Arab, Alara & Al-Rawashdeh, 2021). This prompts stakeholders to increase their use of e-learning, leading to its continued promotion post-pandemic. However, traditional education will not be neglected; Instead, both will coexist through blended learning, making e-learning inseparable from traditional methods (Lalima & Dangwal, 2017).

1.2.2 Biology Practical Skills

When using information technology in the teaching of natural sciences; including biology, it is necessary to consider the particularities of the content of biology education: living with objects, observing life processes in them, and experimenting. The more practical the teaching process is, the more the students' knowledge and skills will be (Tursunaliyevna, 2017). Cullin, Hailu, Kupilik and Petersen (2017) emphasized that laboratory practices play a central role in narrowing the gap between theory and practice, and laboratory applications were mentioned to help students

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

understand the science concepts in a holistic and meaningful way, so laboratories are considered as essential component of science education. Sadoglu and Durukan (2018) noted that the debate over the purpose of the laboratory led to evolving views on learning objectives. So, the laboratory should teach practical skills, not just focus on scientific concepts, without negatively impacting students' attitudes toward science.

It is believed that teachers should focus more on laboratory activities so that the learners could accurately implement the scientific concepts and avoiding any misconceptions (Duban, Aydoğdu & Yüksel 2019). Al-Duliami (2018) emphasized that, the crucial role of laboratories in enhancing both teacher and learner experiences, fostering knowledge acquisition and skill development. Additionally, they expand teachers' delivery methods and enable interactive learning with students as active participants. Ja'affer (2015) asserted that the use of the laboratory in teaching helps students' acquisition of practical skills, information and theoretical ideas, leading to better understanding of the nature of science. It also contributes to the consolidation of information learned by the student when compared to information learned in theoretical-based teaching.

Science teachers often stress that many learning outcomes are achieved through practical laboratory activities, Bahtiar and Dukomalamo (2019) stated that biology practical skills can be carried out with laboratory experiment design or field study, for example, the structure and function of plant tissue needs to be done with a useful laboratory practice model where students get hands-on experience by conducting experiments in laboratories. Hofstein and Lunetta (1982) added, through laboratory teaching students' motivation and positive behaviours towards science

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

education will be enriched. Besides, laboratory teaching develops students' level of knowledge in scientific subjects, and this is evident in biology laboratories.

Sanchez and Wilkes (2016) mentioned that practical skills in biology include the use of tools for quantitative measurements (e.g., mass, time, temperature, pH), laboratory glassware for experimental techniques (e.g., serial dilutions, measurements of plant or animal response), and qualitative reagents for the identification of biological molecules, in addition to electrophoresis. Chosewood and Deborah (2009) added, microbiological techniques include the use of laboratory devices for a variety of experimental techniques as microbiological sterilization, the safe use of instruments like dissection tools and the separation of biological compounds using thin layer-paper chromatography.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Gobaw and Atagana (2016) said that the biological manipulative laboratory tasks are: using the basic biology laboratory equipment, precise use of light microscope and measuring techniques. Also, Krogmann and Holstein (2010) added, that preserving biological samples are also essential practical skills for applied biology. Moreover, dissection in biology fosters hands-on learning, enabling students to actively engage with the material and enhancing motivation and understanding of complex concepts (Edulab, 2016). Ultimately, this contributes to achieving various learning outcomes, including those within the theoretical framework of the subjects.

Practical skills in laboratory experiments, in teaching biology, especially in the Grade-12 curriculum, are of utmost importance. This is due to a real application of the

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

concepts and knowledge included in the curriculum that enables Grade-12 students to conduct their experiments to achieve more depth in dealing with theoretical ideas through conducting practical experiments (Shana & Abulibdeh, 2020). Gobaw and Atagana (2016) indicated that the practical skills include, for example, but not limited to; the skills of using laboratory glassware tools, as well as the skills of dealing with chemicals, the skill of hands-on dissection, identifying plants and their parts, preparing microscopic slides, the manipulating skills of a light microscope, drawing skills, and label the drawing. Hegazy (2011) emphasized that the application of these skills enhances the understanding of the theoretical biological concepts included in the curriculum, which increases students' cognitive levels, in addition to working on developing positive attitudes towards science and scientists. Al-Shehri (2009) pointed out that Grade-12 curriculum covers various skills, including manual efficiency, academic capabilities such as classification and organization, social skills including cooperative work, teamwork, and communication skills such as critical analysis and effective communication. Iskandar, Mahmud, Wan Abdul Wahab, Jamil and Basir (2013) indicated that the need for interactive learning systems to improve students' competency in laboratory techniques due to insufficient practical hours, suggesting e-learning as a means to support educational transformation towards creativity and skill development.

e-learning affect the acquisition and refinement of practical scientific skills, especially in biology. Traditionally, practical skills in biology are developed through hands-on laboratory experiments conducted within physical classrooms. However, the emergence of e-learning platforms and virtual laboratories has ushered in a new era of interactive learning experiences (Anazifa, 2021). Byukusenge, Nsanganwimana and

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Tarmo (2022) added that the acquisition and improvement of practical skills in biology is influenced by e-learning, providing innovative and interactive learning experiences. Traditionally, practical skills in biology have been developed mostly through hands-on laboratory experiments conducted within physical classrooms. However, the emergence of e-learning platforms and virtual laboratories has revolutionized biology education, providing students with new opportunities to develop practical skills. According to (Elsayed and Hasegawa, 2019) e-learning offers students the opportunity to participate in practical activities remotely, as it offers a variety of interactive simulations and digital resources. These platforms enable students to conduct experiments, manipulate variables, and monitor results in a controlled virtual environment that closely mimics real-life laboratory settings. Furthermore, e-learning tools such as interactive tutorials, video demonstrations, and 3D models enhance comprehension of complex biological concepts (Allen, 2018).

Overall, e-learning may Significantly impact the acquisition and refinement of biology practical skills, offering a dynamic and immersive learning experience that complements traditional laboratory instruction.

1.2.3 e-learning in UAE

The educational and skilful activities in biology vary in the United Arab Emirates (UAE) and correspond primarily to the prescribed curriculum of the Grade-12 student's book, and in line with international standards in formulating biology

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

curricula and related skills (Ministry of Education UAE, 2020). This clarifies the nature of the experiments that will be conducted by the students according to what are stated in the practical skills book.

COVID-19 pandemic has led to school closures around the world. As a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms. Moreover, there has been a significant surge in usage of distance e-learning since the pandemic (Li & Lalani, 2020). While the entire world is still fighting the disease around the world, the e-learning approach has been the typical solution during the pandemic phase. After that, educational institutions had resumed face-to-face approach, still most of them continue to utilize e-learning and its devices and tools. Darayseh (2020) pointed out that the pandemic's impact on teaching science in the UAE stressed the need to enhance teachers' digital competencies for hands-on activities, student interaction, behavior management, assessment, and time management. Further studies focusing on different science branches in the same context are recommended. Zalat, Hamed, and Bolbol (2021) asserted the need for further research on all aspects of the new education method amid the current circumstances. They emphasized considering the perspectives of teachers, students, administrators, families, and decision-makers.

Bawa'aneh (2021) mentioned that in UAE, the Ministry of Education mandated full adoption of e-learning by the end of the second trimester for the academic year 2019-2020, impacting all educational sectors, including public and private institutions, as well as higher education. This led to the launch of e-learning infrastructure in UAE. Al Mansoori (2020) referred that the Ministry of Education

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

(MOE) introduced various e-learning platforms and resources, both internally and externally sourced, following rigorous evaluation before integration into the Learning Management System (LMS). These include learning platforms, interactive materials, and assessment tools, with educational plans promptly adapted to suit the new e-learning system.

It is worth noting that UAE has invested generously in Information Communication Technology (ICT) infrastructure for a stable internet connection to reduce the technical problems facing e-learning (Al-Karaki, Ababneh, Hamid, & Gawanmeh, 2021). Bawa'aneh (2021) pointed out that the Learning Management System in UAE (LMS) was enriched by educational material from several platforms like, Microsoft Teams together with the existing Emirati platform, namely Madrasa, Alef and Al-Diwan as shown in Figure 1.1. For virtual labs, the LMS was provided with virtual labs from Praxilab platforms. Also, an agreement with McGraw Hill publishers helped in using their products through the e-learning implementation. Moreover, the McGraw-Hill platform covers science and mathematics curricula. It deals with the same educational levels as the Madrasa platform (Al-Shura, 2022). Madrasa platform contains 5,000 educational lessons in physics, chemistry, and biology, in addition to mathematics and General Science. The platform covers various curricula, from kindergarten to Grade 12. It also includes practical exercises, videos and applications in various scientific subjects to support the educational process in an integrated framework.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Figure 1.1. e-learning platforms in UAE

Microsoft is an effective strategic partner for the Ministry of Education in UAE, as it provided the Microsoft Teams platform for the Ministry of Education in UAE. Almarashdi and Jarrah, (2021) pointed out that this platform serves teachers, students, and administrators, as it provides tools that help the stakeholders to communicate and collaborate with each other. Anonymous (2022) stated that The Ministry of Education (MOE) has developed Al-Diwan platform, which allows teachers and students in public schools to access educational curricula electronically on their computers, and interact with them in a smooth and interesting way. It also allows them to download electronic copies of the various books available for all subjects, and access them at anytime and anywhere.

A Praxilab platform has been launched in the e-learning system which is concerned with the curricula of physics, chemistry, biology and general science. Where it provides explanations of practical experiments and presents this to students in an interactive manner as well as simulates laboratory experiments in the laboratory (Bawa'aneh, 2021).

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Moreover, Alef platform, which is a digital learning platform that uses technology to support teaching and learning transforms traditional teaching methods to create modern 21st century learning communities. It enables schools to implement a student-centred teaching model that fosters independent learning and enhances student engagement. Additionally, it takes a comprehensive approach to learning, engaging students in subjects like Math, Science, Arabic language, Islamic Studies, Social Studies, and English (Alyammahi, 2019).

According to (Alenezi, Alfadley, Alenezi, and Hadi, 2022), the world is currently dealing with a new challenge as the sudden shift to e-learning completely changed the form of normal teaching practice. This forces teachers and institutions to develop more innovative teaching methods to support students' learning (Oyedotun, 2020). Thus, the unusual situation resulting from the COVID-19 crisis, the impact on education systems, components, methods and institutions including schools, universities, teachers and students has become a topic of great importance that draws the attention of many researchers and professionals around the world after the pandemic.

After the pandemic, e-learning educational environment has been continued after the school reopening by most countries, this left the doors open to discussion and criticism. It also opened research opportunities for evaluation and planning for the future of education during and after the pandemic. The pandemic has paved the way for a new era of a learning system that will shape the future teaching methodologies that depend on electronic systems, the role of e-learning will shift from being an off-the-shelf emergency solution into an effective learning mechanism that will create

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

new opportunities and support existing traditional learning methods (Pokhrel & Chhetri, 2021). Furthermore, (Al Rawashdeh, Mohammed, Al Arab, Alara and Al-Rawashdeh, 2021; Bawa'aneh, 2021) confirmed that this will require further studies and investigations to cover all educational aspects and achieve the requirements of effective e-learning.

Based on the measures to reach education that meets the needs and achieves educational outcomes- and the adoption of e-learning in the schools of the United Arab Emirates has prompted the researcher to investigate the teachers' perspectives towards the impact of e-learning on biology learning and biology practical skills of Grade-12 students in UAE Public government schools.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

1.3 Problem Statement

COVID-19 pandemic swept most countries of the world; this is what forced all educational institutions to switch from physical face-to-face education, which leads to the spread of the infection, to e-learning. Abu Shkheidem, Awad, Khalilah and Al-Amd (2020) mentioned that e-learning has long been talked about and there was a debate about the need to integrate it into the educational process before the COVID-19 pandemic. It has become an alternative and an urgent necessity for the education sustainability in these circumstances. Teachers were forced to transfer to e-learning, which requires them to integrate technology into their instruction (Ondis, 2020).

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Alsalhi, Eltahir and Al-Qatawneh (2019) noted that UAE Ministry of Education's launch of e-learning platforms and an LMS, has enabled students to access educational materials virtually or through simulation. In other words, e-learning allowed teachers to apply practical activities accompanying scientific curricula (Darayseh, 2020).

The resurgence of e-learning post-pandemic sparked widespread discussion on its effectiveness globally, especially in STEM subjects like science, impacting student performance in national exams. With UAE schools shifting to e-learning for science education due to the pandemic, there's a pressing need to investigate if simulations and virtual platforms suffice for implementing laboratory experiments and practical activities. Alterri, Hindi, AlMarar, and Shubair (2020) highlighted that the challenges in e-learning, particularly in scientific practical skills like biology, emphasized the need for more research on its effectiveness and solutions (Bawaneh, 2021; Wisanti et al., 2021; Kelum et al., 2020). Similarly, Okereke et al. (2020) stressed the importance of addressing challenges that could hinder the feasibility of e-learning. Consequently, comprehending how these challenges impact the acquisition of practical biology skills becomes crucial for educators and organizations seeking to create more effective e-learning experiences (Zalat, Hamed, & Bolbol, 2021).

Secondary level education focuses on developing scientific thinking and practical scientific skills, which has a positive impact on the formation of the personal aspects of students that qualifies them for the next phase of education (Al-Shehri, 2018). On the other hand, Al-Barqi (2018) found that there is a lack of laboratory computerized processing in secondary schools, and a low level in laboratory

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

experiments implementation. Moreover, the practical work has a key role in the curriculum and in teaching science subjects such as biology in Grade-12 level (Dagnew & Sitotaw, 2019). Grade-12 education system in UAE emphasizes practical scientific skills, especially in biology, aiming to bridge the gap between secondary and higher education while incorporating laboratory experiments to foster learners' practical skills (Olabiyi, 2015).

Teachers play a crucial role in education, shaping its quality and success through their opinions which are integral in constructing educational development plans (Al-Shaer, 2022; Muslim, Dahawy and Khater (2019). Their perspectives in educational research enhance results credibility and assess the effectiveness of teaching methods (Yigit & Bagceci, 2017).

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

The adoption of diverse technologies such as virtual laboratories, Virtual reality and multimedia resources to simulate real-world experiences reshaped the education system and fostering innovative biology education approaches (Anazifa, 2021). To effectively integrate experiential laboratory activities into this educational method, educators must first evaluate available resources, including materials and technical expertise, to determine the feasible approach (Bhute, 2021). In response to the increased use of technology in education the MOE in UAE introduced the Adaptive Education Framework (Alef). Alyammahi (2019) asserted that this educational framework relies on integrating technology and e-learning tools, using computers to deliver pre-loaded content and assessments on an e-platform. The teacher acts as a facilitator, striving for independent, student-centered education aligned with UAE curricula. Despite (Alef) addressing of various aspects of

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

technology integration technology integration, there is still a need for a devoted framework focused on implementing practical biology skills through technology and e-learning tools.

A few studies have focused particularly on the factors that impact the success of adopting e-learning instructional technologies among education institutions in UAE (Daouk & Aldalaien 2019). However, these studies did not directly address practical skills in biology, especially among Grade-12 students. Therefore, there is a need for further studies to investigate the application of e-learning in teaching science in UAE, particularly its effectiveness, challenges and impacts on the practical skills acquisition.

Based on the previously mentioned, this study aims to investigate the teachers' perspectives regarding the e-learning usage and its challenges on the biology practical skills for Grade-12 students.

1.4 Research Objectives

The study aims to:

i. Identify the perspectives of biology teachers towards e-learning usage in teaching biology practical skills for Grade-12 students.
ii. Identify the perspectives of biology teachers on the impact of e-learning on the biology practical skills acquisition for Grade-12 students.
iii. Identify the perspectives of biology teachers on the challenges faced applying biology practical skills for Grade-12 students through e-learning.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

iv. Determine the relationship between using e-learning and biology practical skills acquisition for Grade-12 students.

v. Determine the relationship between e-learning challenges and biology practical skills acquisition for Grade-12 students.

vi. Determine the relationship between e-learning challenges and e-learning usage by biology teachers.

vii. Propose a framework for teaching biology practical skills through e-learning.

1.5 Research Questions

Based on the perspective of biology teachers, this study will answer the following questions:

i. What are the biology teachers' perspectives towards e-learning usage in teaching biology practical skills for Grade-12 students?

ii. What are the biology teachers' perspectives towards the impact of e-learning on the biology practical skills acquisition for Grade-12 students?

iii. What are the biology teachers' perspectives on the challenges in implementing biology practical skills for Grade-12 students through e-learning.?

iv. Is there any relationship between the e-learning usage and biology practical skills acquisition of Grade-12 students?

v. Is there any relationship between e-learning challenges and biology practical skills acquisition for Grade-12 students?

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

vi. Is there any relationship between e-learning challenges and e-learning usage by biology teachers?

vii. What is the proposed framework for teaching biology practical skills through e-learning?

1.6 Research Hypothesis

Based on the above research questions the following hypotheses were generated:

H01: There is no significant relationship between e-learning usage and biology practical skills acquisition of Grade-12 students based on the teachers' perspectives.

H02: There is no significant relationship between e-learning challenges and students' biology practical skills acquisition of Grade-12 based on the teachers' perspectives.

H03: There is no significant relationship between e-learning challenges and e-learning usage based on the teachers' perspectives.

1.7 Theoretical Framework

This subtopic explains the theories underlying this study. Teaching and learning of biology involve important component which is the mastery of practical skills and inculcation of scientific attitudes. Continuous learning is considered a necessity for many life situations. It is the basis for explaining many aspects of human behavior, as it is considered a means for the individual to acquire knowledge and skills to form his

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

behavioral habits and trends. In addition, his humanity is achieved and thus, this contributes to the progress and development of societies. Many theories have been developed to explain the learning process. Abdel Aty (2016) added that the complex nature of the learning process and the difficulty of relying on a single point of view to understand the learning process, there are many theories that explain the learning processes.

Hence, e-learning is linked to multiple theories. These theories aim to settle principles to achieve better and effective teaching and learning for the individual with distinct results. To clarify the general theme of this study regarding e-learning, which has become more widespread and used in education, and biology practical skills acquisition. Some theories and models related to e-learning and to the variables of this study will be presented. These theories are: Theory of independent study, Anderson theory of skill acquisition which is also known as Adaptive Control of Thought (ACT-R), theory of Technology Acceptance Model (TAM) Figure 1.2 illustrate the theoretical framework.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

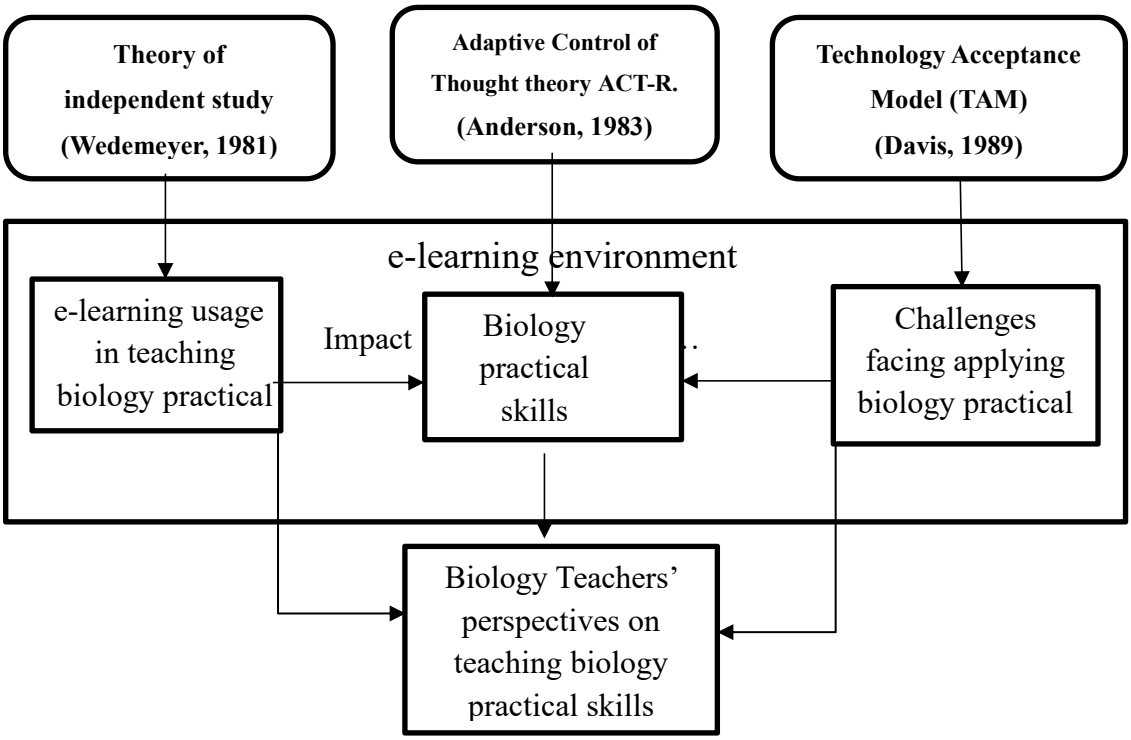

Figure 1.2. Theoretical framework

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

1.7.1 Theory of Independent Study

Wedemeyer (1981) explained that the essence of this theory is the independence of the learner and the implementation of technology as a path to reach this independence. Furthermore, the development of the relationship between the learner and the teacher is the key to the distance e-learning success.

Azmy (2015) confirmed that Wedemeyer has developed a system that includes features around learner autonomy and adopting technology to employ this autonomy on which the student and the teacher are separated, the learning is carried out through

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

medium, and learning takes place through the students' activities. Ghaniemeh (2021) pointed out that the essence of learning, according to Wedemeyer, is the technology and related means adopted to achieve the independence of the learner.

Karipi (2019) emphasized the importance of interaction between the teacher and the learner use of technology means. As a result, teachers in e-learning play a crucial role in providing distance learners with learning skills that enable them to apply these skills and reach success. Burnette (2016) stated that Wedemeyer's theory sets the principles and conditions for learning to occur through the existence of an intermediary system between the teacher and the learner that works in any place and anytime as well as the student is the focus of the educational process. In addition, the individual differences are enhanced, allowing students to stop and start at their own pace. With regard to this study, learning practical skills take place through a mediator, which is e-learning means where the educational content includes the practical skills in biology. The teacher's role is a guide and director, so the learner is the focus of the educational process.

1.7.2 Adaptive Control of Thought Theory (ACT-R theory)

Andersonn (1983), the author of this theory, supposed that this system is divided into two different memory systems: declarative and procedural. The first system which is the declarative system contains all memories of actions, facts, ideas and experiences. Also, anything the individual deliberately practice is a portion of the declarative

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

system. Preub (2018) indicated that this type of memory system deals with both the individual's direct sensory experience and his knowledge of abstract concepts. On the other hand, Anonymous (2022) pointed out that the procedural system includes everything the individual can practice. Moreover, it contains both motor skills and mental skills. Tying a shoelace or typing on a keyboard are examples of the motor skills, while adding up numbers or writing e-mail are considered good examples of the mental skills. So, complex skills acquisition is explained as an interaction between these two systems according to ACT-R.

The skill of using a microscope in biology to examine a microscopic slide is an applied example of the ACT-R. First, students receive theoretical information and instructions. This is a cognitive stage in which information is processed and needs full attention for understanding to carry out this activity which represents the declarative phase. Second, the procedural phase where the generation of behavior begins, that is the skill application, so the activity is individually implemented, which is examining the slide using a microscope. (Onwona, et al., 2022; and Fadzil & Saat 2014) supported the ACT-R theory, they emphasized its importance in acquiring and mastering skills.

From the foregoing, Anderson's theory (ACT-R) focuses on skill acquisition through the procedural stage, which includes skill generation and the generation of desired behavior that reflects the cognitive store from the declarative stage in which the theoretical knowledge group is processed. Therefore, repetition of the skill can lead to mastery and time reduction. In this study, students' ability to apply biology

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

practical skills fall within the procedural stage that is generated after the declarative stage, to generate procedural behavior to apply the skill.

1.7.3 Technology Acceptance Model (TAM)

Davis (1989) is considered as the most prominent person who worked on studying the extent to which users accept dealing with the application of technology, who in turn developed the Technology Acceptance Model (TAM) as a way to explain the extent to which individuals accept new technology.

The success of a novel strategy or method depends on its acceptance and usefulness. Understanding affecting factors and addressing challenges ascertain its success. e-learning faces challenges that need to be addressed for effective learning outcomes. (Bawa'aneh, 2021; Al-Arimi, 2014; and Al-Asiri & Al Moheya, 2012) confirmed the presence of challenges in e-learning that must be tackled to minimize their impact on the learning process.

TAM depends on two primary factors: Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). These important factors originated from psychology, which attempts to comprehend and investigate attitudes and how surrounded stimuli influence the beliefs and behaviors toward new things as technology (Qteishat, Alshibly, Alqatawna & Al-Ma'aitah, 2013). TAM supports decision making regarding technology acceptance and rejection. It can be applied to understand Information

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Communication Technology (ICT) and e-learning adoption in education (Al-Adwan, Al-Adwan & Smedley, 2013). (Al-Adwan and Smedley, 2013; and Abbad, Morris and Nahlik, 2009) asserted that, regarding to TAM, the use of this new technology will be encouraged to reduce the difficulties.

TAM has been successfully applied in various studies to understand user behaviour towards information technology. Abdullah (2018) confirms its suitability for different environments. Endozo and Oluyinka (2019) studied e-learning acceptance, Rafique et al. (2020) and Hong et al. (2002) explored digital library acceptance, and Garavand et *al*. (2022) investigated telemedicine acceptance through electronic tools.

Users' willingness to accept e-learning can be predicted based on their perceptions of the ease and benefit of e-learning, which may reflect the challenges faced by this type of learning.

To provide a clear understanding of the variables and relationships between them in the context of the research topic, Figure 1.3 illustrates the connections between variables pertaining to the research topic, with the aim of presenting a comprehensive comprehension of their relationships. The analysis conducted on the three variables depicted in the figure evaluated their interrelationships and demonstrated the significance of each association.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

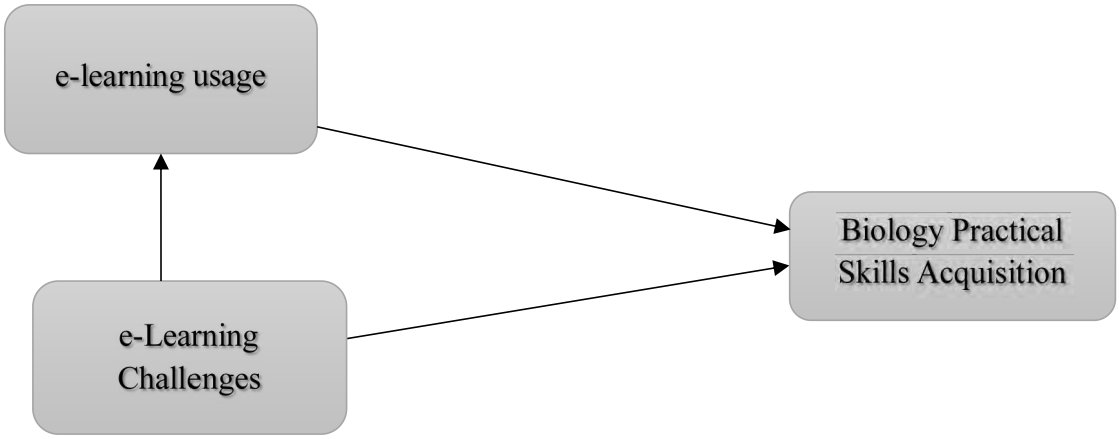

Figure 1.3. Research variables relationships

1.8 Significance of the Study

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

Grade-12 curriculum is rich in skills where teachers can use and apply the properties and capabilities of e-learning, it introduces many hands-on experiments. So, the study seeks to explore the impact of e-learning on acquisition of biology practical skills among Grade-12 students based on the teachers' perspectives. The importance of this research arises from the fact that it investigates the teachers' perspectives on the extent of students' acquisition of the biology practical skills through e-learning. In addition, this study may assist the teachers to determine the appropriate pedagogical tools and methodology that could be conducted during biology practical skills teaching. Furthermore, the study may contribute to reviewing the programs and the procedures for applying and teaching these skills through e-learning for this level of education as it is a foundational phase for a pre-university stage.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

The recent use of e-learning in teaching practical skills, created a necessity to conduct research that highlights the effectiveness of this type of learning. Due to the researcher's knowledge, it is one of the few local studies that deal with the impact of e-learning on biology practical skills in the important stage of school education, which is the secondary level. Students at this period are at the gates of university study, therefore the student needs a sufficient balance of skills to keep pace with the development in the study of scientific disciplines at the undergraduate level.

The applied importance of this study stems from the possibility of contributing to improving students' performance in laboratory activities through e-learning. Its results may be useful for educators to direct biology teachers to pay more attention to e-learning and its extensions and aspects. Furthermore, the study may benefit in developing the infrastructure in educational institutions to provide integrated internet networks and provide appropriate software to apply this type of education. The results of the research could be a spur for teachers to strengthen their own information competencies, e-learning tools in the teaching process and create new e-learning scenarios in teaching Biology practical skills.

In the light of the results of this study instructors, curriculum developers, and teachers can try to improve biology education to make it more meaningful by trying to get rid of the problems which interfere with e-learning implementation specially in practical aspect in biology. It may also recommend training programs for teachers to enable them to master this new experience in education and develop electronic biology curricula to serve the application of e-learning and achieve the desired

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

educational outcomes. Finally, this study could form a suitable background for the researchers to undertake further studies in e-learning.

1.9 Research Limitations

As with other research, this research has its limitations, this research uses quantitative descriptive approach with questionnaire as the data collecting instrument. This study exclusively focuses on the biology teachers'; other teachers are not included in the study for the population and samples. Additionally, the study is built on three variables, namely, e-learning usage and its impact, biology practical skills acquisition for Grade-12 students and the challenge facing applying e-learning on teaching biology practical skills. One of the determinants of the study is also the requirement to obtain approval from the MOE in UAE, which has been obtained.

1.10 Operational Definitions

1.10.1 e-learning

According to (Al-Araibi, bin Mahrin and Yusoff, 2019) e-learning is an educational method which aims to provide educational or training programs for students or trainees at any time and at any place using information and communication technology (ICT). Al Salmi (2020) also defines e-learning, as an educational system that relies on modern communication technology, computers and their accessories to

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

provide learners with the scientific material of lectures, lessons, discussions, exercises and tests, whether synchronized or asynchronized. In this study, e-learning refers to the provision of educational content—such as e-books, lectures, instructional videos, PowerPoint presentations, worksheets, interactive activities, and virtual labs—utilizing information technology (IT) like the internet, email, electronic platforms, and teleconferencing. This pertains specifically to the instruction of Grade-12 biology practical skills in UAE, offering accessibility at any time and from any location.

1.10.2 Practical Skills

Maina (2015) defined Practical skills as the activities that involve operations and manipulations, through which one replicates or demonstrates a scientific process or theory. In this study the practical skills refer to the ability to perform a laboratory works and carry out them with a degree of ease, efficiency, safe, and mastery in the least possible time.

1.10.3 Biology Practical Skills

According to Jaafar (2015), biology practical skills are a set of biological laboratory skills, that through which the learner is able to use tools, devices and chemicals and deal with them in a correct manner and conducting experiments and scientific activities in practice. In this study the biological practical skills refer to the practical skills included in the biology curriculum for Grade-12 in the United Arab Emirates;

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

for example, but not limited, light microscope use, dissection tools, using glass wares, solutions and chemicals.

1.10.4 Grade-12

Grade-12 is the last year of secondary school, which starts from the ninth grade and ends in the twelfth grade, which means the end of 12 years of school education. Moreover, it is the last stage in school education before enrolling in the university (UAE, Stages and streams of school education, 2022). In this study Grade -12 students refers to general education public schools' students in UAE with an age of 17-18 years who study for about 12 years in school until they reach this grade.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

1.10.5 e-learning Challenges

According to (Bani Domi and Al-Shanaq, 2008) definition of the challenges, they are the factors in which their presence leads to a negative impact on the process of implementing skills and practices through e-learning. According to (Majid, Channa and Javed, 2020), challenges, in the context of implementing e-learning, refer to barriers, difficulties or problems that arise during the process of integrating and using e-learning in educational environments. In this study, challenges refer to the difficulties and obstacles that faced by biology teachers during teaching biology practical skills through e- learning, measured by items in the questionnaire.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

1.10.6 e-learning Impacts

e-learning impacts refer to the effects and outcomes that result from the implementation of electronic technologies and digital content for educational purposes. It includes the use of computers, electronic platforms, and other e-learning tools to facilitate learning and knowledge acquisition (Encarnacion, Galang, & Hallar, 2021). In this study e-learning impacts refers to the effects of e-learning usages and its tools on the biology practical skills acquisition for Grade-12 students measured by items in the questionnaire.

1.10.7 e-learning Usage

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

According to Lawless (2023), e-learning is the delivery of learning and training contents through digital resources and information technology applications. In this study, e-learning refers to teaching practical skills in biology using electronic technologies and digital resources to deliver educational content and apply practical skills specifically designed for biology education. It involves the use of computers, internet-based platforms, virtual simulations, and other digital tools to engage students in practical activities, experiments, and lab exercises related to the 12th grade biology curriculum.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

1.10.8 Teachers' Perspectives

According to Liddicoat (2019) "perspectives" refers to the different viewpoints, attitudes, or through which persons or groups perceive and interpret the world around them. In this study the perspectives refer to the perspectives of biology teachers about the variables of the study, namely, the use of e-learning in teaching practical skills in biology and its impact on the acquisition of these skills by students in Grade-12, in addition to their perspectives on the challenges that face the application of e-learning in teaching practical skills in biology.

In conclusion, this chapter has provided a brief explanation of the study and its variables. In the next chapter, previous literature and studies related to the variables of this study will be discussed, namely the use and application of e-learning in teaching practical skills in biology, in addition, discussing the challenges facing the application of e-learning in teaching biology practical skills.

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi