# Embracing the New Norm in Teaching and Learning via G Suite for Education: A Multidimensional Perspective

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**Abstract**: The Covid-19 global pandemic witnessed a paradigm shift where remote teaching and learning had to be embraced by both teachers and students alike at all education levels. The overnight rapid transition witnessed the employment of several online tools including G Suite for Education, launched by Google in 2006. Today, educational institutions all around the globe have embraced G Suite tools but one question that raises concern is its potential as a teaching and learning tool in today's 21st century remote learning classrooms. Therefore, this paper puts forward the findings of an exploratory study that investigated a multidimensional perspective involving both pre-service teachers and lecturers' perspectives of G Suite for Education based on four dimensions of the Technology Acceptance Model (TAM), namely perceived usefulness, perceived ease of use, behavioural intention to use and actual system use. The study was set in a private university in Malaysia involving 50 pre-service teachers and four lecturers. The study employed a sequential explanatory mixed methods research design wherein data were collected via a three-pronged approach involving the use of a test, a questionnaire, and semi-structured interviews. Quantitative data analysis involved both descriptive and inferential statistics whilst qualitative data were thematically analysed. Initial findings indicated that pre-service teachers' knowledge of G Suite for Education is at the moderate level with both students and lecturers' having positive perceptions of G Suite based on the four dimensions of TAM. Despite a few issues of concern and challenges, the findings also implied the potential of G Suite for Education as a viable tool in today's new norm of remote teaching and learning.
(248 words)

## 1.      Introduction

The Sustainable Development Goals (SDGs) initiated in 2015 by United Nations, is a universal call for action to eradicate poverty; to preserve the planet; and to promote prosperity and well-being through environmental sustainability. Listed in the 2030 Agenda are 17 goals and 169 targets that requires global partnership and participation in the form of social, economical, environmental, educational and technological integration for development (Berawi, 2017). UNESCO SDG4.0 articulates the sustainability of the provision of quality education because the basis of all learning and

quality of life on this planet rests upon a good foundation in education. SDG 17 recognises that improving access to technology and knowledge is a crucial route for sharing ideas and fostering innovation.

According to UNESCO (2020), more than 58 million learners at the pre-primary, primary, secondary and tertiary level have been affected by school and campus closures in order to curb the widespread infection of Covid-19. The unprecedented outbreak of Covid-19 in December 2019 compelled the education system to challenge its norm overnight from a traditional face-to-face teaching to remote teaching and learning. With the closure of schools, colleges and universities, educators across the globe had to switch and adapt to online teaching as a swift solution for learning to continue. Nevertheless, recent studies have indicated that, educators faced numerous challenges in integrating technology in their classrooms (Hakim, 2020; Adedoyin & Soykan, 2020; Dhawan, 2020). However, Hakim (2020) conceded that online technology-led classes are probably the only viable alternative to replace face-to-face learning during the Covid-19 pandemic.

Malaysia like many other countries, was not exempted from the cataclysm of the Covid-19 pandemic. Under the Movement Control Order (MCO), physical learning in schools and tertiary institutions came to an uncertain halt. During this period, schools and tertiary institutions have relied on the usage of computers, laptops, tablets and mobile phones with internet access for online learning either through synchronous or asynchronous environments (Selvanathan et al., 2020). The synchronous learning mode requires students to virtually attend class at a predetermined time and is led by an instructor. On the other hand, the asynchronous learning mode provides students with flexibility in the sense that, they are not required to be online at the same time (Francescucci & Rohani, 2018). This mode of learning is usually assisted by emails, discussion boards, technological applications and tools such as G Suite.

One of the key players in embracing the new norm is Google wherein G Suite Applications for Education launched in 2006 provides a collection of web-based applications to encourage collaboration, critical and creative thinking skills, while supporting the learning objectives that teachers have for their students. Under the G Suite applications, *Docs*, *Slides*, *Sheets*, *Drive* and *Jamboard* allow users to create and co-edit documents, presentations, and spreadsheets in real time. Other applications include *Gmail*, *Meets* and *Chats*, which allows users to connect and communicate with each other through email, chat and video. Classroom management applications such as *Classroom*, *Assignments* and *Forms* are also available for creating and managing a classroom, creating assignments, giving and grading quizzes.

Keeping in line with Education 4.0 and Industrial Revolution 4.0, the Malaysian Ministry of Education adopted Google Classroom, an aspect of G Suite for Education as the primary online teaching and learning platform in July 2019. To sustain the provision of quality education at all levels, this paper will present the findings of an exploratory study that investigated the application of the new norm via G Suite through multidimensional perspectives ranging from pre-service teachers to lecturers based on the following dimensions of the Technology Acceptance Model (TAM), namely perceived ease of use (PEOU), perceived usefulness (PU), behavioural intention to use (BITU) and actual usage (AU) of G Suite for Education applications.

## 2. Literature Review

The following section provdes a brief review of literature on the theoretical framework governing the study as well as the summary of current literature to explain the variables examined in this study.

## 2.1 Theoretical Framework

The Technology Acceptance Model (TAM) postulated by Davis in 1989 is derived from the Theory of Reasoned Action by Fishbein and Ajzen in 1975. It highlights the users' motivation on using technology based on four constructs, i.e. Perceived Ease of Use, Perceived Usefulness, Behavioural Intention to Use and Actual Usage. According to Davis (1989) Perceived Ease of Use (PEOU) refers to "the degree to which a person believes that using a particular system would be free from effort". Effort

is a finite resource from an individual to conduct and complete a multitude of tasks, the system that the individual perceives easy to use indicates a higher probability that the system will be used and accepted. Perceived Usefulness (PU) is defined as "the degree to which a person believes that using a particular system would enhance their job performance". Usefulness in this context explains that the system used is advantageous and beneficial which will lead to an existence of a positive performance-use relationship. Furthermore, Behavioural Intention to Use (BITU) are the factors based on the individuals Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) leading to the usage of the system. Lastly Actual Usage (AU) means the actual system use by the individual. These constructs help to identify and determine favourableness and unfavourableness towards technology. The TAM is a widely used and cited model when it comes to research in technology acceptance. The model is illustrated in **Fig.1**.
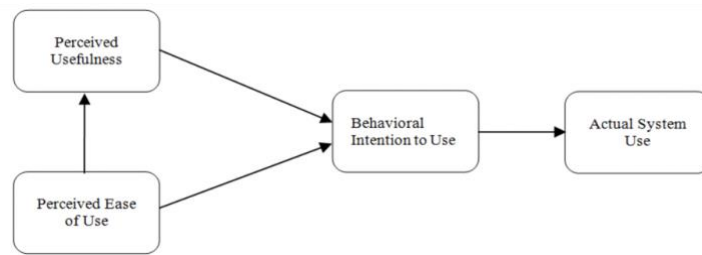


**Fig. 1** Technology Acceptance Model

According to Durodolu (2016), the TAM has assisted researchers in explaining and envisioning the significance of Library and Information Studies (LIS). TAM is adopted by professionals because it has shown its significance in equipping professionals with the knowledge and understanding to adopt and adapt to new technologies and systems. The TAM is often used to validate information technology while explaining the dependent variables that leads to the adoption or adaptation of the technology or system. Granić & Marangunić (2019) indicated that the TAM is a credible model in assisting the assessment of different technologies through their review or relevant studies regarding the TAM. The TAM is a constructive theoretical model in explaining and understanding the data collected of users' PEOU, PU, BITU and AU of a technology or system leading towards the direct or indirect preference to use the technology or system (Brandon-Jones & Kauppi, 2018).

## 2.2 New Normal in Online Teaching and Learning

The term "new normal", or otherwise the new norm, initially emerged during the financial crisis in 2008, and eventually the 2008 to 2012 global recession to refer to the dramatic economic, cultural and social transformations that induced social unrest, impacting collective perceptions and lifestyle changes. This term re-emerged during the Covid-19 pandemic in response to the new adaptation of lifestyles, commonly in professional settings, social organisations such as family and society, and educational settings. Thus, the term "new norm" can simply be defined as the status quo to which society chooses to settle for, after a crisis, which deviates from the precedent state of affairs before the crisis. Today, online or remote teaching and learning can be defined as the utilisation of various tools and applications to facilitate the classroom or lesson in the form of computer-assisted instructions (Adebo, 2018). In order to facilitate the 21st century learner and classroom, an entire industry has emerged to cater to the needs of remote learning. The emergence of this industry has led to the creation of various tools and applications including G Suite for Education applications and learning management systems (LMS) that are designed purposefully with the ability to design and deliver courses within a flexible framework to enable learning and communication.

## 2.3    Benefits and Limitations of Online Teaching and Learning

The primary advantage of online teaching and learning is the accessibility, flexibility and affordability which are factors that are proven to be the most popular by all users of online teaching and learning (Dhull & Arora, 2017). There are tools and applications that can be incorporated in online teaching and learning that are free and open-source, thus making it very accessible to the public, essentially leveling the playing field by giving equal opportunity to all. Moreover, while traditional means of teaching and learning may still be the most preferred method by both educators and students, remote learning is up and coming and it helps in ensuring that students do not miss out on lessons regardless of their circumstances, so long as the students are able to secure a connection to the Internet to join the lesson. Through online learning tools, lessons often become more interactive promoting student-to-teacher or student-to-student interaction and discussions. These interactions lead to a more student-centred learning environment that is less passive listening and more active learning. Furthermore, students are able to learn at their own pace according to their own convenience with the use of online learning tools aiding them with the ability to comprehend under the students' own conceptual information base (Sim et al., 2021). According to Al- Rahmi et al. (2015), if students have a positive attitude towards using online learning tools, online teaching and learning has a possibility to reinforce the students' learning by giving them the feeling of gratification and satisfaction.

On the other hand, Fatoni et al., (2020) highlights that the primary limitations of online teaching and learning is network stability. Educators and learners must be connected to a good network for an effective teaching and learning process. Without the good connectivity there is no online teaching and learning; poor network stability causes teaching materials and voices to be not synchronous, ergo the teaching and learning process is not conveyed properly or interrupted. Poor network stability also causes interactions to be disrupted, if the case persists, educators progress with the content while students listen passively. Another limitation in online teaching and learning is its ability in maintaining academic integrity. According to Mukthar (2020), formal assessments at the tertiary level conducted via online have a higher difficulty of maintaining students' academic integrity. Students are required to be honest in their exams and in the traditional context, an exam invigilator would resolve that issue. However, in the online context, students can easily cheat and plagiarise in their exams if the institution does not employ formal assessment tools to prevent plagiarism. Other than that, students' readiness for online learning is low which leads to their lack of participation during the online session (Chung et al.,2020).

## 2.3    G Suite for Education Applications

As mentioned above, G Suite for Education applications is an open-source suite of applications tailored for educators and students for the purpose of the teaching and learning process via online classrooms which is an aspect of the 21st century classroom. Online classrooms allow educators and students to teach and learn remotely, meaning that the need for a physical classroom is not required. G Suite for Education applications consists of five categories of applications that serve different functions; the five categories include document creation applications, communication applications, classroom management applications, organisational applications and an administrative application.

The document creation applications consist of a word processing tool known as *Docs*, a spreadsheet tool called *Sheets* and a presentation tool which is *Slides*. The communication applications in G Suite for Education such as *Gmail*, *Meet* and *Chat,* enable a more personal teaching and learning process. Besides that, G Suite for Education classroom management applications consist of *Classroom*, *Assignments* and *Forms*. *Classroom* serves as a virtual classroom where the educator in charge of a subject can manage the students in terms of student enrolment into the subject, the subject content to be shared and most importantly classroom management while students are given a code for the access of the classroom by the educator in charge of the subject allowing students to join the classroom and having all the necessary content of the class at their fingertips. It also has other applications such as *Assignments, Forms, Keep, Calendar* and *Admin,* a tool primarily used by the educator to manage students, devices and security.

Finally, studies have also articulated the many advantages of G Suite applications. In-line with the online classroom aspect, the ability to conduct lessons via remote learning not only bridges the gap for students who are unable to physically attend lessons but it also makes the lesson paperless. Students can take down notes of the lesson using *Keep* or *Docs* and complete tutorials given by the educator via *Assignments* or *Forms* which essentially eliminates the need of printed worksheets for the students (Constantinou, 2019). If the online classroom is often conducted as a synchronous session, this enables the educator and students to ask for feedback in real-time, stimulating an actual face-to-face class. Moreover, G Suite for Education applications exist as a suite of applications for a reason which is to serve as a virtual collaborative environment (Romero et al., 2018). The applications function well on their own and as they should but serving as a virtual collaborative environment makes it a step above other systems through its highly integrative functions. This virtual collaborative environment enables educators with students, educators with educators and even students with students to collaborate making this suite of applications highly functional and worthwhile to utilise. Students can discuss with each other regarding the lesson, tutorial or assignment while educators can work with each other to refine their lessons or share resources to facilitate the lessons.

## 3.　　Methodology

Since Malaysian public schools have adopted Google Classroom, a G Suite application as a platform for remote learning, this study explored the new norm via multidimensional perspectives taking into consideration the pre-service teachers going out for their teaching internship and lecturers who are teacher trainers at a private institution of higher learning. Their perspectives were explored based on the four TAM constructs comprising perceived ease of use (PEOU), perceived usefulness (PU), behavioural intention to use (BITU) and actual usage (AU) of G Suite applications.

The study employed a sequential explanatory mixed methods research design wherein data were collected in two consecutive phases. In Phase One, the researchers collected and analyzed the quantitative data utilizing a test and a survey questionnaire. In Phase Two, the qualitative data collected via semi structured interviews with both students and teachers provided clarification on the findings obtained from the quantitative data analysis process. This research design offered not only the triangulation of data analysis but also delivered credibility to the findings of the study.

The study was conducted at the Faculty of Education, Languages and Psychology at a private university located in Petaling Jaya, Malaysia. The study involved 50 randomly selected Year Three (3) Semester One pre-service teachers who were about to embark on their internship in Year Three Semester Two. These teachers had also undertaken a course on *Technology in Education* where they have been exposed to G Suite for Education applications. Out of these 50 students, four (4) student volunteers participated in the interviews alongside four (4) lecturers who were teacher trainers for this group of students.

Data for the study were collected via a three-pronged approach involving a test, a questionnaire, and semi-structured interviews. The test aimed to investigate the 50 pre-service teachers' knowledge and understanding of G Suite for Education applications on 25 statements. Respondents had to state whether each statement was true or false. The questionnaire comprised three sections, where Section A examined the demographic profile of the respondents whilst Section B investigated their perspectives of G Suite applications based on the TAM containing a total of 24 items. Respondents were required to respond based on a 5-point Likert Scale (1=strong disagreement, 5= strong agreement). Finally, Section C examined the challenges that the respondents faced in using G Suite for Education. Validity of the questionnaire was established through a panel of two experts, a professor with 35 years experience in the field of education and a senior lecturer from the Faculty of Information Technology from another local public university. The reliability of the questionnaire was established through a pilot study comprising 45 Year Two pre-service teachers from the same university. The analysis revealed a Cronbach Alpha score of 0.83 indicating that the questionnaire was highly reliable.

Based on the findings obtained from the test and the questionnaire, semi-structured interviews were conducted to further obtain in-depth perspectives of the students and lecturers on G Suite for Education applications. The interviews involved four (4) student volunteers and four lecturers. The interviews probed into their perceptions based on TAM and challenges of using G Suite for Education

as a teaching and learning tool. Validity and reliability issues involving credibility, dependability and confirmability and transferability were addressed through member-checking and inter-rater reliability processes. The quantitative data were analysed using both descriptive and inferential statistics whilst qualitative data were analysed using a thematic approach involving both inductive and deductive analysis.

Throughout the study, ethical considerations were kept in mind on aspects such as maintaining anonymity, obtaining institutional permission and respondent consent as well as storing data in password encrypted laptops.

## 4.        Findings

The following section will discuss the main findings of the study which were guided by the following research objectives:

●        To determine pre-service teachers' knowledge and understanding of G Suite for Education as a teaching and learning tool based on their academic achievement and prior teaching experience.
●        To investigate the pre-service teachers and lecturers' perceptions of G Suite for Education as a teaching and learning tool based on the TAM model.
●        To explore the challenges faced by preservice teachers and lecturers in conducting teaching and learning via G Suite for Education.

### 4.1        Pre-Service Teachers' Knowledge and Understanding of G Suite for Education based on their academic achievement and prior teaching experience

To determine pre-service teachers' knowledge and understanding of G Suite for Education, data were obtained from a test where respondents were required to respond to 25 True/False statements. Based on the findings displayed in Table 1, the results indicated that pre-service teachers were moderately knowledgeable of G Suite for Education. Further analysis indicated that their actual knowledge and understanding of G Suite for Education Productivity Applications left much to be desired (35.7%). For the second construct, the pre-service teachers showed that they are moderately knowledgeable in understanding the use of G Suite applications in teaching and learning (73.7%). The findings also revealed that their knowledge and understanding of Google Classroom is at the moderately high level (78.2%). This was probably because they have used the Google Classroom platform for two of their courses.

**Table 1.** Knowledge and Understanding of G Suite for Education (n=50)

| Constructs | Percentage |
|---|---|
| Knowledge and Understanding of G Suite for Education Productivity Applications | 35.7 |
| The Use of G Suite for Education Productivity Applications in Teaching and Learning | 73.7 |
| The Use of Google Classroom | 78.2 |
| **Overall Average** | **65.2** |

Scale: not at all knowledgeable (0 – 20 %), slightly knowledgeable (21- 40 %), somewhat knowledgeable (41 – 60 %), moderately knowledgeable (61 – 80 %) and extremely knowledgeable (81 – 100 %).

The study also explored their knowledge and understanding based on their academic achievement that focussed on their last semester Grade Point Average (GPA) scores which were divided into three levels, i.e., below 3.00, 3.00 – 3.49 and more than 3.5. Findings revealed that there was no significant difference between groups at the $p<0.05$ level ANOVA (F = 1.23, p = 0.334). The Tukey post hoc test shows that the mean score for pre-service teachers with GPA more than 3.5 does not show any significant difference to the mean scores for pre-service teachers' GPA of less than 3.00 and GPA

more than 3.5. No statistically significant difference was recorded based on the mean scores between pre-service teachers with GPA of less than 3.00 and between 3.00-3.49 (p = 0.334).

The second variable explored was pre-service teachers' knowledge and understanding of G Suite based on their teaching experience which was viewed from two aspects, namely students with no teaching experience and prior teaching experience. The independent samples t-test conducted among pre-service teachers with no experience and with teaching experience, conditions; t(48) = 2.488, p = 0.016 was found to be statistically significant with pre-service teachers with experience indicating a higher score (70%) compared to those without teaching experience (65%).

## 4.2 Respondents' Perceptions of G Suite for Education as a teaching and learning tool based on TAM

The second research objective examined respondents' perceptions of G Suite for Education as a teaching and learning tool based on the Technology Acceptance Model (TAM).

### 4.2.1 Pre-Service Teachers' Perceptions of G Suite for Education as a teaching and learning tool

Given in Table 2 are the quantitative findings which reveal that the pre-service teachers agree that G Suite for Education has the potential to be a viable teaching and learning tool (M=3.77, SD=0.68). They indicated a positive intention to use it in future (M=3.8) and expressed confidence in actually employing it (M=3.87) as they found it useful (M=3.79) as it provided user satisfaction (M=3.81).

**Table 2**. Pre-Service Teachers Perceptions of G Suite for Education (n=50)

| No. | Items | Mean | SD |
|---|---|---|---|
| 1 | Overall perceived usefulness | 3.79 | 0.56 |
| 2 | Overall perceived ease of use | 3.70 | 0.62 |
| 3 | Overall behavioural intention to use in the future | 3.80 | 0.67 |
| 4 | Overall social norms | 3.67 | 0.71 |
| 5 | Overall actual use | 3.87 | 0.76 |
| 6 | Overall user satisfaction | 3.81 | 0.73 |
| | **Overall** | **3.77** | **0.68** |

*Scale: 1- Strong Disagreement, 2- Disagreement, 3- Almost Agreement, 4- Agreement, 5- Strong Agreement*

The above positive perception of G Suite by pre-service teachers obtained from the questionnaire was further investigated via interview sessions with four students. The qualitative findings further corroborated the positive perception. All four students unanimously agreed that they were comfortable and confident of using the tool for their teaching practicum in schools for the coming semester. The overall positive perspective was succinctly put forward by Student B when she said that,

> "*I was a temporary teacher for a year above I joined this course and I can say that I like using G Suite applications because they are user-friendly and I think I can do so many things will make my life as a teacher easier.*" In a similar vein, Student D articulated that G Suite applications have '*made my learning more fun and flexible as I can now learn as my ow pace and time. . .Google Classroom is a dynamic learning platform in this new social norm and I am happy that Ms Lim gave us a chance to experience it as students.*"

The above excerpts helped triangulate findings obtained from both quantitative and qualitative research instruments utilised in this study.

### 4.2.2 Lecturers' Perspective of G Suite as a Teaching and Learning Tool

Semi-structured interviews were conducted with the four female lecturers (refered to as Lecturers A, B, C and D). The transcribed interview data were analysed using thematic analysis. The following section presents their overall perception of G Suite for Education as a teaching and learning tool.

Firstly for "Perceived Ease of Use" they expressed their thoughts with regard to *layout*, *user-friendliness* and *convenience*, All four unanimously agreed that among the many applications they found Google's word processing tool 'D*ocs'* the easiest to use. This is evident when Lecturer D said "*If you compare it with its counterpart with Microsoft, it's much much simpler and everything is laid out very clearly*". She elaborated that the layout is clear and simple making it easy for users to navigate through the applications. Lecturer C further added that "*Google online support is very good... they do everything on the cloud"*. She compared it with Microsoft's online support, which was "*still not that complete yet*". However, Lecturer A stated that she "*seldom touch(es) Google Classroom*" whilst Lecturer D found *Forms* "*a little bit challenging when it comes to the answer keys*" for open-ended questions, as any slight variations in students' answers to the set answer keys will automatically mark it as wrong, including different capitalization, spacing and spelling errors. Lecturer B highlighted that when G Suite applications were launched, they had an "autosave" feature that is self-explanatory – it automatically saves work progress onto *cloud* making it convenient as it removes the risk of students losing their assignments if accidents such as a "*blackout*" occurs. This was also agreed by Lecturer D as she said there is "*no danger of losing data*", unless one forgets their password. Even then, there is always the option of resetting one's password safely and retrieving the document.

The second construct investigated lecturers' opinions to what degree they found G Suite for Education applications as a teaching and learning tool useful in their classroom. Four themes has been identified for factors that infleucned the perceived usefulness of G Suite applications, namely, *facilitates classroom management*, *collaborative*, *interactive* and *enhances learning*. Lecturer C highlighted that the applications she uses often for G Suite for Education were "*very ideal for normal discussions and tutorial*". However, Lecturer C added that the usefulness of G Suite for Education applications is hindered by the lack of embedded tools. Embedded tools like *Turnitin* automatically checks the students' work by producing a plagiarism report which speeds up the process of a formal assessment. Her evidence to support her statement, "*when it comes to formal assessments like assignments and exams, G Suite might not be able to cope up with that... as compared to Blackboard*". Lecturer D also adds to the evidence above, "*Google's plagiarism checker is still not that complete as compared to Turnitin*". Furthermore, the recording function in *Meets* was not available at the time of the interview, resulting in lecturers using *Microsoft Teams* and *Panopto* in order to record their lessons for the purpose of students reviewing the lesson at their pace. This was highlighted by Lecturer B when she stated, "*we also use Microsoft Teams which is by Microsoft and Panopto that is in Blackboard "* regarding the purpose of recording the live lessons.

Lecturer D added that G Suite applications are exceptionally collaborative in terms of sharing resources through a cloud-based storage. She states that having a *Gmail* account for G Suite for Education supplied by the university has unlimited cloud storage albeit with limited customizability but it is free and suitable for collaboration. Lecturer B further emphasised that the ability to collaborate in G suite for Education is as easy as a click of a *share* button, making the completion of tasks more effective and efficient. In terms of interactiveness, Lecturer D mentioned that *slides* is "*quite well-integrated for presentation*" and "*can be very interactive and fun*" implying that the lesson planned is designed to engage students. Lecturer A noted that *JamBoard* is an interactive application and she could use it to teach her lessons using concepts by drawing out figures or diagrams for her students to see, allowing them to better visualise the concepts taught in the lesson. She explains the usefulness of *JamBoard* through her experience, "*I'm more of a graphic and visual person, so I need to draw and scribble to explain concepts to students. I find it useful that I'm able to show students using mind-map forms using JamBoard*".

The third construct explored lecturers' behavioural intentions to use G Suite for Education as a teaching and learning tool. Lecturers were asked if they would use and continue to use G Suite applications as a teaching and learning tool to which they unanimously agreed, yes. Among their

responses, two themes were identified, namely *effectiveness* and *accessibility*. The effectiveness in the delivery of the concepts enables lecturers to tap into their students high-order-thinking-skills. As an educator, to be able to witness a student utilising their high- order-thinking-skills is a product of growth, improvement essentially, and it shows that the educator's lesson plan and materials achieves what it was supposed to achieve. This is evident in Lecturer A's statement when she said that " *Yes, I will definitely continue using G Suite as a teaching tool, because I find it very effective from my past try-outs...Students really improve and I'm really able to help them, to bring them ahead in terms of their critical thinking and in terms of their higher order thinking skills, so I really see learning happening when I'm using G Suite applications in teaching.* Moreover, the effectiveness of G Suite for Education applications not only applies in delivery of concepts, lessons and material but also in setting tasks such as reminders, homework and tests. The suite of applications helps to optimize the lecturers' productivity making them more efficient as some of these tools are used daily and often. To support the statement, Lecturer D said, "*I will still be using a lot of G Suite for Education Applications no matter what. Gmail...I use every day...Google Calendar...a very good tool for teachers to set up reminders, homework, tests*".

Finally in terms of Actual Usage of G Suite for Education applications as teaching and learning tool, lecturers mentioned that Google Search Engines were used most frequently followed by YouTube, Google Docs and Google Slides. Three main themes were identified from these tools which are *word processor application*, *presentation software* and *search engine* (including both the general Google search engine and the Google Scholar search engine). Lecturer D stated that she uses the word processor to enhance her knowledge by making use of the "explore" and define" tools, "*it's also very easy to just right click and explore, right click and define. So that is also... how I have used it to enhance my knowledge as well*". Besides that, all of the lecturers also used *Google Docs* for collaboration in their work. This was also supported by Lecturer A, who highlighted that "*I feel it's still the two major applications that I use, which are the Google Docs and Google Slides; I use... with lecturers at times when we have discussions*".

All the respondents in this study have used presentation softwares such as *Google Slides* to collaborate in their teaching life. Lecturer D used the application the most when collaborating with others to present the product of users through their formation of ideas, stringing together text, image, video, and audio. This study focuses on *google slides*. For her it "*a tie between Google Slides and Docs... for collaboration, because the education community is... all around the world. And a lot of people do share a lot of... things... or even information about particular universities or or things like that... when you are collaborating with educators worldwide... that is something that you can see shared on Google Docs and Google Slides a lot and especially among certified trainers we also have a lot of... shared resources that we can download from the database.*

According to Lecturer A, "*Google Scholar is also one area which I usually use to find information for my students to do some review on the articles*". This software system is also perceived to be easy to use by Lecturer C. She describes the application as "*easier and effective*", as "*I don't need to key my ID... type Google Scholar and that's it*". This helps her to save time and effort in accessing the information needed. Also using Google Scholar to enhance her knowledge, Lecturer D agrees that Google search engines are one of the most popular places people go to search for information and enhance their knowledge. Other than that, the Google Search Engine is viewed as a quotidian tool in Lecturer B's words "*at least once a day*" and Lecturer A uses it to enhance her knowledge. This shows how much people nowadays rely on technology to gain knowledge.

The above analysis emphasises the fact that all four lecturers also agreed that G Suite for Education is a viable tool for teaching and learning. They highlighted that these applications are not only used during lessons with students, but they can also be used to collaborate with educators globally, either to share materials or information. These applications enable the respondents to cross boundaries and communicate with people living in other countries, without having to take even one step out of their houses. This is beneficial especially during the pandemic, where people are encouraged to stay at home to avoid getting infected by the infectious disease.

### 4.3 Challenges in Conducting Teaching and Learning via G Suite for Education

Research objective three examined both pre-service teachers and lecturers' perception on challenges in employing G Suite for Education in the teaching and learning process. The findings in Table 3 below presents the challenges faced by pre-service teachers in using G Suite Education applications. Overall the respondents indicated that the challenges were at a moderate level (m=2.98) and these quantitative findings were further corroborated during the interview sessions.

Detailed analysis of each item indicates that the respondents believe that they do not face serious problems relating to the allocation of time for Google Classroom tasks (M=3.6, SD=0.833) and personalizing learning for students (M=3.040, SD=0.755). However, the majority of the pre-service teachers faced challenges in availability of ICT hardware (M=2.720, SD=1.262) and availability of ICT software (M=2.720, SD=1.278). In addition, findings showed that pre-service teachers do not encounter many challenges with the availability of Wi-Fi or connectivity and digital literacy competency.

**Table 3.** Challenges Faced by Pre-Service Teachers in Using G Suite for Education

| No. | Items | Mean | SD |
|---|---|---|---|
| 1 | Availability of Wifi / Connectivity | 2.960 | 1.399 |
| 2 | Availability of ICT hardware | 2.720 | 1.262 |
| 3 | Availability of ICT software | 2.720 | 1.278 |
| 4 | Digital literacy competency / Techno Savvy | 2.880 | 1.256 |
| 5 | Using Google Suite to personalise learning for students | 3.040 | 0.755 |
| 6 | Sufficient time allocated for Google Classroom tasks | 3.600 | 0.833 |
| | **Overall** | **2.987** | **1.131** |

*Scale: 1-Not at all, 2-To a small extent, 3- To some extent, 4- To a moderate extent, 5- To a large extent*

These findings were also highlighted during the interview sessions. Technical limitations and connectivity were main issues highlighted by students during the use of Google Classroom in teaching and learning. Due to limited or weak connectivity in campus, Student A felt she was "*afraid of losing information in Google Classroom session in the case of Wi-Fi troubleshooting, especially if this information was not saved offline.*" Student B felt that Wi-Fi problems at home has left her cautious when "saving and working online." Student A, highlighted that "*not all students can get connected to Google Classroom at the same time as sometimes announcements are given in a specific time when all students were not available; especially when the deadlines were so close which can cause miscommunication between the teachers and students*." Student D complained about the likelihood privacy problem resulting from the ability to any person not belonging to a class to log on Google Classroom " *especially when one gets the class code of this class.. I think Google Classroom does not have automatic notifications which make students exert efforts to check the posts and announcement regularly.*"

On the other hand, lecturers also voiced some concerns. From the data collected, three main themes emerged which are *lack of awareness*, *lack of digital citizenship* and *lack of facilities*.

The primary issue with any tool or application is publicity and, in this context, a large number of students are not exposed and aware of G Suite for Education applications. Students who have not heard of G Suite for Education will not use it. Lecturer D expressed, "*lack of automated or by default type of exposure to the students*", which is a cause that students do not know the existence of G Suite for Education applications. Another issue that Lecturer D mentioned is that, "*In this particular institution...everything by default is Microsoft...the UniversityA.edu.my domain linked to our G Suite for Education account is a need-to-know basis*"

Lecturers also discussed the issue of digital citizenship which refers to the ability to use the Internet effectively and regularly and it is segregated to good and bad digital citizenship. Students with good digital citizenship have good digital literacy, good understanding and practice of securing of user data, and they understand how the Internet works. Meanwhile, students with bad digital citizenship have irresponsible social media usage in combination with a general lack of understanding and knowledge regarding the use of the Internet. From the responses of Lecturer D, she has seen a large number of students with bad digital citizenship throughout her years working at tertiary institutions. She said that "a*nother problem is the lack of digital literacy in a lot of students...because even though you are very exposed to technology...it is quite limited to the use of the default apps on your phone and what are the current trends like TikTok...you know how to use that but other than that a lot of other things you still don't know. Students don't know the fact that a strong password is very important and you have to remember your password. Most of the common things I see is people keep saying "I forgot my UniversityA.edu.my password"S*he also added that, *"When I ask them to share Google Drive links...a lot of the links are not open for me to see it...have to request for access"* which is by far her most common challenge that she encounters because it is often involved with discussions and the submission or tutorials and assignments.

Despite the institution's subscription to G Suite for Education applications, the lecturers felt that the institution should provide a support hub to encourage the use of G Suite for Education applications. Without a support hub, there will be no student ambassador, which revolves back to the lack of awareness. Lecturer B mentioned that she was once part of a student ambassador programme, "*I think I've also mentioned that I'm also part of the Emerald Student Ambassador Programme*" to which she helped and guided her peers to use "Emerald Insight" which is a large database of journals, books and case studies for students to access and refer to for their assignments. Students usually approach their peers before approaching lecturers and institution staff for support.

Overall lecturers concluded that despite the initial teething issues of concern, all four unanimously agreed that G Suite for education is a viable teaching and learning tool. this was well articulated by Lecturer B when she said that "*given the current new norm which we all had to embrace overnight, I personally feel that G Suite Education should be adopted by all teachers and students at every educational levels.*"

## 5.    Discussion of Findings

In this study, the pre-service teachers demonstrated a low and moderate level of knowledge and understanding of G Suite for Education implying a need for more training for pre-service teachers. Nonetheless, a positive perception towards G Suite for Education was recorded on all four constructs on the TAM model. Similar findings have also been recorded by Al-Shihri (2017) on Google Classroom as pre-service teachers proved to have a reasonable awareness of Google -Applications that could be used in teaching and learning. For example, Cerna (2014) stated that pre-service teachers could use Google Plus in the teaching and learning process whereas Bahri and Mahadi (2016) highlighted that they could use Google Translate in teaching and learning.

The challenges articulated by pre-service teachers included the unavailability of ICT software and hardware, followed by digital literacy and the inconsistency of Wi-Fi availability. Similarly, Singh and Subramaniam (2014) revealed that pre-service teachers face challenges with inadequate understanding of how to integrate technology in teaching and learning, which is related to digital literacy as well as unstable internet connectivity. This was also reiterated by Khokhar and Javiad (2016) that the main challenges teachers faced in integrating technology in the classroom is their inadequate digital literacy competency. Similar findings were also recorded in Fook & Sidhu's (2009) study in which most lecturers did not possess sufficient level of expertise in using online tools for teaching and learning.

The lecturers' perspective based on interviews showed that G Suite for Education applications for teaching as useful because they found that its collaborative functions enabled for easy sharing through working over a cloud-based storage which echoes the findings from Romero et al., (2018). The lecturers also found that it was useful in facilitating classroom management when conducting

discussions and tutorials as students were grouped together easier and faster supporting the findings from Nirmala et al., (2020).

The challenges highlighted were a lack of awareness among both lecturers and students on the potential of G Suite for Education. Similar concern was highlighted by Constantinou (2019) who also felt that exposure to the G Suite for Education application is the first step in overcoming the challenge.

If educationists are not exposed to G Suite for Education applications, they will not see the potential in the suite of applications. Another challenge expressed was the lack of digital citizenship among students. Despite students being younger and better adapted to technology; naturally digital literate, they do not practice good digital citizenship which encompasses good practices when using technology and the Internet. Students are often seen using social media excessively which does not imply that they are digitally literate in all aspects. Lecturers also highlighted that facilities and infrastructure is pertinent to the use of G Suite for Education applications or anything that requires a network connection. Poor network connectivity does not encourage the use of G Suite for Education applications. The lack of interest is another challenge that lecturers faced in using G Suite for Education applications as a teaching tool in the 21st century classroom. Lecturers and students are sometimes seen as complacent and have high resistance to change in using certain tools and applications; for example, sticking with *Microsoft Words* which in turn does not encourage the use of G Suite for Education applications.

## 6.    Conclusion

The global Covid-19 pandemic compelled educational institutions all around the globe including Malaysia to embrace a new norm in teaching and learning. So, this exploratory study examined the perspectives of both preservice teachers and lecturers on the new norm employing G Suite for Education as a viable teaching and learning tool based on the technology-enhanced model (TAM) exploring perceived usefulness, perceived ease of use, behavioural intention to use and actual system use. At this juncture, it is perhaps pertinent to note that this study is not without its share of limitations. As an exploratory study the small sample size of 50 respondents does not allow for the findings to be generalised on the total population of pre-service teachers at institutions of higher learning in Malaysia. Nevertheless, the findings of this study do shed light on the potential of G Suite as a viable teaching and learning tool even during this post pandemic era wherein emerging technologies have and will continue to transform the 21st century classrooms. As educationists, we need to embrace this change as a constant phenomenon as online tools will continue to evolve and flourish because remote learning is today's call for the new norm.

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