Knowledge and Understanding of Google Classroom as a Teaching and Learning Tool: A Case Study

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Abstract

This case study explores pre-service teachers' knowledge and understanding of using Google Classroom as a tool in the teaching and learning process and the challenges they faced. The study was conducted at a private university located in the Klang valley in Malaysia. The study adopted a mixed-method research design involving a total population of two intact classrooms of pre-service teachers who were involved in employing the Google Classroom for one semester of their study. Data were collected through a questionnaire involving 61 respondents and semi structured interviews with seven respondents. The findings of this paper indicated that respondents possessed moderate knowledge and understanding of employing Google Classroom in the teaching and learning process. Interviews further indicated that students were well aware of Google applications and were able to apply them in preparing lesson plans, submitting materials and using them in their daily life. The main challenges highlighted were limited connectivity, and managing large class enrolments. Shortcomings of Google Classroom lay in the inability to connect all students simultaneously and visibility of whether students were online or not. This study implies that future teachers need to possess a higher level of knowledge and understanding so that they can confidently embrace ICT tools like Google classroom applications for future 21st century technology enhanced classrooms.

Keywords: pre-servce teachers, Google Classroom, teaching and learning tool, knowledge, understanding

1. Introduction

Education is one of the fields which has been greatly influenced by information and communication technology (ICT). In today's Education 4.0, teachers at all levels of education need to be digitally literate as ICT has a positive impact of student learning and achievement. Since student learning outcomes have been viewed with such positivity, institutions today have taken proactive steps to provide the necessary training needed for academics in order to prepare successful graduates for future digital-enhanced work markets. In many instances, teachers were involved in professional development of ICT programs and workshops as to how they can utilize ICT in their classrooms. Likewise,

students are encouraged to use ICT in the educational settings such as completing homework and projects through emails [1] (Mims-Word, 2012).

The 21st century classrooms use a large variety of ICT tools that serve diverse needs in school management including teaching learning and assessment procedures. ICT tools are used not only to store and manage information but also communicate, create and disseminate information to all stakeholders. There is sufficient evidence that in most educational contexts, ICT has become an integral part of the teaching and learning process where the traditional chalkboard has been replaced with interactive digital whiteboards and mobile learning where students are allowed to bring their own devices (BYOD) into the classroom. Today in the 'flipped classroom' and 'mobile learning' context, students are allowed to use devices such as smartphones and notebooks making classroom time more interactive sessions.

The rapid advancement in the ICT industry has warranted a critical call for all institutions of learning to continuously update their learning management systems [2]. Today, computer conferencing platforms allow teachers to communicate with students via network connection in real time. Facebook, You Tube, blogs and educational sites are also utilized to enhance the students' academic and technical knowledge. In addition, educational on-line games are used for the sake of edutainment purposes among students. Blackboard, Google street view, 3D glasses and Cardboard are some of these tools that can provide students with in-depth knowledge about the surrounding environments [3].

One of the significant innovations in educational systems is new technologies is web-based education one new player on the educational scene is Google. Today, Google Suite or G Suite offers a diverse range of Google Applications for Education (GAFE, hereafter) that can be viewed as integration of ICT in education. GAFE is a group of applications offered free by Google to educational institutions based mainly on cloud-technology and including; for example but not limited; many apps such as Google Docs, Google Drive, Google Hangout and Google Forms. Google Classroom (GC, hereafter) is among of these GAFE apps which is expected to enhance the teaching and learning (T&L, hereafter) process. It is a collaborative tool for schools that aims to rearrange making, appropriating and evaluating assignments in a paperless manner. It was presented in 2014 as a highlight of Google Apps for instruction training [4].

Since the introduction of ICT, the focus of a large majority of the educational institutions, has been on administrative functions such as online-based course registration, admission and result checking, students' profile, hostel allocation, forms allocation, and reducing the problem of overcrowding [5] Today we witness a shift as many institutions of higher learning (IHL, hereafter) higher education institutions have begun adopting Google Applications in the T&L process [5].

The benefits resulting from using Google Applications in the T&L process can be viewed from a range of aspects [6]. For example, users can use emails to send instant messages, audios, videos and chat. Users also can create groups with a direct access based on invitation as well as configuring permission to view or edit. In addition, they can create calendars to set their personal or academic events with the options of notifying the invitees and confirming their attendance via email. Google site can allow users to create websites including blogs for creative discussion and comments. Last but not least, Google Drive can allow users to store various types of files, videos and audios with a capacity of 30 GB per user.

Izenstark and Leahy (2015) pointed out the wide benefits of using Google Classroom in for teachers and librarians [7]. As for teachers, they can post and announce assignments with the option of direct discussion without using separate forums or discussion tools. In addition, they can give the grades directly and feedback to students via Google Docs because assignments were stored automatically in Google Drive. Furthermore, Google

Plus allows students allows students to join online courses, utilizing the advantages of creating links and attaching videos and photos. It also enables studnets to read their teachers posts and place feeds into one or more circles to control and order the flow of information [8]. Google Plus compared to the other applications, can also be upgraded itself to a professional and instructional tool in the teaching and learning process. In addition, they can bring large number of students in large number of majors in only one classroom to make sure of receiving the same materials, links and instructions. Moreover, they can post assignments and share videos without needing access to the primary instructor's course; which would protect the students' and teachers' privacy[8].

The many benefits that ICT applications such as Google Classroom has to offer puts a critical call for teachers today be to well equipped with the latest developments in ICT. Therefore, schools need to provide regular professional development opportunities to enhance teachers' instructional practices. The UNESCO Learning Portal further highlighted that teachers today need to be digitally literate to increase their ability to use ICT for not only formative learning assessments and individualized instruction but also for accessing online resources and fostering student interaction and collaboration [9]. Furthermore, studies have indicated that effective teachers are professionals who keep up to date with content knowledge of their discipline, latest developments in instructional practices and professional learning and ethical practice [10].

Therefore the main aim of this paper is to investigate pre-service teachers' knowledge and understanding of Google Classroom (GC, hereafter) as a teaching and learning (T&L, hereafter) tool and the challenges that they faced in using it.

2. THE STUDY

This case study involved a total population of two intact classrooms comprising 61 Year Two pre-service teachers undertaking a course on Technology in Education at a Faculty of Education in a private Malaysian university located in the Klang Valley. All the 61 pre-service teachers were required to respond to a questionnaire whereas a subsample of seven pre-service teachers were selected to participate in semi-sturctured interviews. The demographic profile revealed that 93.2 % were females whilst the remaining 6.6% were males. In terms of teaching experience, 33 pre-service teachers had between one (1) to three (3) years of teaching experience, 8.2% of them possessed more than three (3) years of experience whilst the remaining 23 pre-service teachers had no teaching experience.

Data for the study was collected via a mixed-methods design involving a questionnaire and semi-structured interviews. The Teacher Questionnaire investigated the pre-service teachers' knowledge and understanding of using GC and the challenges they faced in using GC in the T&L process. To investigate their knowledge of GC, respondents were required to respond to 20 statements based on a dichotomous scale of True and False. The questionnaire was validated by a panel of three experts and a pilot test conducted, established the reliability at 0.767 indicating it was a reliable instrument. The quantitative data were analysed using descriptive statistics via SPSS version 32. The semi-structured interviews were conducted with seven pre-service teachers and they were referred to as Student (ST) ranging from Respondents ST-A, ST-B, to ST-G. The qualitative analysis was analysed using both inductive and deductive analysis to answer the research questions posed in the study.

3. FINDINGS

The findings in Table 1 shows that pre-service teachers' knowledge and understanding of GC is at the moderate level They however revealed possessing excellent knowledge on items 4, 5, 8, 10, 11 and 13 and a moderate level of understanding of items 7,9,14, 16 and

17. The respondents recorded a below average score on seven items (items 1, 2, 6, 12, 18, 19, 20).

They were very well informed of the fact that they could join GC using a class code (98.4 %), GC allowed teachers to post announcement to Stream (95.1 %) and GC was a learning management system (85.2%) through which they could share worksheets as view-only and organize training sessions (82 %) with the ability to get relative update information about it via Google Help Centre (82 %).

TABLE1: PRE-SERVICE TEACHERS' KNOWLEDGE AND UNDERSTANDING OF GOOGLE CLASSROOM (N=61)

No	Item	Percentage Of correct responses
4	Students can join Google Classroom by using a class code.	98.4
8	Google Classroom allows teachers to post announcements to the Stream	95.1
11	Google Classroom is a learning management system.	85.2
5	To prevent students from modifying a worksheet in a shared file, you can share the folder as view-only.	82
10	You can organize training sessions via Google Classroom.	82
13	Google Help Centre provides up-to-date information about Google Classroom features.	82
7	If students turn in their assignments in Google Classroom, teachers can not provide further feedback.	78.7
9	Synchronous online discussions in Google Classroom require respondents to be online at the same time.	70.5
14	An assignment due in Google Classroom appears in both; Google Classroom calendar and Google Calendar.	68.9
16	Google Classroom allows one to grade assignments using decimal numbers.	63.9
17	You can not create more than one class in Google Classroom.	63.9
3	Google Classroom can only organize information flow sequentially.	55.7
15	The plagiarism checker Unicheck in Google Classroom addresses the problem of plagiarism.	54.1
20	Flubaroo add-on is used in Google Classroom to provide quizzes and tests.	47.5
12	The theme or uploaded image in Google Classroom must be at least 800x200 pixels.	41
18	There are chat features within Google Classroom.	31.1
1	Google Classroom can export grades in one file.	31.1
6	Students must turn in a document in Google Classroom in order to complete an assignment.	27.9
2	Google Classroom can record online courses and video conferences.	21.3
19	Announcement in Google Classroom can create full-featured forums and open discussion board.	9.8
Overall		**59.5**

Scale: very limited (0 – 20 %), limited (21- 40 %), moderate level (41 – 60 %), high level (61 – 80 %) extremely high (81 – 100 %).

Furthermore, the respondents displayed moderate understanding on the following items: GC teachers could provide feedback on assignments (78.7 %) and synchronous online discussions required them to be online at the same time (70.5 %). A limited knowledge was indicated on the following aspects: GC organized information flow sequentially (55.7 %), the Unicheck addressed the problem of plagiarism (54.1 Flubaroo add-on was not used in GC to provide quizzes and tests (47.5 %) and uploaded image and themes must have been at least 800x200 pixels (41 %).

Finally, a majority of the respondents displayed very limited knowledge and understanding of the fact that there were no chat features within GC (31.1 %) and they were unaware of the fact that students must turn in a document to complete an assignment (27.9 %) neither could GC record online courses or video conferences (21.3). The respondents also did not know that announcement in GC could not create full-featured forums and open discussion board (9.8 %).

The interviews further highlighted four major themes that illustrated the reasons why pre-service teahers possessed a moderate level of knowledge and understanding for using Google Classroom.

A.   Knowledge and Understanding of GAFE

When the respondents were asked about Google Applications that could be used in teaching and learning, some respondents perceived Google Classroom, Google Docs, Google Drive and Google Plus applicable in T&L process. A few others used only Google Classroom, Google Search and Google Search only in learning. Their responses indicated that they were not fully aware of the true potential offered by G Suite and Google Classroom applications.

Nevertheless, some students did articulate their awareness of G-Suites in T&L. For example, Respondent ST-C expressed her experiences using Google Docs, Google Drive and Google Slides for the past few months whilst Respondent ST-F who possessed six-year practice of using Google Docs in teaching and learning expressed the use of Google Calendar and Google translate in her daily T&L process. Respondent ST-D used Google Search, Google translate and GC only under guidance. Respondent ST-A further said that: "I have a good understanding of Google applications for example like Google Classroom itself. I have also used Google Docs and most of times I am comfortable using Google Plus and Google Drive". Respondent ST-B added that: "I acknowledge I do not have much knowledge about Google Classroom until now and never used Google Apps for teaching only, google research. But with learning we have our lecturer this semester, …she has taught us to use google classroom and the google sites and all that so I can use it now".

The analysis of these qualitative data further corroborated that respondents were moderately familiar with using Google applications in their daily life. They also used Google application mainly in their learning process and under guidance from their teachers.

B.   Knowledge and Understanding of Synchronization

The respondents were asked about the ability of GC to be synchronized with other Google Applications. Interview findings revealed some respondents were aware of the synchronization between GC and Google Docs to prepare lesson plans and share recording links; other respondents knew the synchronization between GC and Google

Drive to upload and share materials. Respondent ST-B was even aware of the synchronization between Google Forms with regards to giving feedback to parents. The analysis of findings again displayed moderate familiarity with synchronizing Google Docs and Google drive with GC in the T&L process. This synchronization helped them in preparing lesson plans and submitting materials.

C. Knowledge and Understanding of Google Classroom Technical Operation

Another aspect explored was respondents' knowledge of technical procedures to start and operate GC such as the steps of operation, creating classes via class code and using emails to log on. All the respondents indicated excellent knowledge all these aspects starting from logging on the application to creating classes and sending class codes for students to be added. They also knew that class code was compulsory to add students to the class to guarantee safety for the students' privacy. ST-A and ST-E however indicated limited knowledge of logging onto GC via the use of Gmail as they were not familiar with other types of emails whilst another respondent thought that users had to obtain permission from the Google Company first to log on with different emails.

D. Knowledge and Understanding of Google Classroom Collaborative Tools

The respondents were asked about the collaborative tools employed in the GC to contact parents, attach materials and send notifications. Respondent ST-A said that he had no experience contacting parents, whilst ST-C said that she used other applications such as Wan Wex and Almodo to give feedback to the parents. As for adding materials, ST-A was the only respondent who said that he did not add materials much whereas the other respondents said that they could prepare tutorials and submitting them in addition to using add taps in GC to attach materials and links from Google Drive. ST-A admitted he had limited knowledge of making announcements whereas the other respondents said that they had a good understanding of how to send announcements to parents to inform them of their children's grades and assignments.

The analysis of this qualitative data showed that the respondents displayed adequate knowledge of collaborative tools employed with GC in the T&L process. They knew its benefits in posting announcements, uploading materials and contacting parents with the exception of Respondent ST-A.

E. Main Challenges faced in using Google Classroom

The second main issue examined in this study were the challenges that pre-services teachers faced in using Google Classroom. The findings indicated that approximately 75% of the respondents viewed connectivity, i.e. limited Wi-Fi access as one of the main challenge. Consequently, this limitation resulted in respondents' having difficulty accessing GC and uploading and downloading materials. Another 83% felt that class enrolment was another challenge as a large class enrolment would result in teachers having difficulty manging pupils and the teaching and learning process. Respondent ST-A felt that it would also result in teachers not been able to give personalised attention to address learner needs. The third problem highlighted was a lack of training as 55.7% of the respondents felt insufficient knowledge and understanding would result in ineffective implementation of GC. Therefore a large majority felt that continuous professional training ought to be provided to teachers on a regular basis.

Other reasons cited by respondents in the open ended section of the questionnaire revealed that getting the access code (14.8%) and lack of materials and sources (14.8%) as the challenges that encountered when using GC in the T&L process. Another 11.5 % indicated a lack of motivation among both teachers and learners could be seen as a

challenge to the effective implementation of GC as a T&L tool. In this study slightly more than half (57.5%) of the respondents indicated that they were motivated to implement GC in their T&L process as they saw the potential benefits using it.

The thematic analysis of the qualitative findings obtained from interviews further corroborated the quantitative findings. Nevertheless, a few new themes emerged as follows: technical deficiency in the GC structure, non-conducive learning environment and cooperative tools, teachers' competence and students' trust, classroom learning time, issues related to classroom management and students' lack of concentration and overall effectiveness of GC.

For instance, all seven respondents felt that the lack of connectivity led to a non-conducive environment due to frequent cases of WiFi interruptions. ST-C viewed GC as an inconvenient tool for sharing videos whilst ST-D and a few others agreed that the teacher was not able to know whether the students were online or not because GC did not have the features to show persons online. Hence they were not able to communicate or have personal chats or get automatic notifications. A few others also articulated issues related to liability to infringement by others if they got the access code, and inability to amend submitted assignments and the lack of automatic notifications. ST-D further highlighted that a lack of training and professional development of teachers could result in teachers losing their self-confidence and self- esteem especially when they do not have a good understanding of the system and what G-Suite is capable of.

4. DISCUSSION OF FINDINGS

The findings of this study revealed that the respondents possessed moderate knowledge and understanding of implementing GC in the T&L process. Nevertheless, they had positive perception of GC as they saw its potential benefits for T&L. These findings are consistent with findings obtained from others studies [11 and 12]. Like Cahill, the findings showed that the respondents possessed a reasonable knowledge of collaborating with guardians via sending announcements and feedback [9]. Aligning with Al-shihri the findings proved that respondents who had previous experience of Google Applications could use them in the field of T&L [12]. In addition, the findings also corroborate with the findings of Cerna [13] and Mahadi [14] as pre-service teachers in both studies proved to have a reasonable awareness of Goggle Applications that could be used in teaching and learning. For example, Cerna (2014) asserted that pre-service teachers could use Google Plus in the teaching and learning process [13] whereas Mahadi (2016) showed that they could use Google Translate in teaching and learning [14]. Awareness of ICT collaborative tools proved to be a major component of pre-service teachers' knowledge of using ICT in the teaching and learning process. This idea was explored in this study and other studies in literature review [15, 16 and 17]. In contrast to these findings, a study conducted by Swanson and Vaughn (2015), indicated that students displayed limited improvement in content knowledge using technology [18].

The findings of this study also revealed that Google Classroom has some shortcomings in its structure and this has an effect on the T&L process. In this study respondents highlighted the technical deficiencies in GC such as the inability to connect all students simultaneously, adding videos was inconvenient and GC was also not able to show whether students were online or not. The challenges expressed aligned with the findings from other researchers [12, 14 and 17]. Both Cotugno [17] and Al-Shihri [12] too discussed the limitation in the context of a lack of training can prove to be a challenge in integrating Google Chromebook, Google Drive in Cotungo's [17] study and Google Applications in Al-shihri's study [12]. Unlike the findings of this study, there is no study in literature review that revealed class size was a challenge in integrating Google Applications or ICT in teaching and learning.

5. CONCLUSION

This study revealed that the pre-service teachers' knowledge and understanding of Google Classroom as a digital learning tool is at the moderate level. This implies that there is still much that has to be done for pre-service teachers to help them to become more effective teachers ready to face the digital era of teaching and learning in today's Education 4.0. Henceforth, it is pertinent that all teacher training institutions of higher learning equip teachers with the relevant digital literacy in terms of knowledge and skills to ensure they are capable of staying on par with latest developments. This study also revealed that despite its limitations, Google Classroom can be viewed as a viable tool to be used in today's teaching and learning process.

Finally, it is perhaps pertinent to note that the findings of this study cannot be generalised on the target population of pre-service teachers in Malaysia because of the small sample size. Nevertheless, this study has managed to shed some light as to teachers' awareness and understanding of using Google Classroom as a teaching and learning tool. It is hoped that this study will spur more investigation into Google Applications as a viable teaching and learning tool in today's 21st century classrooms.

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