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**Can Students' Smartphones Replace Data-show
Inside the Classroom? Action Research (AR)**

BY

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الملخص

يركز هذا البحث على استخدام الهواتف الذكية كبديل تكنولوجي لعدم كفاية أجهزة العرض المرئية (Projectors) في القاعات الدراسية في كلية التربية الأساسية (PAAE) في الكويت. كذلك، التحقق من امكانية استخدام الهواتف الذكية كمنصة لمتابعة العمل التعاوني بين الطلاب. لهذا الغرض، تم تبني البحث الاجرائي كمنهجية (Action Research AR)، مع العديد من الأساليب التعليمية والتعلمية، أي التعلم التعاوني (CL)، المناقشة الجماعية، والمحاضرات، أفلام فيديو ذات الصلة (عبر بروجكتر خاص بالمعلم، وهواتف الطلاب الذكية)، أنشطة متنوعة من خلال موقع ClassMarker، وأخيراً WhatsApp لربط المشاركين مع بعضهم البعض خارج قاعة المحاضرات. تم جمع البيانات من خلال مراقبة المشاركين، رسائل الواتساب المتبادلة بين الطلاب، والمسح الإلكتروني. ثم تحليل النتائج، من خلال تحليل التفاعل (Interactional Analysis IA) لتحليل الرسائل النصية، ومن المسح الإلكتروني SurveyMonkey، والملاحظة المباشرة. توضح النتائج كيف يمكن للهواتف الذكية والتطبيقات المصاحبة لها أن تمثل بديلاً تكنولوجياً مناسباً لعرض البيانات لعرض مقاطع الفيديو التعليمية ذات الصلة في الفصل الدراسي. أيضاً، هناك أدلة تشير إلى أن غالبية المشاركين في هذه الدراسة وافقوا على وتقبلوا استخدام هواتفهم الذكية والتطبيقات المصاحبة لها داخل وخارج الفصل الدراسي. كان معظم المشاركين راضين عن أساليب التدريس المستخدمة في هذه الدراسة، وفضلوا التعاون مع أقرانهم لقناعتهم أنه يوفر لهم الفرصة لزيادة فهمهم ومعرفتهم. في الختام، تم تقديم بعض التوصيات المفيدة.

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Abstract:

Due to the shortage of adequate data-show and projectors at the Public Authority for Applied Education and Training (PAAET) in Kuwait, smartphones and their accompanying apps provide a platform which, if exploited appropriately, could benefit both teachers and students. This research focuses on the use of smartphones as a technological alternative to inadequate data-show and projectors. Furthermore, the use of smartphones as a platform for pursuing collaborative work amongst pre-service teachers is explored here. For this purpose, action research (AR) was applied as a methodology, with several different approaches and technologies being adopted by the teacher and participants, i.e. collaborative learning (CL); group discussion; lectures; relevant video material (via personal data-show and smartphones); a summative activity through ClassMarker; an e-survey on SurveyMonkey, and finally, WhatsApp to connect participants with each other outside the lecture hall. Text messages from WhatsApp were analysed using interaction analysis (IA). In addition, two methods of data collection and analysis were applied, namely participant observation and an e-survey. Within AR, these allow for the ongoing and immediate analysis of data in recurring cycles of planning, data-gathering, evaluation and action.

The findings show how smartphones and their accompanying apps can represent a suitable technological alternative to data-show for displaying relevant educational videos in the classroom. There is evidence to suggest that the majority of participants in the present study accepted and appreciated being able to use their own smartphones and accompanying apps (in this case, WhatsApp), both within and outside the classroom. These were used as a means of communicating with peers and for accessing relevant educational videos. Overall, it was believed to be a useful practice. Moreover, most of the participants were satisfied with the combination of teaching methods used in this study (i.e. video material presented via different means, such as on smartphones or through data-show; CL; a summative activity; group discussion, and lectures) and collaboration with peers was generally favoured by the participants, as they thought it offered them the chance to increase their

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understanding and knowledge. However, further research is called for to be able to fully understand the real impact of educationally relevant videos on the training of pre-service teachers.

Introduction:

The lack of data-show and projectors in classrooms is not a new challenge faced by teachers in the College of Basic Education at Kuwait's Public Authority for Applied Education and Training (PAAET). Unfortunately, even with a move to new premises, there are certain shortcomings which prevail, such as the shortage or even complete lack of equipment in classrooms. Moreover, in recent research, Alfelaj (2015) found many barriers to the integration of technology into classrooms in this context, whether contextual/cultural, general or technical. For instance, some of the contextual/cultural barriers represent:

- The current education system, which encourages rote learning amongst students, as opposed to the synthesis of information.
- Teachers and students depending heavily on printed resources, e.g. textbooks.
- Constraints arising from a lack of self-confidence and motivation amongst the students themselves.

More general barriers represent:

- Health problems arising through the excessive use of certain devices, e.g. back pain or eye problems, resulting in headaches, blurred vision and eye strain
- The long-term prospect of a loss of interest in technology and the accompanying materials used.

However, technical barriers include:

- The lack of space and equipment in lecture rooms and classrooms, especially the shortage of data-show for displaying images, text and video.
- The lack of ongoing technical support.
- The lack of Internet access, e.g. Wi-Fi in lecture rooms and classrooms.

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The above challenges had a negative effect on the researcher (who was also the teacher) in his efforts to implement technology as a means of displaying relevant videos in the classroom, such as on topics being studied by the pre-service teachers concerned. Therefore, having to think 'outside the box' drove him to search for alternatives to the above technology (namely data-show and projectors), in order to display relevant materials of all kinds. Along these lines, the technology already available to the pre-service teachers in the form of their own smartphones presented itself as a feasible option, given that this kind of technology, sometimes referred to as mobile or M-technology (e.g. smartphones), "is widely embraced by the student community" (Al-Fahad, 2009, p. 118). Furthermore, M-technology suggests the potential for more effective learner engagement (Wang, Shen, Novak & Pan, 2009) and the facilitation of CL (Alfelaij, 2015). It is moreover convenient for displaying educational video material. In the following Literature Review, the researcher discusses several important questions in this regard, namely why it is important to be able to display video material, why smartphones and their accompanying apps were selected for the present study and why CL has been emphasised here.

Literature Review:

Why is it important for pre-service teachers at PAAET to be able to view educational video materials?

The present researcher is of the opinion that short and relevant videos, followed by a discussion of any thoughts or concepts which subsequently emerge is more beneficial for students in the abovementioned context than merely listening to a lecture that includes a few slides. One manager involved in the construction of online courses and e-textbooks for formal education (Stanic, 2014) has in fact illustrated that the use of relevant videos holds many advantages for learning and the retention of information. For example, graphics and audio-material can be integrated into teaching as a means of capturing students' attention, engaging them in the learning process and then enhancing their ability to retain

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what they have learned. Furthermore, Bruhl, Klosky and Bristow (2008) conclude that “[t]he use of short, simple, focused videos improves student perception of learning and academic performance in an engineering course” (p. 9).

Even more dramatically, Freeman et al. (2014) reveal that the percentage of failure increases amongst undergraduate students when ‘traditional stand-and-deliver lectures’ are adopted as the sole teaching methods, instead of more inspiring and active learning methods. In her blog Grabill (2009), a third year college student at Vassar College expressed her disappointment with such traditional methods: “[R]ecently I came to the conclusion that I do not learn well from classes in which the lectures are based on PowerPoint presentations”. As an educator, Johnson (2012) endorses this, pointing out that regardless of the teacher’s efforts, “a lecture is still a lecture”.

Nevertheless, there have been criticisms of access to audio-visual material both inside and outside the classroom. For instance, in response to one blogger, Young (2012), several teachers and college students expressed a certain amount of scepticism about whether students could learn more effectively through such means. It was claimed that students who exclusively access recorded lectures or educational videos may turn into passive rather than active learners. Additionally, it was highlighted that students will not automatically learn something new merely by watching videos, unless they engage in active learning.

What consequently emerges is that the actual engagement of learners will further shift them from being passive to active learners. This will raise their level of thinking from mere memorisation of knowledge to the capacity to analyse, evaluate and even create it. The present researcher believes that the acquisition of more advanced skills, as in the higher thinking skills described in (Bloom, 1956) should play a vital role in the ongoing professional development of any motivated and effective teacher. Therefore, the researcher mission here is to focus on increasing engagement by implementing procedures and activities within the lecture hall, instead of relying solely on the traditional lecture format. For

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example, this would incorporate the encouragement of CL and the presentation of relevant videos, followed by fruitful interaction and discussion on the material thus presented. As a possibility for enhancing learner engagement and promoting more active learning, Johnson (2012) makes the following suggestions:

“ask the students to do something with the knowledge and skills they have learned. Break up the lecture with learning activities. Let them practice. Get them moving. Get them talking. Make it so engaging that it will be difficult for students not to participate.”

In the present research, blended learning approaches are adopted. This involves the researcher meeting the students at least twice weekly to clarify anything which is unambiguous or unclear, as well as to design the activities and offer guidance and support. As a result, there is no fear of leaving the students isolated and struggling alone, which is what can happen on most online courses. According to Karnad (2013), “Students prefer blended teaching methods which incorporate both lecture recordings and live lectures, and often do not view recorded lectures as a replacement for attending live lectures” (p. 2).

Why Collaborative Learning (CL)?

It is the opinion of the current researcher that students need to advance to the higher thinking skills and become critical thinkers and that this is in fact one of the essential goals of effective teaching. Hence, it is important to vary the teaching and learning methods adopted. An example of this could be the inclusion of relevant videos alongside lectures. Mercer (2013) links improved learning outcomes with a greater interchange of ideas amongst learners, together with enhanced mutual support between them. However, the mere act of watching relevant videos will not in itself guarantee that the students fully understood all topics, concepts and lessons – their silence while watching educational videos does not imply the acquisition of required knowledge. Therefore, they may also be engaged in small groups in the classroom to initiate debate and provide an arena for any hesitant or defeatist voices. It is precisely for the latter reason

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that the researcher was eager to adopt a CL approach in this instance.

Dillenbourg (1999) defines CL as follows: “The broadest (but unsatisfactory) definition of 'collaborative learning' (CL) is that it is a situation in which two or more people learn or attempt to learn something together” (p. 1). Thamraksa (2003) highlights many positive contributions of CL, such as promoting growth in students' knowledge and skills, while at the same time developing their social skills. This is achieved at a personal level through the mutual exchange of opinions, competences and information. In fact, CL creates situations and environments where students not only grasp knowledge more fully and in more depth, but also grow in their capacity for critical thinking (Gokhale, 1995).

The key element in the present case is that technology is used in such collaboration; more specifically, handheld devices in the form of M-technology. In this way, the process becomes easier and can take place more rapidly. Salmons (2009) supports this integration of technology via collaborative e-learning activities, through which innovation and new solutions can be generated as new knowledge acquired through learner interaction. Huang et al. (2010) confirm this, emphasising the opportunities for CL offered by M-technologies. The conclusion that may thus be drawn is that handheld devices potentially equip both teachers and students to extend collaboration beyond the walls of the classroom, whether to another single fixed venue, or from scattered locations.

Why Smartphones and Their Accompanying Apps (i.e. WhatsApp)?

Many scholars and researchers have presented the various benefits to be gained from integrating M-technologies into the classroom. For example, researchers such as Klopfer, Squire and Jenkins (2002) argue that “A powerful handheld learning environment might capitalize on the portability, social interactivity, context sensitivity, connectivity, and individuality of ubiquitous devices to bridge real and virtual worlds” (p. 95). Furthermore, Milrad (2003) and Thornton and Houser (2004) declare that M-

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technologies offer more opportunities for students to engage in CL, both inside and outside the classroom. Sharples, Taylor and Vavoula (2005) also point out that students with access to M-technologies can extend their classroom learning to homework, field trips and museum visits. In addition, Cobcroft et al. (2006) conclude from the most recent literature that M-technologies present substantial advantages and affordances for constructing and backing up critical, collaborative, creative and communicative capabilities within learning settings. Moreover, Bryant (2006) perceives M-learning as a tool to “expand discussion beyond the classroom and provide new ways for students to collaborate and communicate within their class or around the world” (p. 61), while Duncan-Howell and Lee (2007) claim that “Mobile technologies present [...] a means of bridging the gap between formal and informal learning” (p. 229). More specifically, Traxler (2009) found in the literature that M-learning was defined in terms such as “personal, spontaneous, opportunistic, informal, pervasive, situated, private, context-aware, bite-sized, portable” (p. 13), adding that “Mobile learning technologies clearly support the transmission and delivery of rich multimedia content” (p. 17). Another study conducted as a survey at PAAET by Fargoun (2010) noted a positive attitude towards the adoption of M-learning amongst students.

More recently, the attitudes of certain scholars have shifted to a greater focus on the pedagogical affordances of M-technologies. For example, Cochrane and Bateman (2010) believe that M-learning has the potential to bridge pedagogically designed learning contexts and to facilitate the creation of contexts and content by the students themselves, in a personal and collaborative way. The above authors add that M-learning can maintain personalisation and 'social connectedness' from any location. Furthermore, Woodill (2010) identifies seven main affordances of M-learning: “Mobility, ubiquity, accessibility, connectivity, context sensitivity, individuality and creativity” (p. 530) and in a recent study, Alfelaij (2015) found that smartphone apps, especially WhatsApp, hold a pedagogical affordance which can enhance CL, i.e. quality of communication, control of communication, social construction of knowledge with new media, new roles (participatory simulation), and more opportunities to socialise with others.

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With a more specific focus on WhatsApp, researchers such as Ngaleka and Uys (2013) have tried to find a solution to the lack of computer laboratories at institutions, thus using mobile phones as a platform for collaborative research work in a group of third year undergraduate Information Systems students. The learners used WhatsApp to discuss their research project and the results show that this facilitated their work outside the classroom, i.e. when discussing meetings, the project and even other unrelated issues. What was important in the above case was that WhatsApp permitted learning and collaboration outside the classroom, without the influence of the lecturer.

However, there are also many challenges related to the use of technology in the classroom, especially concerning hand-held devices like smartphones. For instance, they are generally expensive, making them inaccessible for some and they can also be distracting, as their many functions and options may lead students away from the main study topic and tasks. Besides, the “text-based message lacks inflection, lacking interactive multimedia, interaction can be clumpy and stilted, everything has to be short and small making meaningful interaction difficult” (Kukulka-Hulme & Pettit, 2009, p. 148). Moreover, there have been some concerns over health, such as backache from poor posture and eye strain through the overuse of devices (see Baldwin-Evans, 2004; Mehdipour & Zerehkafi, 2013; Rekkedal & Dye, 2007; Richardson, 2013). What is more, there is no demographic boundary between students' personal and academic lives. Added to the above, there is the potential issue of a lack of policy support, government investment and interest/awareness from stakeholders. Therefore, “as with all change management projects, gaining institutional support for the m-learning approach is critical. Areas to be addressed include cost, compatibility, equity of access, security, privacy and ethical concerns” (Traxler & Bridges, 2005; Mobile Learning Group, 2004, cited in Cobcroft et al., 2006, p. 25).

However, in spite of the above-mentioned challenges, smartphones and their accompanying apps still hold many advantages, which have encouraged the present researcher to investigate the opportunities they offer for collaboration both inside and outside the classroom. Furthermore, according to the

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researcher's knowledge, no study in the current context of PAAET in Kuwait has endeavoured to offer a technological alternative to data-show or projectors inside lecture halls, given that there is currently a problem with the adequate provision of these. What is more, very few, if any, studies have combined several technologies, e.g. a free website as a platform (SimpleSite), a free application (WhatsApp), a summative activity (ClassMarker), an e-survey (SurveyMonkey), or a book-based curriculum to deliver a successful course.

The Significance of this Research:

The significance of this research lies in its presentation of an alternative technology (i.e. smartphones and their accompanying apps), to compensate for insufficient data-show at PAAET. This represents a solution which can be used both inside and outside the classroom. The researcher hopes that this AR, consisting of a four-step spiral process of planning, action, observation and reflection (for more details, see the Methodology section) will improve practice in the respective context. In addition, it is anticipated to open up new prospects and perspectives for other teachers to adopt and integrate M-technologies, as a means of displaying relevant videos to students, while at the same time keeping them consistently connected. Such technology can therefore initiate a channel for collaboration both within and beyond the classroom. Furthermore, it encourages teachers to abandon traditional teaching methods (i.e. teacher-centred approaches), transferring the focus to more learner-centred approaches.

The Context and Participants:

The present study takes place in the Education Technology Division (ETD) at PAAET in Kuwait. The participants (i.e. pre-service teachers) are members of this academic institution and all native Arabic speakers. Moreover, they are all male, with an average age of 20 and possess smartphones, as well as the ability to use them with their accompanying apps, i.e. WhatsApp in this particular case. The respective course is Introduction to Educational Technology -

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IET: 112, equivalent to two credits. It requires physical attendance amounting to three hours per week, divided over two days (14:00-15:30 on Mondays and Wednesdays) and concentrates on theoretical aspects, giving an overview of technology and its uses in modern education. The content includes an explanation of general concepts of educational technology and an educational study of the communication process. It also focuses on technological innovation in the field of education and how to use such innovation as a prospective teacher. The students must study five chapters of a text book entitled 'Introduction to Education Technology'. The intended learning outcomes are listed below:

By the end of the course, the students will be able to:

- 1. Define the basic concepts related to learning technology and its relationship to education and human contact components.**
- 2. Recognise publishing technology, sculpture, paintings, drawings and printed visualisations.**
- 3. Describe various types of display technology and its benefits, e.g. overhead projectors (OHPs) and opaque projectors – being able to indicate the main parts, exhibits and methods of use.**
- 4. Define the computer and identify its roles, elements and applications.**
- 5. Comprehend concepts like e-learning and distance learning (DL), with the respective properties, types and components.**
- 6. Specify the constraints of technology and its various stages of application.**

A consent form was distributed amongst all the participants to obtain their permission at the beginning of the investigation. The students were all informed that their personal information would be anonymised and remain confidential; stored on the researcher's personal hard drive until the end of the study, when it would be permanently deleted. Additionally, the students were informed of their right to withdraw from the study at any stage of the investigation and at their discretion and convenience.

Methodology:

In trying to improve practice at PAAET in Kuwait, the present researcher decided to conduct AR. Carr and Kemmis (1986, p. 162) definition of AR may be encapsulated in the following definitions of it as:

“A form of enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their own understanding of these practices and situations in which these practices are carried out.”

According to Koshy (2005), AR is “an enquiry, undertaken with rigour and understanding so as to constantly refine practice; the emerging evidence-based outcomes will then contribute to the researching practitioner’s continuing professional development” (p. 10). It consists of a spiral process of planning, action, observation and reflection (Calhoun, 1993; McLean, 1995; Koshy, 2005). What is unique about it is its flexibility, whereby the process may begin at any step, with one cycle beginning once another is completed. This type of inquiry is considered to be most effective when it is viewed as a continuous process for improvement (McLean, 1995). What matters here is that “[f]or action researchers, theory informs practice, practice refines theory, in a continuous transformation” (O’Brien, 1998), thus indicating that it can be useful for the researcher to refine his theory after implementing practice. The present researcher’s theory is that students’ smartphones can supply pre-service teachers with a powerful technological tool for use in peer-communication and collaboration, as well as representing a successful technological alternative to data-show in lecture halls, since this equipment is often in short supply for viewing relevant videos. The confirmation or rejection of the theory will involve some work to refine it.

According to Koshy (2005, p. 10), AR “involves researching your own practice, [...] is about improvement; involves analysis, reflection and evaluation; and facilitates changes through enquiry.” However, the above author also warns that, AR faces some criticism which must be considered. For example, there have been allegations that it

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lacks rigour and validity, or that it is difficult to generalise from its results. Fortunately, some researchers have offered valuable advice related to the generalisation of the results. For example, Walsham (1995) argues that, to some extent, generalisation is achievable for qualitative research, as concepts can be generated that provide precise implications or rich insights. Furthermore, Hammersley (1992) clarifies how we can make generalisations, if other studies confirm the findings. He adds that a single case study may be used for inferential generalisation. This means a researcher providing a thorough description of the phenomenon under study and its context, so that findings may be applied to similar settings. Naturalistic generalisation is another means of generalising from a small case study. According to Stake (1980), naturalistic generalisation more commonly ensues from a single study to similar ones, rather than from a single study to an entire population. However, in the present research, the researcher is not interested in generalising findings or replicability, but in gaining rich and deep insights into how pre-service teachers use their smartphones and accompanying apps to watch relevant videos, interact, communicate and collaborate to construct knowledge.

O'Leary, Rao, and Perry (2004, p. 139), lists some of the reasons for carrying out AR, i.e. being able to address practical problems, generate knowledge and effect change. The present researcher will primarily focus on the first of these, namely how practical problems can be addressed. In this case, these arise from the absence of adequate data-show inside lecture halls at PAAET in Kuwait. The following Figure (Figure 1) presents a simple model of the typical cyclical AR process, with each cycle in four steps: planning, acting, observing and reflecting Reflect (MacIsaac, 1995 cited in O'Brien, 2001).

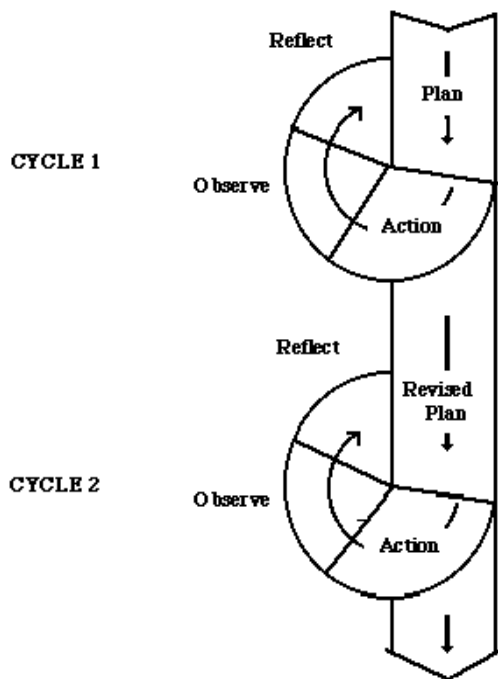


Figure 1: Simple Action Research (AR) Model (from Dan MacIsaac, 1995)

Methods Used to Collect Data:

1. Participant Observation

According to Jorgensen and Jorgensen (2015), participant observation involves the researcher interacting with others in everyday life, while also collecting information. This is a unique method of investigating the whole complex, diverse and contradictory gamut of human experience, in order to derive conclusions, concepts and meaning. In the (European-Commission, 2009, p. 62), it has been pointed out that “[O]bservational methods have the advantage of directly evaluating learners’ involvement and engagement in the learning environment and with the learning activities”. This method gives the researcher the chance to observe how participants (in this case, pre-service teachers at PAAET) act, accept or reject certain activities and communicate with each other

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within diverse instructional practices, such as classroom discussions, group activities, or classroom interaction.

2. Interaction Analysis (IA)

Jordan and Henderson (1995) indicate that:

“Interaction Analysis [...] is an interdisciplinary method for the empirical investigation of the interaction of human beings with each other and with objects in their environment. It investigates human activities, such as talk, nonverbal interaction, and the use of artefacts and technologies, identifying routine practices and problems and the resources for their solution” (p. 39).

The IA approach is used to discover and understand some of the anticipated problems and challenges potentially faced by students during their learning journey. Using a smartphone app, i.e. WhatsApp, synchronous communication is facilitated among participants; giving them a better chance to obtain instant support and feedback from their teacher and colleagues. Analysing participants' needs, problems and challenges will instantly allow teachers and researchers to act faster and modify their plans before it is too late and it becomes hard to correct mistakes.

3. E-Survey

The researcher carried out a short e-survey (i.e. on SurveyMonkey, which is free online survey software with a questionnaire). In this way, participants' responses were collected and analysed. This e-survey is completely free of charge and easy to use, but the 'Basic' plan is limited and only allows for the creation and transmission of a survey with up to 10 questions or elements. It was used to measure participants' satisfaction with their own smartphones, both inside and outside the classroom, with reference to the viewing of relevant videos on topics currently being studied. Furthermore, it explored the students' perspectives of using their own smartphones and accompanying apps (in this case, WhatsApp) for communication with other group members. Moreover, it assessed the different approaches adopted by the researcher during the

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semester (i.e. CL and the displaying of relevant videos). This method of investigation was meant to give the present researcher and other teachers in this context, namely at PAAET in Kuwait, more insight into the preferences of pre-service teachers and their perspectives of such approaches, i.e. CL, watching relevant videos and the use of technologies, such as smartphones, instead of just listening to lecturers.

The Process of Data Collection and Analysis:

Due to the lack of data-show in the classroom, the researcher had a range of techniques lined up for displaying and delivering lessons:

- A. The use of personal data-show for viewing certain video material (i.e. from YouTube) in the classroom (this is not an option for every teacher around the globe, due to the high price of equipment).
- B. Diversity in the type of lessons offered; the displaying of relevant videos; the curriculum course book; the encouragement of group discussion, and permission for the participants to use their own smartphones inside and outside the classroom, as a means of viewing relevant videos on the topics being studied, as well as to search for appropriate information, i.e. the concept of DL.

Some of the topics being studied by the participants were difficult to conceptualise or master in a single session, e.g. e-learning and DL. Furthermore, there were technical difficulties involved in activating the researcher's personal data-show, besides the absence of some of the participants during the summative activity. Therefore, the AR cycles were repeated and in each cycle, when the participants encountered obstacles, the researcher immediately intervened to address the imbalance and make amendments. What emerged was the continual analysis of data through recurring cycles of planning, data-gathering, evaluating and acting, thus amounting to four cycles:

Cycle One: to avoid repeating what was already presented in the curriculum course book and to save the teacher's voice, relevant videos were selected from YouTube. Many teachers, educators and

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institutions have presented useful and clear explanations of topics planned for the current research and furthermore, in Arabic (e.g. Introduction to Education Technology). Very often, these videos are new, updated and contain images and links to sources. Uploading such videos onto the website personally created by the present researcher, <http://etpaaet.simplesite.com> gave the participants the chance to watch them wherever and whenever they wanted, using any convenient means, e.g. on their own smartphones, laptops, etc. This website can be seen as the platform containing the course aims and description, announcements, a specific page for each aspect of the curriculum, learning videos, and copies of previous exam papers. The present researcher's activities involved showing the participants relevant videos, as well as asking them to view this material at their convenience outside the classroom.

The researcher connected his own smartphone (a Samsung Galaxy III) to the data-show with a HDMI connector and consequently observed that most of the participants agreed to watch the abovementioned videos. This activity was then followed by a short discussion on what the students had learnt or noted, as an alternative to a lecture. This is because although feedback after lectures is mainly found to be positive, not all participants are engaged by lectures; some hide behind the efforts of their peers, due to shyness and hesitation to share their opinions in public (Eberly Center for Teaching Excellence & Educational Innovation, 2008); sometimes referred to as the 'free-rider phenomenon'.

Unfortunately, at the start of the activity, the researcher's personal data-show failed to work properly. For the first three chapters of the curriculum, technical problems were faced (i.e. the lack of connectors for recharging the equipment; poor display resolution and sound in a large lecture hall, and the loss of the Internet signal). To overcome these problems, during the reflection and modification step, the researcher purchased a connector and reconsidered the use of his own data-show to watch the videos. This was replaced with the students' own smartphones. The sound was improved by using an external speakerphone and the latest smartphone (Samsung Note 5), with a WIFI display receiver (HDMI dongle), allowing for a faster Internet connection.

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Cycle Two: The researcher planned to use both his own data-show and the students' smartphones to watch videos in the classroom. The researcher also planned to activate the CL approach to engage and benefit more students. During the fourth step in the process, namely 'acting', the participants were asked to watch relevant videos uploaded by the researcher. These were then discussed within each randomly selected group, based on where the participants were seated in the classroom. Furthermore, the students were asked to think creatively – 'out of the box' – rather than adhering closely to the course book. Extra grades were awarded for sharing in the classroom discussion. The researcher observed that this step encouraged most of the students to openly share their opinions. Furthermore, there was less reliance on the out-of-date course book. Instead, the participants began to search for new and relevant information from other resources, using their own smartphones.

During this period, the researcher was teaching the content of Chapter Four, the longest chapter, covering many important and complex topics and concepts (computer components, display technology, e-learning, DL, and the constraints of technology and its various stages of application). Most of the participants were attentive while watching the videos in class. They were also at ease with using their own smartphones to access the website and view the videos. They then discussed these with peers sitting next to them.

Disappointingly, however, the researcher was not always able to find useful or relevant Arabic videos to upload to the website. As a result, the topics which were not covered in this way included:

- **Writing programs (Word); used for writing, editing and coordinating text, as well as adding photographs and drawings and then printing the product - see course book schedule (p. 150)**
- **Database programs (p. 152)**
- **Spreadsheet programs (p. 154)**
- **Presentation programs (p. 155)**
- **Drawing programs (p. 157)**
- **Programs for producing images (p. 158)**

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- **Programs for producing videos (p. 160)**
- **Design programs (p. 161)**
- **Programs for producing sound (p. 163).**

Therefore, during the reflection and modification steps, the researcher contented himself by simply introducing the title and page numbers for each topic in Chapter Four of the course book. Furthermore, he began discussing the above topics with the students in class and then had them collaboratively discussing the relevant concepts, with their advantages and disadvantages.

Cycle Three: This cycle began with the content of the final chapter of the course book, Chapter Six. The plan was to allow the participants to collaboratively discuss the concept of DL and other relevant questions, in order to expand their knowledge before the researcher actually began teaching. For instance, the participants considered the question: What is distance learning (DL)? Why is it important? What obstacles are faced globally and domestically and what do the participants themselves think about it?

In this activity, the students were gathered into small groups of three or four - smaller groups can be more manageable in that members cannot easily hide behind the efforts of their peers (Alfelaij, 2015). The abovementioned questions were then discussed, with the participants being permitted to use their own smartphones to carry out individual searches for relevant information about the definitions, advantages and disadvantages of DL. The participants then shared and discussed what they had found with other group members and submitted a handwritten report to demonstrate their own understanding of this concept, the extent of its usefulness and the extent to which it is acceptable or unacceptable in the Kuwaiti context. Finally, the researcher gave a total grade for each group member (for an illustration of the nine groups, see Figure 2).

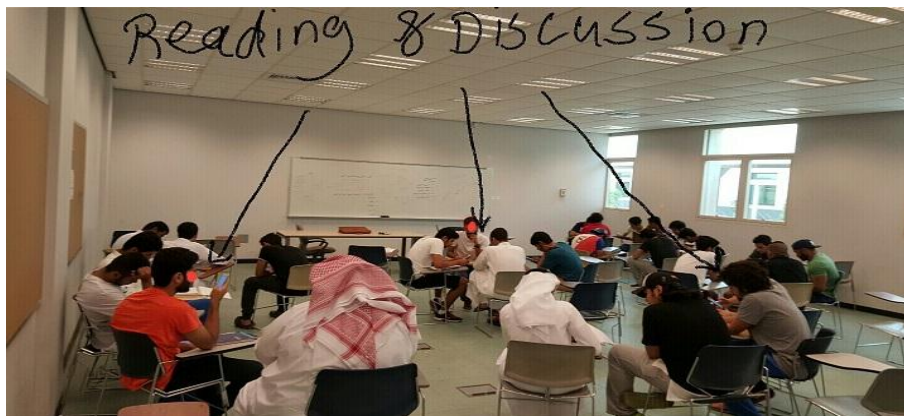


Figure 2: Participants reading relevant topics from their own smartphones, engaging in discussion with fellow group members and presenting collective and summative reports

It was observed that with 45 or more participants all using their smartphones at the same time, the classroom management initially deteriorated, with chaos and noise. Within around 10 minutes, however, the noise level had dropped and there was more focus on the lesson objective, i.e. to read about DL. It would seem that once the researcher explained that the session would entail an open discussion as preparation for the next lesson, the students were relieved and appeared to be more comfortable. The researcher also noted a few participants who had failed to bring the course book or their own smartphones, e.g. because they had left them at home, in their cars, or else their subscriptions had expired.

The next step involved reflection and modification. Fortunately, the fact the participants were working in groups meant they could read and share information from each other's smartphones, as well as listening to conversations and engaging with each other. By blending approaches and technologies, e.g. CL and smartphones and providing an environment where the participants could express their thoughts, engagement was effectively enhanced and the students appeared to feel more comfortable. Additionally, some of the obstacles which emerged, such as smartphones not working properly or being left at home, were overcome. However, some participants were absent and therefore failed

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to attend this summative activity and due to time constraints, it could not be repeated. Therefore, a new cycle of AR needed to be started.

Cycle 4: This cycle was begun to give those absent from the summative activity another chance. The plan was to use a free online quiz-maker to deliver a summative activity to the participants. This would be worth 20% of the total course grades. The online test used was accessed on [classmarker.com](https://www.classmarker.com) (see Figure 3). The researcher consequently prepared 20 (multiple choice) questions, with a set time limit of 10 minutes. Full instruction was then provided on the website already designed and used by the researcher, i.e. <http://etpaaet.simplesite.com>. The participants were directed to read these instructions before the start of the activity. This was followed by sending out to all the groups via WhatsApp the names of the seven absent participants, with further instructions and guidance.

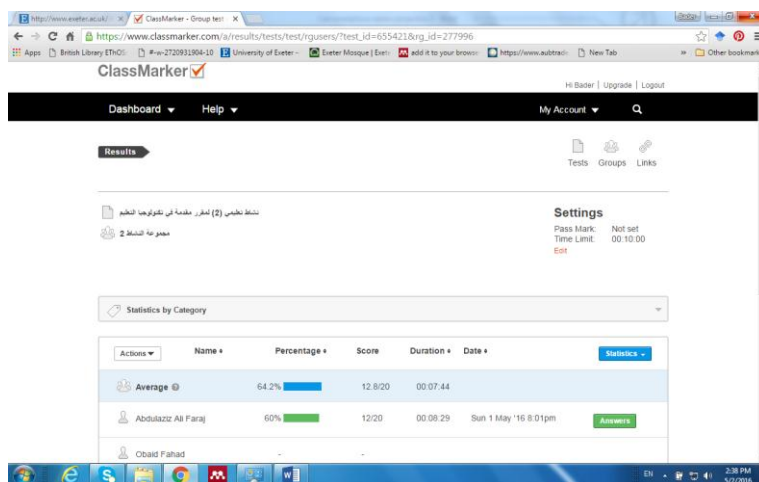


Figure 3: The summative activity

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During the observation, the researcher faced certain technical challenges. ClassMarker does not offer free access to all its features; some of its important features require an upgrade. For instance, these include the three options for providing access to the test in question:

- A. Email test link to users.**
- B. Add test link to your website.**
- C. Embed test into your website.**

However, ClassMarker does provide a free plan for assigning to group members, who can then log in via the ClassMarker.com website. Here, they can access tests assigned to them by the researcher. All seven participants completed the activity, with an average percentage of 64.2%, average score of 12.8/20 and average duration of 00:07:44. Moreover, when seven of the participants were asked via WhatsApp about the extent of their satisfaction with this process, they indicated positive acceptance and satisfaction with the activity, without feeling the need to attend college.

In the reflection stage, the technology was found to help the researcher and participants save time and effort. To be more specific, the technology proved to be useful for both the researcher and participants (i.e. the pre-service teachers) in the delivery and receipt of the summative activity, without the need to visit the campus. Furthermore, the technology gave the researcher the opportunity to present the summative activity to the absent participants.

Using WhatsApp as a Technological Means of Communication outside the Lecture Hall:

From experience, it was clear there needed to be a means for the participants to remain connected with their peers outside the classroom. Fortunately, the latest technology - in this case, smartphones and their accompanying apps, offered a suitable and easy to use solution, free of charge. Many apps are designed to flexibly and easily keep people in touch at all times. In the Kuwaiti context, the most popular app is WhatsApp; it allows links, audio-material, videos, images and text to be freely exchanged. Most

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people, including the students and the teacher/researcher in this instance, are familiar with WhatsApp.

"WhatsApp Messenger is a cross-platform mobile messaging app which allows you to exchange messages without having to pay for SMS. WhatsApp Messenger is available for iPhone, BlackBerry, Android, Windows Phone and Nokia and yes, those phones can all message each other! Because WhatsApp Messenger uses the same internet data plan that you use for email and web browsing, there is no cost to message and stay in touch with your friends. In addition to basic messaging WhatsApp users can create groups, send each other unlimited images, video and audio media messages."
<https://www.whatsapp.com/>

SurveyMonkey Used for Collecting and Analysing Data from Participants:

An e-survey was used to assess participants' perspectives and attitudes to the blending of different approaches adopted by the researcher during the semester (i.e. CL and the viewing of relevant videos), besides the use of the participants' smartphones. The e-survey was sent to nearly 50 pre-service teachers, yet only 37 responded. The 10 questions in the e-survey were focused on four themes (see Table 1);

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Table 1: Themes and questions to assess participants' perspectives

Themes	Questions
Acceptance of smartphones	<ol style="list-style-type: none"> 1. To what extent do you agree to use your smartphone both within and beyond classroom communication with others? 2. Did your smartphone give you an opportunity to communicate with others and exchange ideas?
Satisfaction with the teaching and learning methods	<ol style="list-style-type: none"> 1. To what extent are you satisfied with the methods used for delivering the course? 2. Do you prefer traditional learning methods (listening to lectures)?
Acceptance of CL	<ol style="list-style-type: none"> 1. Do you prefer collaborating with others in your learning? 2. Did participation and collaboration with others dissipate your efforts? 3. Did collaboration with others allow you to declare your opinions and thoughts? 4. Did collaboration with others allow you to increase your understanding and knowledge?
Acceptance of watching relevant videos	<ol style="list-style-type: none"> 1. To what extent do you accept to watch educationally relevant videos? 2. To what extent did videos you watched during your lessons prove useful?

The following Figure from SurveyMonkey (Figure 4) presents examples of the responses with the chart and percentages for the first question. SurveyMonkey also presented the same formula for the remaining questions (with a total 10 questions).

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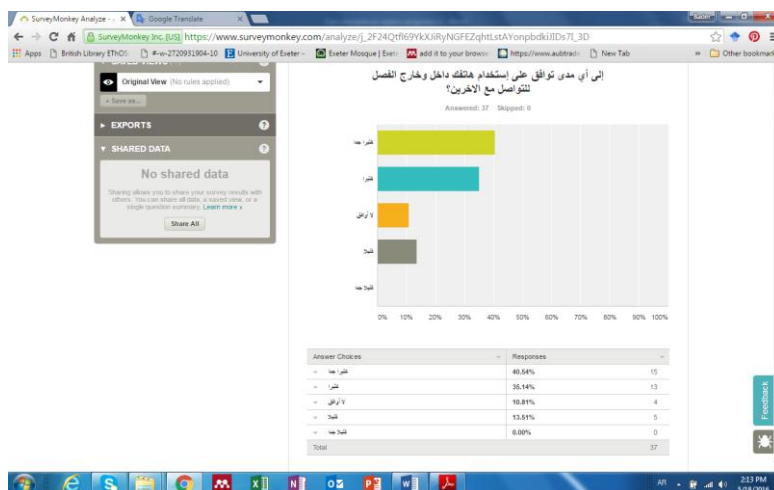


Figure 4: Example of responses from participants

Results:

➤ Participant Observation

1. Smartphones alleviate the need for data-show in the classroom. To a great extent, they therefore represent a suitable technological stopgap and can offset the lack of data-show in lecture halls at PAAET in Kuwait.
2. Creating a website, e.g. etpaaet.smaplesite.com proved fruitful. This was used as a vehicle for many educational videos, copies of pre-exams and announcements. The website allowed the researcher to upload relevant videos on topics being taught and relieved him of the need to overstrain his voice as a teacher. Additionally, it took some of the burden of effort and time required for research and lecturing. What is more, it gave the participants the opportunity to watch and listen to videos that explained relevant topics containing different kinds of chart, image and audio-material, which might otherwise have been difficult for all the participants to grasp in a regular classroom. The presence of these educational videos on the site offered the students the option of returning to the material by viewing the videos more than once, as well as on their phones, so they did not need to access a computer lab. It therefore provided them with an important

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educational alternative, saving them a great deal of time and effort.

3. CL was found to be a useful approach inside and outside the lecture hall. It allowed the participants to discuss relevant issues on topics currently being studied, while clarifying difficult concepts, such as e-learning and DL. The significance of these approaches was explored, as well as their challenges for educators, students and policy-makers in the Kuwaiti context. Collaboration outside the classroom was represented in the sharing of information, images, videos and resources among the learners via WhatsApp. However, there were some indications that not all the participants appreciated the CL approach (see evidence from the e-survey – Table 2).
4. Ensuring diversity in delivering the topics being studied by the participants in the lecture hall proved to be a useful approach for engaging and motivating them. It emerged that most of the students were able to stand at the centre of their own learning. This means that a learner-centred, as opposed to a teacher-centred approach was achieved and the participants become more responsible for their own learning, while the teacher took on the role of facilitator. Accordingly, the control in the classroom shifted to the participants.
5. YouTube can be a suitable resource for relevant videos, without the need for teachers to produce new ones.

➤ Interaction Analysis (IA) through WhatsApp

The researcher found WhatsApp to be a useful tool; it allowed the respective pre-service teachers to spontaneously communicate with each other at all times and from different places, e.g. at home, in their cars, in malls or on campus. There were nine groups in total, each consisting of three to seven members. The researcher, who was also their teacher, was then added to these groups, which allowed him to observe everything being written and the corresponding interaction. In the main, issues relevant to the study topics were discussed, as well as the exam schedule and subjects anticipated to be in the exams and course activities. This was also a means of

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reporting absences. In addition, WhatsApp was a channel through which the students asked their peers and teacher for help and support. Moreover, it was found to be a useful app for all concerned, in terms of its capacity to capture and exchange images conveying important information, without the need to write about it. For example, images of technical challenges were exchanged, such as not being able to access a website or the free online quiz maker on classmarker.com – which was required for the summative activity. The following Figure (Figure 5) is an example of communication between the students in Group 2, where one member summarises what was studied earlier and his peers thank him.

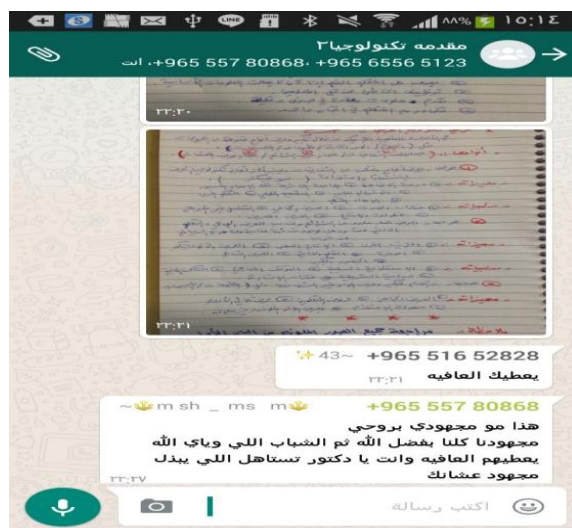


Figure 5: Example of communication between the participants via WhatsApp

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➤ **E-Survey**

Table 2: Responses to the e-survey

Questions	Answer choices	Responses from total number of participants - 37	
1) To what extent do you agree to use your smartphone inside/outside the classroom as a means of communicating with others?	Very much	40.54%	15
	Much	35.14%	13
	Disagree	10.81%	4
	Little	13.51%	5
	Very little	0.00%	0
2) Did your smartphone give you the opportunity to communicate with others and exchange ideas with them?	Very much	72.97%	27
	Much	16.22%	6
	Disagree	2.70%	1
	Little	8.11%	3
	Very little	0.00%	0
3) To what extent are you satisfied with this method of teaching the course?	Very much	54.05%	20
	Much	40.54%	15
	Disagree	0.00%	0
	Little	5.41%	2
	Very little	0.00%	0
4) Do you prefer traditional learning methods (e.g. listening to a lecture)?	Very much	8.11%	3
	Much	10.81%	4
	Disagree	48.65%	18
	Little	29.73%	11
	Very Little	2.70%	1
5) Do you prefer to collaborate with others for learning?	Very much	51.35%	19
	Much	40.54%	15
	Disagree	2.70%	1
	Little	5.41%	2
	Very little	0.00%	0
6) Did participation	Very much	5.41%	2
	Much	2.70%	1

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and collaboration with others dissipate your efforts?	Disagree Little Very little	72.97% 16.22% 2.70%	27 6 1
7) Did collaboration with others allow you to declare your opinions and thoughts?	Very much Much Disagree Little Very little	35.14% 37.84% 5.41% 18.92% 2.70%	13 14 2 7 1
8) Did collaborating with others allow you to increase your understanding and knowledge?	Very much Much Disagree Little Very little	54.05% 40.54% 2.70% 2.70% 0.00%	20 15 1 1 0
9) To what extent do you accept to watch educationally relevant videos?	Very much Much Disagree Little Very little	62.16% 24.32% 10.81% 2.70% 0.00%	23 9 4 1 0
10) To what extent have the videos you watched been useful in your lessons?	Very much Much Disagree Little Very little	64.86% 29.73% 0.00% 5.41% 0.00%	24 11 0 2 0

1. As the above Table shows, 75% of the study participants accepted to use their own smartphones inside and outside the classroom as a means of communicating with others. 13% of the participants were less in agreement and 10.8% disagreed.
2. Approximately 89% of the participants agreed that smartphones gave them an opportunity to communicate with others and exchange ideas with them.

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3. More than 94% of the participants were satisfied with this teaching method, i.e. presenting videos via different means, such as on smartphones or data-show, as well as CL, a summative activity, group discussion and lectures.
4. Nearly 19% (7/37 participants) stated a preference for more traditional learning methods – e.g. listening to a lecturer. However, 32% (12/37 participants) stated less of a preference for this, while 48% rejected the idea.
5. Collaboration with peers was favoured by 91% of the participants.
6. Nearly 73% of the participants claimed CL did not dissipate their efforts, while 18% saw CL as having slightly dissipated their efforts.
7. Approximately 72% declared CL allowed them to express their opinions and thoughts, while 21% showed little support for this idea.
8. 94% of the participants believed that CL offered them the chance to increase their understanding and knowledge.
9. More than 86% of the participants showed acceptance of educationally relevant videos, but 10.8% (4/37 participants) rejected these.
10. Nearly all the participants believed that watching educationally relevant videos was useful, except for two, who did not find this activity of much use.

Discussion:

Smartphones and their accompanying apps can be seen as a technological alternative to compensate for the absence of data-show in lecture halls in higher education institutions (HEIs). Teachers at PAAET in Kuwait can use such portable personal devices to engage students and this has been supported by other authors (Milrad, 2003; Thornton & Houser, 2004). Such methods have been found to enhance collaboration, as well as providing a means of viewing relevant video materials. Additionally, this means offering equal opportunities for all to share, communicate and express their views as required and on an immediate basis, without having to wait for the next lecture. Despite this, the use of a smartphone remains a temporary solution and is not a permanent substitute for the use of

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data-show, especially when educational videos must be shown to large classes.

Aside from the above, free open source technologies that are available on the Internet were accessed for this study, i.e. ClassMarker, and SurveyMonkey. These were then used to design and deliver the summative activity. The e-survey facilitated the work of the researcher and saved a great deal of time and effort. Nonetheless, the free features of the abovementioned open sources were limited. For instance, no advanced analysis was possible without upgrading the account by purchasing advanced services. A teacher or researcher without funding could therefore find it difficult to pay for a subscription to these technological sources.

Observation of the participants showed that the CL approach was acceptable to them and the majority even stated a preference for it. This was confirmed by the e-survey. The e-survey also showed that the majority of the participants, e.g. the pre-service teachers agreed to use their own smartphones inside and outside the classroom. Moreover, their smartphones and the accompanying app (in this case, WhatsApp) gave them the opportunity to communicate with their peers and exchange ideas.

It turned out that my speculations about the participant observation were accurate. To clarify, the responses from the e-survey showed that most of the participants were satisfied with the methods used for teaching and learning, namely lectures, the viewing of relevant videos, the use of personal smartphones to communicate, collaboration with peers, searching for relevant information inside and outside the lecture hall, and accomplishing the summative activity. It would appear that the blend of many approaches to deliver the course topics to the students (watching videos via different means, such as on smartphones and through data-show; CL; summative activities; group discussions, and lectures) comprised an effective approach for enhancing participants' knowledge and engagement. Furthermore, WhatsApp opened up a channel of communication for the pre-service teachers concerned; allowing them to communicate and receive instant help if required. More importantly, the students' smartphones helped to overcome

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certain technical and contextual problems (i.e. a lack of data-show, the lack of well-equipped classrooms, shyness and hesitation).

However, this combination of approaches for every teaching event can also be challenging, while also demanding a great deal of time and effort. It needs sound preparation and in many cases, training, with skilled teachers who can devote their time and effort to achieving the planned objectives. In this situation, teachers must always be prepared to monitor many things both inside and outside the classroom, e.g. the designing of activities; the preparation of exams; the correction of exams and assignments; the selection or preparation of videos; the designing of a website to work as a vehicle or platform for announcements and communication; the designing of e-activities and e-surveys, and the lecturing, supervision, support and motivation of learners.

Diversity in teaching methods met with wide acceptance from the learners in the present study. Nevertheless, there was a certain percentage of them who declared a preference for more traditional methods of teaching and learning (i.e. the teacher-centred approach) and at 19% this dissent cannot be underestimated. It could be related to the effort required in acquiring new skills, or may be due to other challenges mentioned earlier in the Literature Review (see, Alfelajj, 2015a). Oddly enough, some of the participants, namely 10.8% (4/37 participants) were not completely satisfied with watching relevant videos in the lecture hall, but there were no participants who thought this was an altogether fruitless exercise. These conflicting responses raise an important question: Why were the students dissatisfied with watching educationally relevant videos, when the majority saw this approach as useful to learning? Unfortunately, it was not possible to contact the participants after the course ended, in order to answer this significant question.

Limitations:

On the other hand, there were also some limitations to this study. First, the students were asked to use their own smartphones and download the desired apps themselves, which could raise an ethical issue in that it potentially interfered with their private lives.

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Naismith, Lonsdale, Vavoula, and Sharples (2004) warn that students could abandon the use of certain technologies in education if they perceive their social networks to be under attack. Secondly, not all the participants took part in the e-survey; only 37 of the total number of 47 participants chose to be involved and female pre-service teachers were excluded. As a result, this absence of certain voices might have weakened the results obtained. Thirdly, it is difficult to generalise these results, because the investigation took place in a very specific context, i.e. PAAET in Kuwait and even more specifically, the focus was on a small group of male pre-service teachers. Furthermore, the assessment of collaborative group work was not a straightforward mission for the teacher, because of the uneven contribution made by the various group members. Therefore, this raises issues of fairness and equity.

Conclusion:

The practice in this research refined the researcher's theory and presented explicit evidence to prove that the students' smartphones could be useful for communication and collaboration among pre-service teachers at PAAET in Kuwait. Additionally, smartphones could be considered as a suitable alternative technology to overcome the shortage of data-show at PAAET.

The researcher reached a conclusion that smartphones and their accompanying apps can represent a suitable technological alternative to a lack of data-show in the classroom, when seeking to display educationally relevant videos. There is evidence that the majority of participants accept the use of their own smartphones both inside and outside the classroom, as a means of communicating with peers. Most of the study participants stated that smartphones gave them an opportunity to communicate with each other and exchange ideas. Furthermore, most were satisfied with the teaching methods used in this experiment (i.e. watching videos via different means, such as on their smartphones and through data-show; CL; a summative activity; group discussion and lectures), while fewer participants rejected such means and stated a preference for more traditional methods of learning, like exclusively listening to the lecturer. Additionally, collaboration with peers was favoured by

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most of the participants, whereby they were permitted to express their opinions and thoughts. What is more, 94% of the participants believed that CL offered them a chance to increase their understanding and knowledge. Nearly all of them accepted to watch educationally relevant videos and found this to be a useful practice. However, there was no conclusive evidence that all the students reached a higher level of critical thinking.

The success of the experiment (i.e. the use of smartphones to watch educational videos, as a technological alternative to the lack of data-show) does not mean a radical or permanent solution has been found for the lack of data-show at PAAET, but rather represents a temporary solution. Even with the students' ability to access the website concerned, <http://etpaaet.simplesite.com>, and run and watch educational videos via their smartphones, a significant problem remained, as regards the follow-up and assistance of students while watching those videos, especially in the light of a class size of approximately 50 students. Through observation, the researcher found that when asking the students to download and watch the videos, many hands went up, each bringing a new challenge, e.g. the inability to find or play the particular video. Moreover, at times, videos would not run properly. These multiplied tasks added to the pressure on the teacher, but the extra effort demanded seemed to be worthwhile, given the increased student engagement.

Watching relevant videos does not necessarily lead to successful and productive learning. However, there is a good chance of achieving a minimum level of success if some activities are associated with the videos and clear instructions presented. Furthermore, even if those who are resistant to change continue to refuse any integration of technology inside or outside the classroom at PAAET in Kuwait, these represent a minority. In fact, teachers should anticipate and accept such resistance and try to develop the learners' environment accordingly, in order to alleviate it.

The researcher recommends teachers at PAAET to consider students' smartphones and their accompanying apps as a means of overcoming some of the barriers to teaching and learning in that context, e.g. ill-equipped classrooms and the lack of data-show.

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Teachers at PAAET need to be practical and start looking for free alternative resources, such as SurveyMonkey, ClassMarker and YouTube, or else free websites like <http://etpaaet.simplesite.com>, available on the World Wide Web for delivering or collecting information for or about students. Blending several approaches in the classroom; for example, by watching videos via different means, in this case, smartphone or data show; CL; a summative activity; group discussion, and lectures is highly recommended for raising the level of students' thinking skills and to increase engagement. The researcher also recommends that teachers and educators at PAAET or other HEIs in Kuwait start adopting an AR approach, due to the need for practicality and flexibility in developing and documenting new practices.

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