REMODELLING 'RE-IMAGINING UTAUT 2' ON GOOGLE CLASSROOM USAGE AMONG SCIENCE TEACHERS IN PERAK AMID COVID-19 PANDEMIC

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UNIVERSITI PENDIDIKAN SULTAN IDRIS

2023

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THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENT FOR THE DOCTOR OF PHILOSOPHY
(RESEARCH MODE)

FACULTY OF SCIENCE AND MATHEMATICS
UNIVERSITI PENDIDIKAN SULTAN IDRIS

2023

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ACKNOWLEDGEMENT

This thesis becomes a reality with kind support and help of many individuals. I would like to extend my sincere thanks to all of them.

First and foremost, praises and thanks to the God, the Almighty, for the showers of blessings throughout my research work to complete the research successfully.

My heartiest gratitude and deepest thanks go to my main supervisor, Associate Professor Mai Shihah binti Abdullah for her precious guidance and expert knowledge at all the stages of this thesis. Equally, I also express my appreciation to my second supervisor, Associate Professor Shakinaz binti Desa for her constructive feedback and support throughout the study.

My sincere thanks also go to the moderator of the PHD in Biology course, Associate Professor Som Cit a/p Sinang for all the positive words and encouragement to continue my study when I am doubting myself and almost give up when I faced with obstacles.

In addition, I would also like to thank my fellow course-mates and researchers, from the Department of Biology and other departments as well for their willingness to respond to my inquiry pertaining to my study directly or indirectly.

Furthermore, my earnest gratitude also goes to all the lecturers at Faculty of Science and Mathematics and staff at IPS for helping me in processing all the technical enquiry that I applied in a prompt respond, so that I can carry out my research smoothly. I am thankful with their suggestions throughout the period of completion of the thesis.

Besides that, I would also like to thank my examiners for evaluating my work and giving me constructive feedback for improvement.

On the other hand, my greatest appreciation goes to my computer tutor, who is also my best friend, Miss Jennifer Foo Mei Kuen for her kind action for teaching me computer knowledge whenever I needed her help. With her constant guidance, I could understand all the computer knowledge that we should master while doing research and hence, producing a good quality work.

A special thanks to my friend and mentor, Mr. Ramesh K Chandran who has provided me with invaluable advice, guidance and support throughout my journey.

Last but not least, I would like to convey my appreciation to my mother for her generous support, motivation and as my faithful companion throughout these few years. Thanks to my mother who always pray well for me and sacrificing her time for me. I am also thankful with my husband, Patrick for bearing with me during the stressful time. Thank you dear all for making my dream comes true.

ABSTRACT

Teachers, students, and education stakeholders globally had been exploring ways to mitigate the effects of the COVID-19 pandemic on the education sectors. One solution that has rapidly gained traction is the use of Google Classroom platform to provide instructions to students. The main aim of this study is remodeling a Re-Imagining UTAUT2 in using Google Classroom platform among Science teachers amid pandemic. This study adopted the two-steps approach of modeling and analysing the structural model namely, Confirmatory Factor Analysis and Structural Equation Modeling through SPSS-AMOS 24.0 software. The survey method with simple random sampling technique involving 421 selected respondents was used. The proposed model has attained the fit indices (RMSEA=0.038, CFI=0.951, χ^2/df=1.519). The results of the regression showed the eight exogenous constructs contribute 87% towards Behavioural Intention (BI) to use Google Classroom platform while BI contributes 52% to Actual use (AU). Performance expectancy (PE), Perceived Compatibility (PC), Social Influence (SI) and facilitating condition (FC) had significant influence on BI. Meanwhile, Hedonic Motivation, Habits, Price Value and Effort Expectancy has no significant influence on BI. BI had significant influence on AU. Age, gender, teaching experiences and educational background moderate the relationship between PE, PC, SI, and FC to BI. In conclusion, the Re-Imagining UTAUT2 had successfully been remodeled. This developed novel model enhanced our comprehension of the power of the Google Classroom platform and clarified current outcomes, strengthening the understanding, insights, and viewpoints of the science teachers to use Google Classroom platform. Perceived compatibility on behavioural intention to use Google Classroom platform and educational background of the teachers as moderator are novel findings and provide added scientific knowledge to the current literature. The implication is that the usage of Google Classroom platform is being accepted among science teachers and is continued accordingly on a hybrid basis in teaching and learning.

PEMODELAN SEMULA "RE-IMAGINING UTAUT 2" DALAM PENGGUNAAN GOOGLE CLASSROOM DI KALANGAN GURU SAINS DI PERAK SEMASA PANDEMIK COVID-19

ABSTRAK

Guru, pelajar dan pemegang taruh pendidikan secara global telah meneroka pelbagai cara untuk mengurangkan kesan pandemik COVID-19 terhadap sektor pendidikan. Satu penyelesaian yang mendapat pengiktirafan pantas ialah penggunaan pelantar *Google Classroom.* Tujuan utama kajian ini adalah memodelkan semula Re-*Imagining UTAUT2* dalam penggunaan pelantar *Google Classroom* dalam kalangan guru Sains semasa pandemik. Kajian ini menggunakan pendekatan dua-langkah pemodelan dan penganalisisan model struktur, iaitu Analisis Faktor Pengesahan dan Pemodelan Persamaan Berstruktur melalui perisian *SPSS-AMOS 24.0.* Kaedah tinjauan digunakan melibatkan 421 responden yang dipilih menggunakan teknik persampelan rawak mudah. Model yang dicadangkan telah mencapai indeks yang sesuai (*RMSEA*=0.038, *CFI*=0.951, χ^2/df=1.519). Hasil regresi menunjukkan lapan konstruk eksogenus menyumbang 87% terhadap *Behavioural Intention* (BI) untuk menggunakan pelantar *Google Classroom* sementara *BI* menyumbang 52% untuk *Actual Use (AU). Performance Expectancy (PE), Perceived Compatibility (PC)*, *Social Influence (SI)* dan *Facilitating Conditions (FC)* mempunyai pengaruh yang signifikan terhadap *BI.* Manakala *Hedonic Motivation*, *Habits, Price Value* dan *Effort Expectancy* tidak mempengaruhi *BI. BI* mempunyai pengaruh yang signifikan terhadap *AU.* Umur, jantina, pengalaman mengajar, latar belakang pendidikan menyederhanakan hubungan secara signifikan antara *PE, PC, SI, FC* terhadap *BI.* Kesimpulannya, *Re-Imagining UTAUT2* telah berjaya dimodelkan semula. Model novel yang dibangunkan ini dapat meningkatkan kefahaman, pengertian serta sudut pandangan guru Sains tentang kuasa penggunaan pelantar *Google Classroom. Perceived Compatibility* terhadap *BI* dalam penggunaan pelantar *Google Classroom* dan latar belakang pendidikan sebagai moderator merupakan dapatan novel dalam menyumbang kepada penambahan pengetahuan saintifik kepada literatur terkini. Implikasinya, penggunaan pelantar *Google Classroom* diterima baik dalam kalangan guru Sains dan sewajarnya diteruskan secara hibrid dalam pengajaran dan pembelajaran.

DECLARATION OF PUBLISHED WORK

The researcher has published the following referred paper during the academic year 2020 at Sultan Idris Education University, Malaysia.

Michelle Lock Sow Yee & Mai Shihah Abdullah (2020). A Review of UTAUT and Extended Model as a Conceptual Framework in Education Research. *Jurnal Pendidikan Sains dan Matematik Malaysia.* Retrieved from https://doi.org/10.37134/jpsmm.vol11.sp.1.2021

The researcher has published the following referred paper during the academic year 2022 at TIJARI International Journal of Islamic Economics, Business and Entrepreneurship, Malaysia.

Michelle Lock Sow Yee & Mai Shihah Bt Haji Abdullah (2022). Remodeling "Re-Imagining Utaut 2" On Google Classroom Usage Among Science Teachers In Perak Amid Covid-19 Pandemic. TIJARI International Journal of Islamic Economics, Business and Entrepreneurship 4(1), 30 – 48.

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LIST OF ABBREVIATIONS

A	attitude
AGFI	Adjusted Goodness-of- Fit Index
AMOS	Analysis of Moment Structures
ANOVA	Analysis of variance
APP	application
AU	Actual Use
AVE	Average Variance Extracted
BBC	British Broadcasting Corporation
BI	Behavioural Intention
Blogs	weblog
CFA	Confirmatory Factor Analysis
COVID-19	Coronavirus disease 2019
CR	Composite Reliability
DF	Degree of Freedom
Dol	Diffusion of Innovation
DTPB	Decomposed Theory of Planned Behaviour
EE	Effort Expectancy
EFA	Exploratory Factor Analysis
FC	Facilitating Condition
GFI	Goodness-of-Fit Index
HB	Habit
HM	Hedonic Motivation

ICT	Information and Communications Technology
IFI	Incremental Fit Index
IS	Information Success
KMO	Kaiser-Mayer-Olkin
KPM	Kementerian Pendidikan Malaysia
MCO	Movement Control Order
MGA	Multiple group analysis
MI	Modification Index
Moodle	Modular Object-Oriented Dynamic Learning Environment
MPCU	Model Of PC Utilization
NFI	Normed Fit Index
NNFI	Non- Normed Fit Index
OECD	Organisation for Economic Co-operation and Development
PBC	Perceived Behavioural Control
PC	Perceived Compatibility
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PI	Personal Innovativeness
PHEIC	Public Health Emergency of International Concern
PLS	Partial Least Squares
PLS-SEM	Partial Least Squares Structural Equation Modeling
POS	Proximity of Support
PV	Price Value
R^2	Coefficient of determination

RIUTAUT 2	Re-Imagining UTAUT 2
SARS	Severe Acute Respiratory Syndrome
SCT	Social Cognitive Theory
SDT	Self-Determination Theory
SEM	Structural Equation Modeling
SI	Social Influence
SPM	Sijil Pelajaran Malaysian
STEM	Science, Technology, Engineering, and Mathematics
TPB	Theory of Planned Behaviour
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
UNESCO	United Nations Educational Scientific and Cultural Organization
UTAUT	Unified Theory of Acceptance of the Use of Technology
Vlogs	Video logs
VLE	Virtual Learning Environment
VR	Virtual reality
WBQAS	Web Based Questions and Answer
WHO	World Health Organization
x^2	Chi-Square
x^2/df	Normed Chi-Square

APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Introduction

Coronavirus disease 2019 (COVID-19) is a disease that is linked to a novel virus that was first detected in Wuhan, China in December 2019 (World Health Organization (WHO), 2020). The novel virus that causes the disease is linked to the same family as the virus that causes severe acute respiratory syndrome (SARS) which was also first detected in China in 2003. For this reason, the virus that causes COVID-19 has been officially named the SARS-Coronavirus-2 to indicate that it is the second known novel coronavirus that causes severe acute respiratory syndrome (WHO, 2020). The difference between the current pandemic and the 2003 SARS outbreak is the transmissibility of SARS-Coronavirus-2. Unlike its relative, SARS-Coronavirus-2 is highly transmitTable and has rapidly spread across the world resulting in the biggest global pandemic since the Spanish flu pandemic of 1918. The virus infected hundreds

of millions of people around the world and resulted in the deaths of several million people.

Besides its health impact, COVID-19 has also had an extraordinary ripple effect on the economic and education sectors throughout the world. MacFeely (2020) warned that 40-60 million people will be pushed to extreme poverty, living on only $1.90 daily. The pandemic has resulted in the disruption of the education of 1.6 billion learners which means that 9 out of every 10 students have witnessed disruptions to their education. Throughout the world, governments have taken initiatives to slow down the outbreak until a vaccine is developed. The initiatives taken by governments such as the restrictions on the movement of citizens, closures of businesses, closures of schools, and social distancing requirements have been responsible for the vast majority of disruptions endured by students across the world (MacFeely, 2020).

Teachers, students, and education stakeholders around the world have been urgently exploring ways to mitigate the effects of the COVID-19 pandemic on the education sector. One solution that has rapidly gained traction around the world is the use of online or remote learning to provide instruction to students. Online learning has a lot of benefits but some noTable disadvantages are the lack of direct interaction between students and teachers and the inability to perform some learning activities such as empirical lab experiments over the internet (Attaran and Zainuddin, 2018). In many places, around the world, schools are opening and closing down depending on the local COVID-19 situation. Additionally, one way that has been proposed to reduce the spread of the virus is having students come into school in shifts while others learn online. This practice is very consistent with the blended learning model. Blended learning is a

deliberate blend of learning which has been extensively integrated into the Malaysian education system where the main component of Face-to-Face and online instruction activities is to stimulate and support learning (Attaran and Zainuddin, 2018). According to Yilmaz and Orhan (2010) blended learning is a good platform for distance learning or remote learning as course material can be reviewed easily at any time and place and teachers' role has expanded to cater needs of students since the early 21st Century.

Furthermore, Gallagher et al. (2005) stated that distance (remote), online or blending learning style of teaching provides many advantages over the traditional classroom teaching style where its influential advantages lie in its accessibility, students' scheduling, and adaptability for teaching and learning. United Nations Educational Scientific and Cultural Organization [UNESCO] (2020) added that the future teaching and learning style is not to alert it to short-term adaptations due to the pandemic but rather to ensure permanent changes with the adoption of the soft-ware program of ongoing abilities. Many recent initiatives to mitigate the disruptions to education in Malaysia support the use of blended learning in the short and longer-term. Some of these initiatives include the development of an Educational Television Program, enhancing Web-based learning for teaching and learning and supporting the use of mobile learning with their availability on the Ministry E-learning platform. Education Technology Companies and Organizations also initiated to assist educators in bringing learning experiences via various disciplines, including STEM experiences to students studying Science virtually too.

A key component of blended learning is Web-based learning. Web-based learning, also known as electronic learning (E-learning), refers to the use of advanced online technology to deliver a wide range of solutions to improve the instructional delivery process. Web 2.0 is an important technology in this regard and its emergence in the early years of the century is regarded as an important factor in the rise of Web-based learning. According to O'Reilly (2005), Web 2.0 refers to Internet-based Applications/ web-based learning technologies that support users' creation and revision of data for exchanging ideas within formal or informal online communities. Currently, multiple technologies in use meet the criteria for being Web 2.0 tools, such as Google Classroom, social networks, podcasts/video blogs (Vlogs), weblogs (Blogs), Skype, YouTube, Prezi, VoiceThread, Flickr and Wikis.

The Web-Based Learning environment is an interactive network system where learners can access information on topics selected and studied without the need for a classroom setting or teachers to be present. Over the past ten years, web-based learning has been dominating the education field, be it at schools or higher education. Starting distance learning for Malaysia way back in 1980 by the University of London has opened the opportunity of distance learning with the external degree programs in hand (Poon et al., 2004). Malaysia conducted several measures in encouraging Web-based learning by installing Web technologies and Internet services as a delivery mode in the forms of HTML, URL, browsers, e-mail, file transfer facilities and so forth. However, limited access to the internet during the 1980s restricted the usage of web-based learning among students and teachers.

Although such facilities are available, the conventional learning method still has been the main preference for a learning session for the last 10 years. However, in recent years growing awareness of lifelong learning has led to a shift toward remote learning which was found feasible to replace teaching in the classroom. Nowadays, web-based learning has become more convenient for teachers, lecturers and students because it provides a new and wide range of teaching-learning experiences such as accessing information at any time and place, online presentation of information, interactive task-based activities, effective dissemination of information, and long-distance education that is less possible in traditional classrooms (Nam and Smith-Jackson, 2007).

The importance of Web-based learning has also been significantly enhanced as a result of the pandemic. However, whether the technologies that underpin Web-based and blended learning are widely accepted and used by teachers in Malaysia is unknown. Historical evidence indicates that most teachers do not readily accept new technologies. According to MoCT (2003), the number of teachers using technology as a teaching and learning tool at the time was very small and worrying. Therefore, the study of web-based acceptance among science teachers has become a vital area to ponder in the present context. Few relevant studies have been conducted on the acceptance of Web-based Learning in several countries and analysed in this study with several factors that have been detected to contribute to the effectiveness of Web-based learning such as Google Classroom teaching.

Google Classroom, a service that offers online learning tools via the web and an App, surged in popularity in March 2020 as schools and universities closed in response to the coronavirus pandemic. According to Latif (2016), Google Classroom

is a kind of blending way of learning that was initiated in 2014 by the Malaysian of Education followed by the Apps in 2015 combining Google Drive, Google Docs, Sheets and Slides along with Gmail and Google Calendar to allow teachers to provide lessons for students. Latif (2016) added that the service includes support for assignments, similar coursework and the ability to grade assignments, and being paperless is a crucial factor in developing learning strategies and also for students to keep their files in an organized manner.

The Google Classroom App has always had users but had never been in the top 100 Apps before as the App tracking service App. The App has now surpassed 50 million downloads and was in the top five Apps in the U.S. The App is also popular around the world, with a huge spike in downloads in countries such as Indonesia, Mexico, Canada, Finland, Italy and Malaysia recording the highest downloads among the other Web 2.0 technologies (Figure 1.1). In contrast, students are not big fans of the service as The Telegraph (2020) reported that school children are bombarding the App with one-star reviews hoping that it will be taken down and they will no longer have to attend classes remotely.

Figure 1.1. Google Classroom is the official E-learning platform in the Ministry of Education in Malaysia.

Google Classroom is assumed to be one of the popular Web 2.0 tools as it offers many interesting facilities and Applications and it is a potential teaching and learning tool because of its unique built-in function that has pedagogical and technological affordance, enabling the promotion of higher thinking order, creative thinkers and openness to dialogues and discussion among students (Shaharanee et al., 2016). In addition, The Malaysia Ministry of Education, no longer subscribe to the Frog VLE service effective July 1, 2019, but has adopted Google Classroom as an alternative new learning platform upon the termination of the Phase 2 Net of KPM net service contract to ensure continual facilitation by teachers to create and organize assignments quickly, provide effective feedback and the ability to communicate easily (Wong and Aliman, 2019). According to the Google Classroom users' statistics, it has recorded the highest searches for the phrase 'Google Classroom' compared with other Web 2.0 tools in the world.

Figure 1.2. Malaysia recorded the highest searches for the phrase 'Google Classroom' in the world.

By 2019, 50% of all high school courses are predicted to be delivered in an online format as predicted by Horn and Staker (2011). However, no matter what is enforced, teachers still play a pivotal role to form a stronger connection with the students and parents for effective and sustainable teaching and learning during this challenging time. Science teachers teaching science to students as Science, Technology, Engineering and Mathematics (STEM) education has been an important agenda globally for their contribution to preparing future human resources in science and technology. Hopefully, the current COVID-19 crisis will be eventually conquered but, without a forceful fiscal response to integrating E-learning (Google Classroom), the educational scars it leaves behind will be viciously long-lasting.

1.2 Research Background

1.2.1 Context

The Global COVID-19 pandemic has been declared a Public Health Emergency of International Concern (PHEIC) affecting the health, economy and educational stability of many countries including Malaysia. Technology offers a way to overcome some of the challenges posed by the pandemic. However, during the first SARS outbreak in 2003, the acceptance of remote learning varied as countries, such as Singapore and Hong Kong with high penetration rates of computers and broadband within a home, have an education-continuity plan for students to do home-based learning. Meanwhile, emerging countries like China and Vietnam with lower penetration rates of ICTs were not doing so well as the students either had to risk going to school and getting infected or staying at home and falling behind in schoolwork. Research studies showed that in these countries, the acceptance of ICT was poor stating factors like inadequate support, lack of facilities, being a novice and unpreparedness as hindrances (Fox, 2004).

1.2.2 Blended Learning in Malaysia

Like China in the early 2000s, Malaysia is a middle-income country. It shares some of the problems that China and Vietnam faced at the time. A recent literature search on issues and challenges related to ICTS/Google Classroom use in teaching and learning in the Malaysian education system revealed issues such as limited accessibility and network connection, novice and lack of support system (Ghavifekr et al., 2016) and

problem with peer interaction and interface design (Amantha et al., 2019) among teachers in general and students. However, integrating technology into teaching and learning is not a new challenge for schools and universities as administrators and faculty had grappled with how to effectively use technical innovations such as Web 2.0 tools like video and audio recordings, Email, and teleconferencing to augment or replace traditional instructional delivery methods since the 1900s (Kaware and Sain, 2015; Westera, 2015). Despite the challenges, blended learning has not been unpopular in Malaysia. In recent years, blended learning, or the integration of face-to-face and online instruction has been introduced to slowly replace traditional teaching and learning strategies. Dziuban et al. (2018) stated that 35% of higher education Institutions offered blended learning courses and that 12% of 12.2 million documented distance learning environments were in blended learning. Horn and Staker (2011) predicted that by 2019, 50% of all high school courses are to be conducted online, while Johnson et al. (2011) forecasted that education should be revolutionized in a more accessible and individualized way.

Numerous literature reviews showed Google Classroom to be popular as Malaysia recorded the highest number of searches of the phrase 'Google Classroom' in the world to prove its impact on the efforts of educators to use online teaching and learning media during the Movement Control Order (MCO). Since Google is a popular Web 2.0 tool, thus, it has the potential for teaching and learning because of its unique built-in functions that offer pedagogical, social and technological affordances, and is a tool introduced in Google Apps for Education commencing 2014 in facilitating the teachers to create and organize assignments quickly, provide feedback efficiently, and communicate with their classes with ease (Shaharanee et al., 2016). However, there is

a lack of information on the extent to which science teachers integrate Google Classroom in their blended learning of teaching and learning of science amid the COVID-19 pandemic. Therefore, it justifies an important gap in this research.

1.2.3 Unified Theory of Acceptance of the Use of Technology 2 (UTAUT 2)

The initial Technology Acceptance Model (TAM) was invented by Davis (1989). Venkatesh et al. (2003), proposed the Unified Theory of Acceptance of the Use of Technology (UTAUT) derived from the combination of The Theory of Reasoned Action, The Technology Acceptance Model, The Theory of Planned Behaviour, The Model of Personal Computer Utilization and theory of human behaviour. Subsequently, a new model was derived by Venkatesh et al. (2012) based on an additional theory of Motivation and renamed the second generation UTAUT, given the new name of the UTAUT 2 model. Researchers used the UTAUT 2 model extensively examining the constructs of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price Value and Habit with the age, gender and experiences of the users in influencing the Behavioural Intention and the actual use of ICTs.

A newer model, UTAUT 3 developed by Farooq et al. (2017) has been proposed in recent years. It is an extension of UTAUT 2 with eight determinants of technology acceptance with Personal Innovativeness in Information Technology as the novel construct. However, the model is only still emerging and more research needs to be conducted for it to be used. Using the model in a study that intends to extend the theory

would be inappropriate. This study has the potential to extend the UTAUT 2 theory into a new theory.

Recent phenomena such as the prevailing COVID-19 pandemic also provide an impetus for further expanding the UTAUT 2 model. There is a need for the expansion of the Unified Theory of Acceptance of the Use of Technology 2 (UTAUT 2) to the new context of this research, the expansion needs the effort of improving the model. The researcher is optimistic that the remodeling of the novel Re-Imagining Unified Theory of Acceptance of the Use of Technology (UTAUT 2) or the Re-Imagining UTAUT 2 model when administered helps to validate the model by examining factors that can influence the Behavioural Intention of the use of Google Classroom among science teachers amid COVID-19 global pandemic. Hence, besides the original 7 constructs in the UTAUT 2, that: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price Value and Habits being maintained, the researcher adds in a new construct, that is, Perceived Compatibility, which is derived from The Theory of Innovation adoption and diffusion. Ramiller (1994) argued that this theory serves poorly in the study of Innovation among IT users within an organization. Hence, the researcher remodels the UTAUT 2 to extend the conceptualization of Perceived Compatibility to re-examine its' influence on the Behavioural Intention to the use of Google Classroom among science Teachers amid the COVID-19 Global pandemic where science teaching is modified to home-based learning currently.

In addition, the UTAUT 2 Model by Venkatesh et al. (2012) had the inclusion of moderator variables: age, experiences and gender to moderate the effects on the

constructs in influencing Behavioural Intention to the use of technology. Although other researchers had added or removed these three moderator variables in their studies the findings were also inconsistent (Palau-Saumell et al., 2019). Besides, there are limited research studies on teachers adopting ICTs using UTAUT 2 model which had the age, gender and experiences components. Therefore, the researcher has the inclusion of science teachers' age, gender, experiences as well as educational backgrounds as new moderators that further strengthened the novelty of the model. Venkatesh et al. (2012) suggested for additional moderators be added to the UTAUT 2 model to strengthen its power and comprehensiveness. There are limited studies that can be retrieved where the educational background of science teachers' is being used as the moderator variable of the extended or modified UTAUT 2 model. The researcher is optimistic that the educational background of the teachers has a positive moderating impact on the eight exogenous constructs to influence the Behavioural Intention to use Google Classroom among science teachers amid the COVID-19 pandemic. With these, the researcher intends to find answers to these questions; (a) What will be the independent variables and moderator variables of this proposed study that can influence science teachers' Behavioural Intention to use Google Classroom and (b) The relationship between Behavioural Intention to Actual Use (AU) of Google Classroom in teaching science amid pandemic.

Besides, the researcher also intends to examine the significant difference between the opinions of two groups of teachers regarding their increase in Google Classroom usage amid pandemics to the actual use of Google Classroom among science teachers. Will the difference in opinions about the increase in the usage of Google Classroom amid the COVID-19 pandemic affect the actual use of Google Classroom

among them? Will they be using Google Classroom if they can see that Google Classroom with its unique functions can be adopted specifically in their teaching? In addition, how do they feel about the effectiveness of using Google Classroom? Findings of various literature reviews in the local context revealed obstacles like a lack of technical facilities and support systems. So, are the science teachers also facing the same predicament when using ICTS, like Google Classroom? How about the aspects of social influence on the use of Google Classrooms? To what extent can the influence of their colleagues enable them to change their Behavioural Intention to be receptive to adopting and eventually using Google Classroom?

According to motivation theories, people are motivated if they find pleasure and fun in doing a task. Hence, the researcher will attempt to determine whether science teachers can also be influenced by motivation. The other essential variable is the habit of the science teachers as recent studies stressed the role of habit in influencing the Behavioural Intentions of people in adopting a technology (Huang and Kao, 2015). Huang and Kao (2015) added that habit is regarded as a prior behaviour and is the degree to which people believe the behaviour to be automatic. The researcher is keen to find out whether Perceived Compatibility can influence science teachers' acceptance of Google Classroom.

According to Rogers (1983), Perceived Compatibility is defined as the degree to which a new technology meets the habits, values and needs of the potential users. Although numerous literature reviews stated that Perceived Compatibility is one of the main indicators influencing the acceptance of Information Technology (Ramillier, 1994), limited studies using Perceived Compatibility as a construct have been carried

out on teachers. Therefore, the researcher explores the influence of habit and Perceived Compatibility of the science teachers in their Behavioural Intention to use Google Classroom.

Science teachers are unique in their ways with different characteristics: age, gender, teaching experiences and educational background, social-cultural background, beliefs, and values. Previous literature reviews showed that although those factors had moderating effects on the users' adoption of ICTs, they are inconsistent. So, the researcher's findings can fill up the research gap of whether age, gender differences, teaching experiences and educational background have moderating effects on the factors to influence science teachers' Behavioural Intention to use Google Classroom and the relationship between usage of Google Classroom in teaching science amid COVID-19 pandemic and the actual use of Google Classroom among science teachers. In addition, the researcher is keen to examine the significant difference between the two groups of the opinion of the teachers on their increase in the usage of Google Classroom amid the COVID-19 pandemic to the actual use of Google Classroom. Numerous literature reviews of theories of social behaviour and models of technology acceptance have given the researcher invaluable insights and awareness of the importance of those validated models of Technology Acceptance.

Various important research findings had been revealed for Application in their situations to bridge their respective research gaps. With that, the researcher develops a re-imagined/re-create/remodel new technology acceptance model based on the UTAUT 2 model. Based on the research gaps of the researcher's intended research, the researcher applies the theory of Innovation and Diffusion to derive a new construct, that is,

Perceived Compatibility. In addition to the moderator variables of age, gender and experiences in the UTAUT 2, the researcher adds another moderator variable, that is, the teachers' educational background. Hence, the researcher utilizes the novel Re-Imagining UTAUT 2 (UTAUT2) as a customized model to measure all the independent variables, moderator variables that can influence the science teachers' Behavioural Intention to use Google Classroom and the influence of the Behavioural Intention to use Google Classroom on the actual use of Google Classroom in teaching science. The researcher validates and strengthens this model for further use. The research findings of this novel model can bridge those stated research gaps to ensure continual quality education for science teachers and students, as well as, as a platform for futuristic blended learning for all education sectors.

1.3 Problem Statement

COVID-19 and its rapid escalation into a global pandemic have had a significant impact on the global economic outlook. Most governments around the world have begun to practice initiatives suggested by the World Health Organization (WHO), which is a response to increasing the level of preparedness and alertness in managing COVID-19 cases. This initiative has been implemented by several countries, such as Indonesia, Singapore, and Thailand. Malaysia began with the 2020 Movement Control Order (MCO) that started on 18 March 2020. Hence, due to the implementation of the MCO, Malaysia's education system has gone online, with most private and public universities following suit. This is important for both students and lecturers when preparing for continued online learning in the future. Online learning during the MCO provides

numerous benefits, one of which is developing new skill sets related to online learning (Rahman, 2020). During the MCO, both lecturers and students face several challenges in ensuring continuity in the online learning process (Kamarudin, 2020). The top three challenges are educators' experience and skills in using the online system and online applications, the infrastructure's state of readiness (internet connectivity, bandwidth and devices) and an evolving mindset involving educators and students (Rahman, 2020), as well as the readiness, skills, internet connectivity and devices (Sani, 2020). However, according to Universiti Kebangsaan Malaysia's Centre for Education and Community Well-Being, Malaysia is not fully ready to embrace online teaching and learning as internet services in rural areas are slow and unsTable (Rahman, 2020).

According to Poon et al. (2004), there is still a strong preference for the face-to-face conventional learning method even though much Web-based learning was introduced. Cleaver (2014) stated that educators face the problem of adopting new classroom technologies such as Google Classroom and Google Meet because it perceives as "double innovation". It is a challenge for them because the teachers have to learn thoroughly before utilizing it during class. Therefore, they have to make sure they have enough time to use these technologies. Limited accessibility to the internet is the major problem with the acceptance of Web-based-Learning. In many countries, this factor has led to a significant gap in how children have learned during this critical era in many countries. Such disparities are even more apparent in underdeveloped nations like the Netherlands, where the majority of pupils lack access to the Internet and proper learning conditions. Studies by Cotella and Vitale Brovarone (2020) stated that in rural areas and even more so in remote and mountainous ones, the challenge of guaranteeing adequate levels of accessibility is particularly problematic. Several benefits of using

online learning such as flexibility in scheduling and lower costs compared to Offline Learning. Online learning, or e-learning, provides a virtual learning environment that engages students in various activities involving a multitude of devices through the audio-visual platform (Al-Rahmi et al., 2018) and is used for delivering information, managing communicating content, interacting or facilitating teaching and learning activities (Anshari et al., 2016).

Online learning, or e-learning, provides a virtual learning environment that engages students in various activities involving a multitude of subjects through the audio-visual platform (Al-Rahmi et al., 2019). Online learning is used for delivering information, while the database system is used for managing, communicating content, and interacting with or facilitating teaching and learning activities (Anshari et al., 2016). Several benefits of using online learning were found, such as flexibility in scheduling and lower costs compared to offline learning (Omar et al., 2018), increased students' sociability, confidence and participatory qualities (Panigrahi et al., 2018) and improved quality of projects and information sharing (Anshari et al., 2016).

Having listed the benefits of engaging with online learning via web-based, over the past years the acceptance of behaviour intended to facilitate the system is not widespread in Malaysia. Thus, this study attempts to overview the global perspectives on online learning due to the impact of the Pandemic. According to Magiera (2020), a way must be implemented whenever there is an event that caused the closure of schools so that students do not lose valuable time. Likewise, the teaching and learning of science students are greatly affected by the current global COVID-19 pandemic paralysing all education sectors. Since the Malaysian government imposed the

Movement Control Orders (MCO) in March 2020 most of the students had not gone back to school yet except for those preparing for major public examinations i.e. *Sijil Pelajaran Malaysia* (SPM) and *Ujian Penilaian Sekolah Rendah* (UPSR). They are studying Science lessons through various Web 2.0 tools like YouTube, Webex, Telegram, WhatsApp, Zoom as well as Google Classroom. Time is a crucial factor for them as the science students have to sit for the major examination.

The Malaysian education system, the students, students' parents and teachers are showing enormous concerns as some of the major examinations like the *Sijil Pelajaran Malaysia* (SPM) the determinant for students' journey to a higher institution and determining their future careers. They elaborated that a distance learning strategy must be adopted quickly regardless of whether the teachers are from virtual schools or are faced with a unique event, and explore the strategy to see how to make it work. Similarly, science teachers must adopt the E-learning system to ensure effective and continual quality science teaching and learning to students amid the pandemic.

Advanced Handouts Meet features which are available for free to anyone using G-suite globally will be able to overcome the issue of teaching and learning science lessons. In addition, this multi-functional Apps can put up to 250 people on a Hangouts Meet call-enabling an entire class or group of classes to join a lesson concurrently, live streaming for up to 100,000 viewers within a domain for a lecture or assembly to be carried out, recording of the meeting and saving to Google Drive and enabling students who cannot join the lesson and view the content later (Magiera, 2020). Malaysian education systems have detected several obstacles in the implementation of Web-based Learning among teachers and students. It is a fact that there are many reasons for this

problem, but one of them is the lack of awareness among teachers and students regarding the acceptance of web-based Learning. According to Poon et al. (2004), there is still a strong preference for the face-to-face conventional learning method even though much Web-based learning were introduced.

Next, according to Cleaver (2014), educators face the problem of adopting new classroom technologies such as Google Classroom and Google Meet because it perceives as “double innovation”. It is a challenge for them because the teachers have to learn thoroughly before utilizing it during class. Therefore, they have to make sure they have enough time to use these technologies. Limited accessibility to the internet is the major problem with the acceptance of Web-based-Learning. Studies by Cotella and Vitale Brovarone (2020) stated that in rural areas and even more so in remote and mountainous ones, the challenge of guaranteeing adequate levels of accessibility is particularly problematic.

According to Ain et al. (2015), the UTAUT 2 model has been used extensively in various settings with the Application of several or all of the UTAUT 2 constructs and investigate the influence of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price Value, Habit on mobile social network adoption (Nikou and Bouwman, 2013), prescribing technology acceptance (Cohen et al., 2013), use of e-governance technology (Krishnaraja et al., 2013), smartphone acceptance (Ally and Gardiner, 2012) and adoption of broadband internet (LaRose et al., 2012). UTAUT2 Model is applicable in google classroom for science subject teaching. In an ideal situation, performance expectancy refers to the extent/degree to which an individual believes that using the system will help him/her to

attain gains in job performance (Venkatesh et al., 2003). This factor is similar to the perceived usefulness of TAM and is recognized to be a fundamental attribute in influencing an individual's attitude towards using any system (Chau et al., 2004). According to Venkatesh et al. (2003), performance expectancy is found to uniquely, significantly and positively influence teachers' Behavioural Intention to accept and use an IT system.

In addition, Venkatesh et al. (2003) define effort expectancy as the level of easiness related while using any system. This means that effort expectancy refers to the effort needed to use the system, whether it is simple or complicated. User-friendly technology could be easily accepted and adopted by users. Most users prefer technology that provides flexibility, usefulness, and ease of use. According to Giesing (2003), effort expectancy is a factor that is highly significant in influencing intention to use. In the present context, effort expectancy refers to the perception of ease using a computer-based google classroom. Therefore, if teachers expect students to perform excellently in the science subject, they are more likely to use the system.

Social Influence: Social influence is defined as the degree to which an individual perceives that important others (such as relatives, peers and subordinates) believe that he or she should use the new system (Venkatesh et al., 2003). Social influence can be the subjective norm, social factors, or image. Image refers to the improvement of a solitary image or class in a social system using the apparent new system (Venkatesh et al., 2003). In this case, teachers are determined by their perception that salient social referents think they should or should not perform a particular behaviour (Ajzen and Fishbein, 1980).

Facilitating Conditions: Facilitating conditions are defined as the degree to which an individual perceives that organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003). In the context of this study, it referred to the objective factors like infrastructures and resources that influence the intention to use google classroom. Venkatesh et al. (2013) argued that there is a positive relationship between facilitating conditions and behavioural intention to use and adoption of technology. However, the relationship was moderated by age and experience with the result being stronger for older workers with increasing experience. For the case of this study, teachers will be willing to use google classroom if they believe the infrastructure and resources exist to support the use of the system. The following constructs are introduced:

Hedonic motivation: This refers to the first new construct that the UTAUT2 introduces as hedonic motivation, which is defined as "the fun or pleasure derived from using a technology" (Venkatesh et al., 2012). It means science teachers are happy and enjoy themselves when they are using Google Classroom. UTAUT 2 also prescribes price value as one of the constructs of the model. This refers to consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost of using them. Ideally, the teachers are expected to gain benefits when they are using Google Classroom more than the price that they pay for the usage of the platform.

Habit: This refers to the degree to which people tend to exhibit behaviour automatically and spontaneously because of learning and what has been operationalised in the UTAUT2 model in the context of technology. Thus, ideally, the model promotes the spontaneous behaviour of the science teachers to use Google Classroom as it had

become their habitual routine. However, in actual practice, the scenario is different and varies according to study findings. In educational settings, numerous studies have been carried out deploying UTAUT and UTAUT 2 models on students with varying findings, acceptance of mobile phones by university students for their studies (Nikolopoulon et al., 2020), Google Classroom: insights from Malaysian higher education (Amantha et al., 2019), habit and hedonic motivation are the strongest influences in mobile learning behaviours (Moorthy et al., 2019). In contrast, Tseng et al. (2019) findings on 166 university lecturers do not find a hedonic motivation to influence their intent behaviour to employ Massive Open Online Courses (MOOCs).

According to Lewis et al. (2013), Performance Expectancy, Effort Expectancy, Social Influence and Habit influence the teachers' adoption of new technology whereas Raman and Don (2013) reported Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions and Hedonic Motivation influence pre-service teachers' acceptance of Learning Management Software. Hence, it is timely for the researcher to explore to what extent the identified factors will be influencing the Behavioural Intention to use Google Classrooms among science teachers.

A user's continuous use of technology makes the use habitual and gains positive perceptions about the technology (Bandyopadhyay and Fraccastoro, 2007). Ally and Gardiner (2012) and Lewis et al. (2013) reported that there had been studies on the impact of habit on the adoption of technology. However, in educational settings, habitual use of technology has received limited attention (Ain et al., 2015). According to Jakkaew and Hemrungrote (2017), habit is found to influence students' and teachers' Behavioural Intention to adopt Google Classroom Apps. However, Amadin et al. (2018)

are of a contrasting viewpoint with the study finding as their habit construct does not influence the Behavioural Intention in adopting Google Apps among the 200 university lecturers of Nigeria. Hence, it is pertinent to explore the habit construct influence on the Behavioural Intention to use Google Classroom among science teachers.

In the consumer setting, the use of technology is determined by price value, which denotes the products' good or bad value for the price paid, associated with good or bad value for money (Venkatesh et al., 2012). However, many researchers simply dropped out of the price value construct when applying the UTAUT 2 model in technology use studies in the educational context (Ain et al., 2015). For instance, research on students as respondents often ignored the price value construct, justifying those students do not bear the technology costs (Lewis et al., 2013; Raman and Don, 2013). In this perspective, although the Google for Education Suite is free for schools but a paid G Suite Enterprise for education tier includes additional features such as advanced video conferencing features and advanced security and premium support (Pardo-Bunte, 2020). In addition, Google sells a variety of optional products like Chromebooks and partners with other companies for authoring tools, content topics and professional development (Pardo-Bunte, 2020). As such, the researcher maintains the price value construct as there is a paid cost to prevent a lack of theoretical grounding to fill the gap in the literature as there is limited access to the literature on price value influence on the Behavioural Intention to use Google Classroom among science teachers.

In the aspect of effort expectancy, the senior teachers still have not mastered the skill of using Google Classroom. During remote teaching, some teachers still depend

on family members to help them operate the Google Classroom system. When the family members are not around, they have to end the teaching session abruptly. These findings which are similar to the study reported that effort expectancy does not have a direct effect on the Behavioural Intention to use Google Classroom or other technological gadgets among teachers in teaching (Radovan and Kristl, 2017; Raman and Rathakrishnan, 2018; Raman et al., 2014; Tseng et al., 2019). According to Oudhuis (2017), the teachers in the Netherlands found Perceived Ease of Use (PEOU) to be not easy to use resulting in low usage among them.

Researchers found a few gaps between ideal practices and current practices based on literature searches and analyses. They have Perceived Compatibility which is one of the main indicators influencing the use and acceptance of Information technology (Almaiah et al., 2019). Rogers (2003) prevailed that Perceived Compatibility is the degree to which the technology is consistent with the existing values, beliefs, lifestyles and needs of the users. Kristen (2016) cited in Isaac et al. (2016) stated that Perceived Ease of Use is influenced by Perceived Compatibility. However, there are limited findings on Perceived Compatibility influence on the Behavioural Intention to use technology within a UTAUT 2 framework in the educational context. It will be worthwhile to examine the relationship between the Perceived Compatibility and Behavioural Intention to use Google Classroom among science teachers to bridge the research knowledge gap as the teachers also have varying values, beliefs, needs, previous experiences and the present COVID-19 pandemic. The relationship between the Behavioural Intention to use Google Classroom and the actual use of Google Classroom will be examined too. The Google Classroom system suit the teachers' needs, teaching styles, past experiences, current situations, and values.

The second research gap is teaching experiences (moderator) when teachers with high teaching experiences do not have the chance for formal training in computer usage, hence there is a limitation in their usage (Limone et al., 2019) and the third gap is Moderator: educational background. Manstead (2014) reported of educational influence creates a user's social identity, a better understanding of oneself, their connection with others and to possess the intelligence and good behaviour needed for oneself and society (Gerungan, 2004). According to Manstead (2014), a higher level of education is linked to higher social trust. This implies that as the educational level of the teachers increased, their perceptions of the significance of social influence increased to form a positive social identity.

Numerous studies on UTAUT and UTAUT 2 have included age, gender and experiences of users to moderate the effects of the constructs on the Behavioural Intention to use technology and the actual use of technology with varying findings (Venkatesh et al., 2012). Chang et al. (2019) added that many researchers are deploying UTAUT and UTAUT 2 that ignore these demographic profiles which act as moderator variables. The researcher includes all three moderator variables, that is, age, gender, experiences and the additional construct of the educational background of the teachers too. Venkatesh et al. (2012) suggested for inclusion of more moderator variables to strengthen the proposed model.

In this study, attempts are made to investigate the factors that influence the Behavioural Intention to use Google Classroom and the relationship between the Behavioural Intention to use Google Classroom and the actual use of Google Classroom among science teachers of Perak in teaching science through a novel model of

Technology Acceptance adapted and modified from the previous UTAUT 2 model, that is, the Re-Imagining UTAUT 2 (RIUTAUT 2) model. From the Re-modeling UTAUT 2, the researcher identifies factors such as the teachers' performance expectancy, perceived compatibility, social influence, facilitating conditions, hedonic motivation, habits, price value and effort expectancy that will influence their Behavioural Intention to use Google Classroom, the relationship of the Behavioural Intention to use Google Classroom and the actual use of Google Classroom. In addition, moderator variables like age, gender, teaching experiences and educational background moderate the effects between the identified factors and Behavioural Intention to use Google Classroom among the science teachers. The researcher examines the relationship between the Behavioural Intention to use Google Classroom to the actual use of Google Classroom among science teachers. In addition, the researcher examines the significant difference in the relationship between the two different groups of the opinion of science teachers regarding their increase in the usage of Google Classroom in teaching science amid the COVID-19 pandemic and the actual use of Google Classroom among science teachers. With the novel theoretical framework of Re-Imagining UTAUT 2 (RIUTAUT 2) as a solid base, the researcher confronts the issues through the identified research gaps in this study.

The area of this study has many consequences. If the model is not implemented, the teachers will not use Google Classroom if it does not suit their needs. Ryn and Sandaran (2020) reported if teachers perceived technology as not fulfilling the students and their needs, then it is not likely for them to use it. The study by Pereira and Wahi (2017) had compatibility significantly impacted the intention of the instructors to use the online Course Management System (CMS) because it suits their teaching styles.

Similar findings reported in studies by Kumar et al. (2008), Salem and Mohammadzadeh (2018), Sayadian et al. (2009) implied that educators employed technology when the tools are consistent with their needs, values and teaching methodology. Similarly, Jakkaew and Hemrungrote (2017) supported that Google Classroom alongside its paperless feature and abilities for teachers to produce tasks, convey statements and commence a conversation with students promptly fit well into their daily working requirements. Lee et al. (2011) found only Perceived Compatibility to affect the intended behaviour of the users to use E-learning.

The outcomes of this study can bring about changes to the Malaysian Education System to ensure quality education in science for all sectors and futuristic teaching and learning strategy with the prioritization of E-learning. The researcher is optimistic that the findings of this study bring enormous benefits to the students, students' parents, teachers, school administrators, policymakers and the Malaysian Education System.

1.4 Purpose of the Study

The purpose of this study is to measure the influence of the independent variables of the Re-Imagining UTAUT 2 model on the Behavioural Intention to use Google Classroom, and the influence of the Behavioural Intention to use Google Classroom on the actual use of Google Classroom. In addition, to determine the moderator variables effects between independent variables and the Behavioural Intention to use Google Classroom among science teachers in teaching science students of Perak amid the COVID-19 pandemic. It also assesses the levels of importance of the independent

variables that will influence the science teachers' Behavioural Intention to use Google Classroom. In addition, to identify the significant difference between the following two groups of opinions on their actual usage of Google Classroom among science teachers of Perak: the teachers who reported there is an increase in usage of Google Classroom amid the COVID-19 pandemic, the teachers who reported there is no increase in their usage of Google Classroom amid COVID-19 pandemic. This research is carried out through a quantitative cross-sectional survey among the science teachers of Perak.

1.5 Research Objectives

The objectives of this research are to:

a. Assess the levels of importance of the Re-Imagining UTAUT 2 Independent Variables: Performance Expectancy, Perceived Compatibility, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, Price Value and Effort Expectancy that influence the Behavioural Intention to use Google Classroom among science teachers in teaching science students of Perak amid COVID-19 pandemic.

b. Examine the relationship between the Re-Imagining UTAUT 2 Independent variables: Performance Expectancy, Perceived Compatibility, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, Price Value, Effort Expectancy, and Behavioural Intention to use Google Classroom among science teachers in teaching science students of Perak amid COVID-19 pandemic.

c. Examine the relationship between the Behavioural Intention to use Google Classroom and the actual use of Google Classroom among science teachers in teaching science students of Perak amid the COVID-19 pandemic.

d. Examine the Re-Imagining UTAUT 2 moderator variables: age, gender differences, teaching experiences and educational background that moderates the relationship between the independent variables: Performance Expectancy, Perceived Compatibility, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, Price Value, Effort Expectancy and the Behavioural Intention to use Google Classroom among science teachers in teaching science Students of Perak amid COVID-19 pandemic.

e. Identify the significant difference between the following two groups of opinions on their actual use of Google Classroom among science teachers of Perak: the teachers who reported there is an increase in usage of Google Classroom amid the COVID-19 pandemic, the teachers who reported there is no increase in their usage of Google Classroom amid the COVID-19 pandemic.

1.6 Research Questions

a. Does Performance Expectancy, Perceived Compatibility, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, Price Value and Effort Expectancy have a significant influence on the Behavioural Intention to use

Google Classroom among science teachers in teaching science students of Perak amid the COVID-19 pandemic?

b. Does Behavioural Intention use of Google Classroom has a significant influence on the actual use of Google Classroom among science teachers in teaching science students of Perak amid the COVID-19 pandemic?

c. Do the moderator variables such as age, gender, teaching experiences and educational background moderate the relationship between Performance Expectancy, Perceived Compatibility, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, Price Value, Effort Expectancy and the Behavioural Intention to use Google Classroom among science teachers in teaching science Students of Perak amid the COVID-19 pandemic?

d. Do the two groups of teachers (who reported an increase and who reported no increase in their usage of Google Classroom amid the COVID-19 pandemic) differ significantly in their actual usage of Google Classroom?

1.7 Research Hypothesis

Previous literature provides a foundation for the development of a proposed model based on the hypothesis. Hence, the proposed model of this study displays an illustrated picture of the relationships between the independent variables to the dependent variable. The analysis of data enables the explanation of the relationships between the observable

and latent variables. The goodness-of-fit indices values determine the hypothesized paths. This study analyses the proposed hypothesis to ascertain the direct relationships, and the moderator effects of the path of the identified observed variables as in Fig 1.3: Theoretical Framework for the elaboration of the paths. The hypothesis related to direct relationships:

H1: Performance Expectancy has a positive and significant influence on the Behavioural Intention to use Google Classroom.

H2: Perceived Compatibility has a positive and significant influence on the Behavioural Intention to use Google Classroom.

H3: Social Influence has a positive and significant influence on the Behavioural Intention to use Google Classroom.

H4: Facilitating Condition has a positive and significant influence on the Behavioural Intention to use Google Classroom.

H5: Hedonic Motivation has a positive and significant influence on the Behavioural Intention to use Google Classroom.

H6: Habit has a positive and significant influence on the Behavioural Intention to use Google Classroom.

H7: Price Value has a positive and significant influence on the Behavioural Intention to use Google Classroom.

H8: Effort Expectancy has a positive and significant influence on the Behavioural Intention to use Google Classroom.

H9: Behavioural Intention has a positive and significant influence on the Actual Use of Google Classroom.

H10: Age moderates the relationship between Performance Expectancy and Behavioural Intention to use Google Classroom.

H11: Gender moderates the relationship between Performance Expectancy and Behavioural Intention to use Google Classroom.

H12: Teaching Experiences moderates the relationship between Performance Expectancy and Behavioural Intention to use Google Classroom.

H13: Educational Background moderates the relationship between Performance Expectancy and Behavioural Intention to use Google Classroom.

H14: Age moderates the relationship between Perceived Compatibility and Behavioural Intention to use Google Classroom.

H15: Gender moderates the relationship between Perceived Compatibility and Behavioural Intention to use Google Classroom.

H16: Teaching Experiences moderates the relationship between Perceived Compatibility and Behavioural Intention to use Google Classroom.

H17: Educational Background moderates the relationship between Perceived Compatibility and Behavioural Intention to use Google Classroom.

H18: Age moderates the relationship between Social Influence and Behavioural Intention to use Google Classroom.

H19: Gender moderates the relationship between Social Influence and Behavioural Intention to use Google Classroom.

H20: Teaching Experiences moderates the relationship between Social Influence and Behavioural Intention to use Google Classroom.

H21: Educational Background moderates the relationship between Social Influence and Behavioural Intention to use Google Classroom.

H22: Age moderates the relationship between Facilitating Conditions and Behavioural Intention to use Google Classroom.

H23: Gender moderates the relationship between Facilitating Conditions and Behavioural Intention to use Google Classroom.

H24: Teaching Experiences moderates the relationship between Facilitating Conditions and Behavioural Intention to use Google Classroom.

H25: Educational Background moderates the relationship between Facilitating Conditions and Behavioural Intention to use Google Classroom.

H26: Age moderates the relationship between Hedonic Motivation and Behavioural Intention to use Google Classroom.

H27: Gender moderates the relationship between Hedonic Motivation and Behavioural Intention to use Google Classroom.

H28: Teaching Experiences moderates the relationship between Hedonic Motivation and Behavioural Intention to use Google Classroom.

H29: Educational Background moderates the relationship between Hedonic Motivation and Behavioural Intention to use Google Classroom.

H30: Age moderates the relationship between Habit and Behavioural Intention to use Google Classroom.

H31: Gender moderates the relationship between Habit and Behavioural Intention to use Google Classroom.

H32: Teaching Experiences moderates the relationship between Habit and Behavioural Intention to use Google Classroom.

H33: Educational Background moderates the relationship between Habit and Behavioural Intention to use Google Classroom.

H34: Age moderates the relationship between Price Value and Behavioural Intention to use Google Classroom.

H35: Gender moderates the relationship between Price Value and Behavioural Intention to use Google Classroom.

H36: Teaching Experiences moderates the relationship between Price Value and Behavioural Intention to use Google Classroom.

H37: Educational Background moderates the relationship between Price Value and Behavioural Intention to use Google Classroom.

H38: Age moderates the relationship between Effort Expectancy and Behavioural Intention to use Google Classroom.

H39: Gender moderates the relationship between Effort Expectancy and Behavioural Intention to use Google Classroom.

H40: Teaching Experiences moderates the relationship between Effort Expectancy and Behavioural Intention to use Google Classroom.

H41: Educational Background moderates the relationship between Effort Expectancy and Behavioural Intention to use Google Classroom.

The COVID-19 pandemic affecting the education system has forced teachers to opt for the Google Classroom system to ensure sustainability and quality education for their students. During the pandemic, online teaching is no longer considered an option anymore, it is a necessary step for teachers to move forward. Hence, it is pertinent to determine the statistically significant differences between the following two groups of opinions on their actual usage of Google Classroom amid the COVID-19 pandemic.

The first group consists of teachers who reported there is an increase in usage of Google Classroom and the second group consists of teachers who reported that there

is no increase in usage of Google Classroom amid the COVID-19 pandemic. With that explanation, hence H42 is developed as follows:

H42: The actual usage of Google Classroom differs significantly between the teachers who reported an increase and the teachers who reported no increase in usage of Google Classroom amid the COVID-19 pandemic.

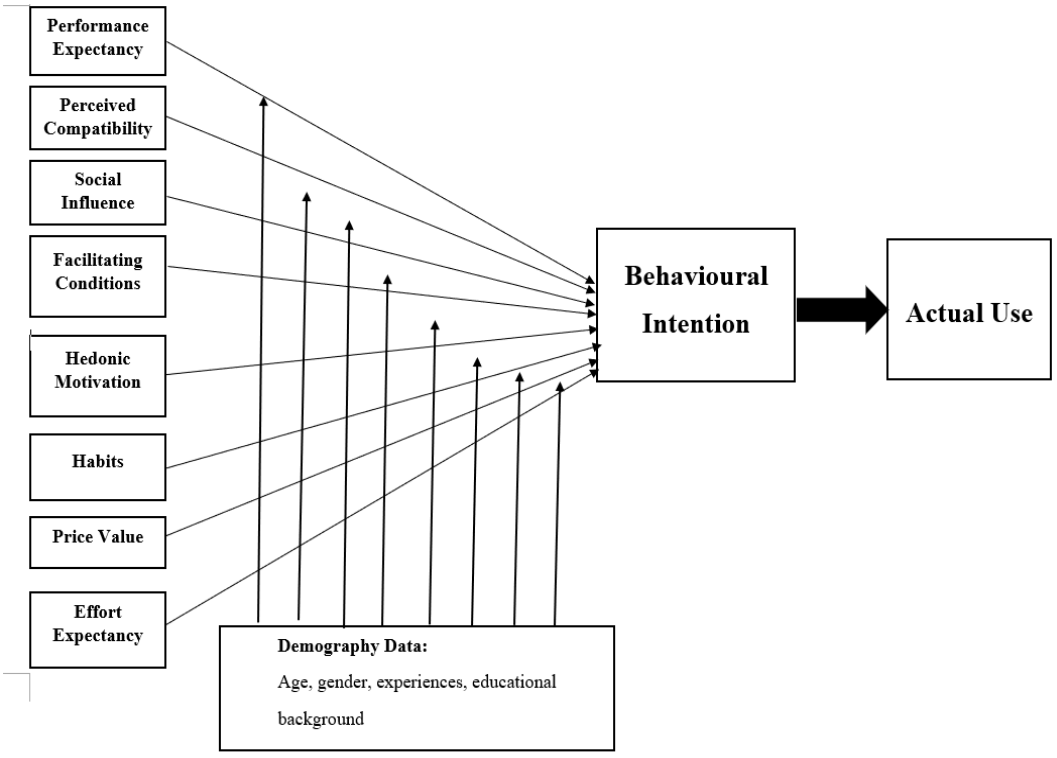

Figure 1.3. Theoretical Framework of the Re-Imagining UTAUT 2 model to examine Independent Variables that influence the Behavioural Intention to use Google Classroom among science teachers amid the COVID-19 pandemic.

1.8 The Proposed Theoretical Framework and Research Framework

Jabareen (2009) reported that an issue under examination in a study is considered carefully planned and the inter-relationships among the variables attain the entire

fundamental to understand completely the situation under the study. All the elements form a clear concept of the issue under examination. The proposed study is to examine the constructs in developing a Re-Imagining UTAUT 2 model in the use of Google Classroom in teaching science among science teachers of Perak, Malaysia amid the COVID-19 pandemic when remote teaching and learning seems apparent. The study concentrates on the relationship of the predicting variables in developing a novel model for science teachers in using Google Classroom in teaching science.

This proposed model is grounded on UTAUT and UTAUT 2 originated from the integration of eight paramount prior predominant models covering human behaviour to Computer Science namely: Theory of Reasoned Action (Fishbein and Ajzen, 1975), Technology Acceptance Model (Davis, 1989), Theory Of Innovation Diffusion (Moore and Benbasat, 2001), Motivational Model (Davis et al., 1992), Model Of PC Utilization (MPCU) (Thompson et al., 1991), Theory Of Planned Behaviour (Ajzen, 1991), TAM (Davis et al., 1989, TAM 2 (Venkatesh and Davis, 2000), Decomposed Theory of Planned Behaviour (DTPB) (Taylor and Todd,1995), and Theory of Social Cognitive (Compeau and Higgins, 1995). The unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model designed by Venkatesh et al.(2003) and the unified theory of acceptance and use of technology 2 (UTAUT 2) is a technology acceptance model designed by (Venkatesh et al., 2012).

The proposed theoretical model is mirroring the research objectives and hypothesis identified in the study as it sets out to further explains the variables that emphasize the main problems in the context of the study and ultimately contribute to

the body of knowledge in specific areas (Marshall and Rossman, 2011). This study has a proposed model with specifically identified paths supported by previous literature. However, Bryne (1994) prompt that even though supported by previous findings, a proposed model can just remain as a tentative model as the exact data fit with the theorized model may not always be similar as there are always possibilities that some path analysis findings may not be significant.

1.9 The Conceptual Framework

To attain the research objectives of the study, a conceptual framework is developed to design and describe the variables, organization and progress of the study. The conceptual framework of the study is presented in Figure 1.4.

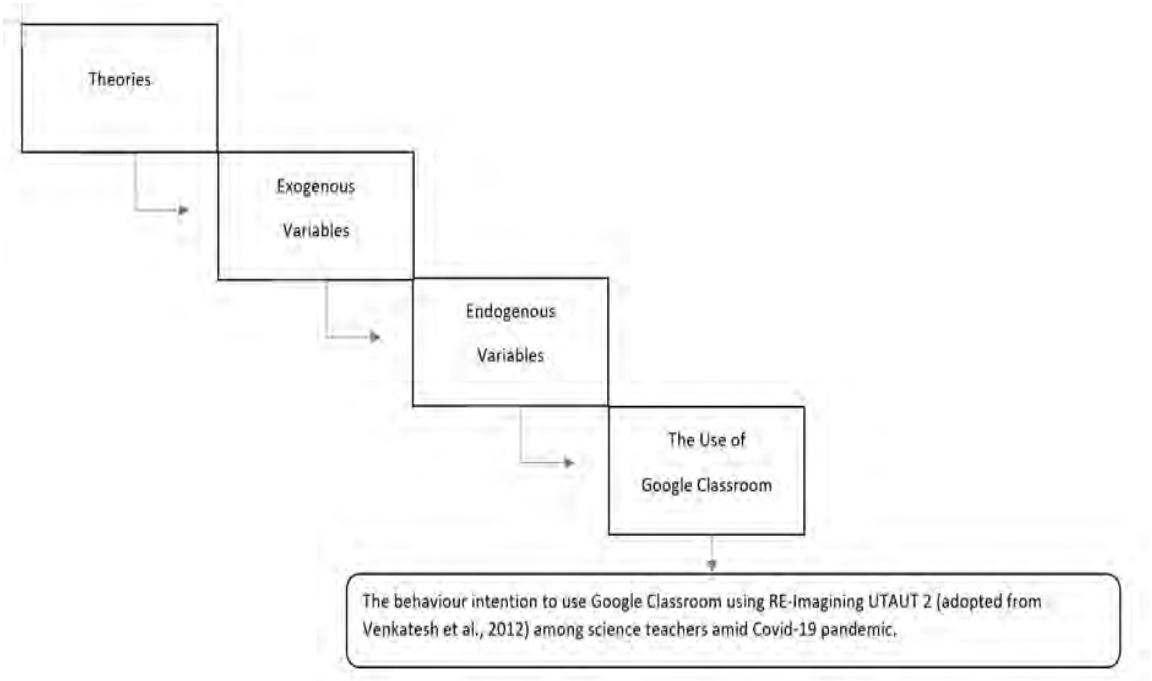

Figure 1.4. The Conceptual Framework.

The conceptual framework of the study denotes that the hypothesized relationships identified are drawn from numerous previous works of literature and the entire variables are based on supported theories and models as mentioned in the proposed theoretical framework. The independent variables are exogenous constructs while the moderators and dependent variables (endogenous constructs) are endogenous. The main aim of this study is to analyse the factors that influence the Behavioural Intention to use Google Classroom among science teachers of Perak amid the COVID-19 pandemic.

1.10 The Outline of the Research Design and Methodology

A non-experimental, correlational, and cross-sectional survey method is used for this study. The characteristics and context of this study make it suiTable to embark on the positivist approach through quantitative data analyses for achieving research objectives and hypotheses because of its good reliability and representation. A survey method is selected as it is a systematic collection and presentation of data to give a clear picture of a particular situation that happen currently involving populations or individuals compared with other methods like observations or interviews (Fraenkel and Wallen, 2005; Sekaran, 2003).

Meanwhile, Chua (2006) and Punch (2009) addressed that the quantitative cross-sectional approach can provide general facts and an overall picture of the entire population of the study, existing phenomena, explain the relationship among variables, test hypotheses, make assumptions and obtain inferences from implications of

particular issues or problems addressed. Hence, this survey method is deemed appropriate from the perspective of ontological, epistemological, and methodological for this study. A self-administered questionnaire was used for data collection, where the sample size is selected via a simple random sampling method. The privacy and confidentiality of the respondents are maintained.

Sekaran and Bougie (2016) reported such a study design offers a better understanding of concepts and reduces the outlier's issue as the respondents can seek clarity before answering the questionnaire. A pilot study will determine its reliability and validity (further detail in Chapter 3). However, Structural Equation Modeling (SEM) using the two-step approach is carried out from the measurement model to the structural model (Hair et al., 2010). In addition, multiple group analysis (MGA) was done to measure the moderation effects of age, gender, teaching experiences and educational background in the proposed theoretical model.

1.11 The Scope of the Study

The scope of this study covers the aim and research objective and the obtainable support. Hence, the main aim and research objective are to ascertain the predicting factors that can influence the Behavioural Intention to use Google Classroom among science teachers amid the COVID-19 pandemic. It includes the Re-Imagining UTAUT 2 model: 8 Independent Variables, 4 moderator variables, behavioural intention and the actual use of Google Classroom among science teachers. The samples consist of 421 science teachers who are employed at secondary schools in Perak.

The inclusion criteria are teachers who use Google Classroom in teaching science subjects. Exclusion criteria are teachers who are not teaching science subjects, science teachers who are administrators, science teachers who are using Google Classroom in teaching science subjects but are on long study leaves, long maternity leaves and prolonged medical leaves. The main areas that determine the scope of the study include:

a) The target of the study is to determine the predicting factors that influence the Behavioural Intention to use Google Classroom among science teachers of Perak amid the COVID-19 pandemic. The findings of the study can be applied to science teachers so that effective remote teaching and learning via Google Classroom can be sustained.

b) The respondents of the study are science teachers from Perak. The teaching methods, especially through Google Classroom are highly recommended, the remote learning due to the Movement Control Order restriction, the demographic of the context of the study, escalating number of COVID-19 cases are pertinent issues to address. The proposed model in the study provides answers to the aim, research objectives and hypothesis enabling teachers and policymakers to decide on the reinforcement of using Google Classroom extensively and effectively in all education sectors.

1.12 Significance of the Study

This study develops and empirically tests a novel Re-Imagining UTAUT 2 model to predict the factors influencing science teachers' Behavioural Intention to use Google Classroom, the relationship between the Behavioural Intention to use Google Classroom and the actual use of Google Classroom amid the COVID-19 pandemic where remote teaching and learning is the best option and the significant difference between the two groups of teachers' opinion on the usage of Google Classroom in teaching science amid COVID-19 pandemic and the actual use of Google Classroom among the science teachers. Determining the factors that motivate the use of Google Classroom can improve the teaching and learning quality and boost pedagogical and instructional uses of Google Classroom.

Hence, the researcher is confident that the novel Re-Imagining UTAUT 2 model provides a practical reference for educational institutions and decision-makers involved to ensure a quality and sustainable education system in Malaysia. The results of this research aim to give a contribution to other researchers, the Science Department at the Ministry of Education, students, and the researcher and are as followed.

a) Further Studies

The findings of the result are a source of reference for other researchers for engaging in future research related to teaching and learning by using technology. The research findings contribute to the literature by identifying the main predictors that influence the science teachers' Behavioural Intention to use Google Classroom in teaching science

students amid the COVID-19 pandemic. In addition, there is an advancement in the theoretical understanding of the Behavioural Intention of science teachers.

b) Science Department at the Ministry of Education

The findings of this research are useful for the Science Department at the Ministry of Education, especially in choosing suitable tools of technology for E-learning.

c) Students

The students are to receive benefits as the findings are expected to help the teachers to provide more knowledge to students who are studying using Google Classroom as a learning tool during this quarantine.

d) The researcher

The empirical evidence of the effects of external factors which lead to Behavioural Intention and use of Google Classroom. An adequate body of knowledge in the area of study from this research is useful for future development direction and approaches related to the implementation of Google Classroom.

1.13 Limitations of the Study

The limitation of the research is on the selected respondents of the study. The science teachers' preference for using Google Classroom in teaching science could be due to various underlying reasons, that is, whether they are examination-oriented or willing to use Google Classroom as part of their teaching and learning of science. If the teachers

are doing it for the sake of completion of the syllabus and to prepare the students for coming major examinations such as *Sijil Pelajaran Malaysia* (SPM), then their opinions will differ from teachers who are using it as blended learning with the integration of Google Classroom.

The science teachers' prioritisation and opinion may vary and result in inconsistency of findings.

1.14 Operational Definition

A conceptual definition expresses what precisely concepts in the study are to be measured or checked while an operational definition would describe how to capture (identify, create, measure and assess the value) of the concepts (Slife et al., 2016).

In this research, the operational operations of several terms are further explained to avoid misconceptions in this study.

a) Performance Expectancy

The degree to which using Google Classroom in teaching science will provide benefits to science teachers. The degree to which an individual believes that using the system will help him or her to achieve gains in a job (Davies et al., 1992; Shin, 2009). The theoretical background of this construct is derived from the efficacy perceptions of a user (Technology Acceptance Model), extrinsic motivation (Model of Motivation), job fit (Personal Computer Utilization Model), relative advantage (Theory of Innovation

Diffusion) and outcome expectation (Theory of Social Cognition) (Compeau and Higgins, 1995).

b) Perceived Compatibility

The degree of consistency of the Google Classroom with values and beliefs, past and present, as well as with the needs of the science teachers in teaching science. Perceived Compatibility is a new construct added to the novel Re-Imagining UTAUT 2 Model. Ramiller (1994) defined perceived compatibility as the degree to which Information System/Information Technology is perceived as consistent with the perceptions and needs of the potential users. Users would adopt a mobile learning system when they feel that it is compatible with their needs and online system (Cheng, 2014; Joo et al., 2014). Moreover, Almaiah et al. (2019) stated that numerous literature reviews showed perceived compatibility as one of the main indicators in influencing and the acceptance of Information. Ramiller (1994) reported innovation that fits into an organization well can bring along the implementation of new technology.

c) Social Influence

The science teachers perceive that important others (family, friends) believe that they should use Google Classroom in teaching science. The degree to which a user perceives that important person believes technology used to be pertinent (Diaz and Loraas, 2010). In extension TAM, a construct of the subjective norm was added and social influence is similar to the subjective norm and the subjective norm exerts a direct influence on the usage of ICTs significantly (Schepers and Wetzels, 2007). Social influence was derived from the Theory of Reasoned Action, Technology Acceptance Model 2, and the Theory of Planned Behaviour, a combination of TAM and TPB. According to

Venkatesh et al. (2003), the subjective norm is a construct from TAM 2 and had been adopted into UTAUT and UTAUT 2 as social influence. Subjective norm has a strong influence on the perception of usefulness and identification in which people use the system to be famous and influence the workgroup to improve, especially in the initial stage of experience (Keong et al., 2012; Venkatesh et al., 2003).

d) Facilitating Conditions

The science teacher's perception of the resources and support available to use Google Classroom in teaching science. The degree to which an individual believes that the organizations and the technical infrastructure are there to support them in the usage of the system (Chang, 2012). This construct is derived from the Model of personal computer utilization (Thompson et al., 1991 and the theory of Innovation Diffusion (Roger, 2003). Study findings showed that infrastructure stability such as technological and environmental support is an important support system to ensure the acceptance of the users (Keong et al., 2012).

e) Hedonic Motivation

The pleasure or enjoyment of the science teachers derived from using Google Classroom in teaching science. It is a new construct in UTAUT 2, which was derived from The Theory of motivation where people will adopt the system if they find it to be fun (Venkatesh et al., 2012). According to Thong et al. (2006), hedonic motivation conceptualized as perceived enjoyment has played a significant role in influencing the Information System users' acceptance of technology.

f) Habit

The extent to which science teachers tend to use Google Classroom in teaching science automatically because of learning. According to Venkatesh (2012), experience and habit are important factors in the UTAUT 2 model. Venkatesh et al. (2003) explained that experience is divided into three levels based on the passage of time: (1) post-training was when the technology was initially in place for use, (2) one month later (3) three months later. Kim et al. (2005) perceived habit as an automatization process where because of repeated actions, the users will do it even without their awareness, it is a prior behaviour and measured as the extent to which a person believes the behaviour to be automatic. However, Limayen et al. (2007) believed that people tend to perform behaviour automatically because of learning.

g) Price Value

The science teachers' cognitive trade-off between the perceived benefits of the Applications and the monetary cost of using Google Classroom in teaching science. According to Chang (2012), price value is defined as the consumers bearing the monetary cost of technology use and if the consumer feels that the value of the technology used is equivalent to the cost, then he/she will accept and use that technology and often the monetary cost is bear by the organization or Institution. According to Venkatesh et al. (2012), the difference between a consumer use setting and the organizational use setting is that consumers usually need to pay for that technology whereas, in an organizational setting, the employees will just use the system as it is already paid by the employers. Although the use of Google Classroom is free for use, however, there is a paid price for extra functions and support systems to be bear by school administrators. So, using Google Classroom is not free. This is one

determinant factor that will influence the users' Behavioural Intention and the use of technology. They will need to consider whether it is worthwhile to pay for a technology, value for money will be the issue. Hence, cost and pricing structure may have a significant impact on usage (Chang, 2012).

h) Effort Expectancy

The degree of ease/ effort associated with the science teachers' use of Google Classroom in teaching science. The degree of ease associated with the use of a system. Venkatesh et al. (2003) reported this construct was derived from the perceived ease of the Technology Acceptance Model (TAM). Davis (1989) stated that anything easy to use can influence users to use it. Both Performance Expectancy and Effort Expectancy were strong predictors of the intention to use WBQAS (Web-Based Questions and Answers) (Deng et al., 2011).

i) Behavioural Intention

The extent to which one believes that he or she will engage in action (Venkatesh et al., 2012). The intention is simply defined as how hard the science teachers are willing to try and how determined they are. The teachers are planning to use Google Classroom in teaching science amid the pandemic.

j) The Actual Use of Google Classroom

It is the client's extent of obtaining and using technology (Venkatesh et al., 2003). Actual use is defined as the action of science teachers using Google Classroom in teaching science amid the COVID-19 pandemic.

k) Age as moderator categorize into High Age Group and Low Age Group. The age of the science teachers is collected through a structured questionnaire (Section A) under Demographics data. There are 4 columns for them to tick, that is, less than 29 years, 30-39 years, 40-49 years, and more than 49 years. The categorization of teachers in the High Age Group is those teachers who are above 40 years old while Low Age Group teachers are 40 years below. This is similar to the study of Fraillon et al. (2014) in terms of age categorization.

l) Teaching experiences as moderators categorize into High teaching experiences and Low Teaching experiences. The teaching experiences of the science teachers are collected under the demographics data section. There are 4 columns for them to tick, 0-5 years of teaching, 6-10 years, 11-20 years and more than 20 years. The high teaching experience group are those with more than 10 years of teaching while the low group has less than 10 years of teaching science. This is following studies by Binyamin et al. (2019) and Mahdi and Al-Dera (2013).

J) Educational Background as moderator categorize into High Educational level and Low Educational level. The educational background of the teachers is collected through the demographics data section under the 4 columns provided: Diploma, Bachelor Degree, Master Degree and PhD in science. Teachers with a Master's or PhD are categorized as High educational level group while those with a Bachelor's degree and below are in the low educational group. Binyamin et al. (2019) also categorize teachers as a high educational group when they have a Master's or PhD degree while those with a Bachelor's degree and below are classified as a low educational group.

1.15 The Structure of the Study

The study is structured in the following manner:

Chapter 1: Displays the research background, problem statement, purpose of the study, research objectives, research questions, research hypothesis, the proposed theoretical framework, operational definition and limitations of the study.

Chapter 2: Presents a literature review of the empirical and theoretical literature about the independent and dependent variables.

Chapter 3: Provides information on the methodology of the study. The parts include the population, sampling procedures, description of the variables, item building, collection of data, and analysis methods.

Chapter 4: Presents the response rate of the respondents, and displays the descriptive and inferential statistics using SPSS and SEM, which address the measurement model to the structural model.

Chapter 5: To sum up the research outcomes, research objectives, research questions, research hypothesis, and interpret the findings, discuss with relevant literature and draw implications and limitations of the study. Executes suggestions for the application of the research findings in the education arena.

1.16 Summary

This chapter provides an overview of the COVID-19 pandemic causing a disruption of teaching and learning of science for science students because of the closure of the school. Remote learning has been replacing the face-to-face didactic style since March 2020 due to the Movement Control Order (MCO). Google Classroom is a highly recommended option by the Ministry of Education and is reported to be used widely globally. Science teachers play a pivotal role in using Google Classroom to replace the traditional Face-to-Face teaching method. However, to what extent are the teachers accepting Google Classroom? The researcher has adapted and modified the UTAUT 2, to the novel customized model, epithet as the Re-Imagining UTAUT 2 (RIUTAUT 2) model for science teachers. It encompasses the specific constructs that will answer the research gaps identified amid the COVID-19 global pandemic to ensure quality and continual education for the scientific discipline and all education sectors in Malaysia. Hence, this research aims at testing the hypothesized model to ascertain the relationships among the independent, dependent and moderator variables in influencing Behavioural Intention to use Google Classroom among science teachers. The whole chapter has a summary of the purpose, research objectives, research questions, research hypothesis, the significance of the study, scope and its limitation. Follow-through of the next chapter will provide an extensive literature review based on the research objectives and the theoretical framework of the study.