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Promoting technology implementation learning paradigm for online learning in secondary education

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Abstract

Online learning via educational technology tools has been used as a paradigm shift in education to transmit knowledge and promote learners' engagement in secondary learning environments. The emotional, behavioural and cognitive facets of engagement play an important role in the learning process and social development. Learner engagement refers to the degree of attention, focus, belief, interest and emotions that motivate learners successfully to practice higher level critical thinking skills and to promote meaningful learning experiences to achieve the course's learning objectives and progress in their education. This study adopted the instructional design theory, which aimed to propose a clear technology implementation model to enhance learners' engagement in online learning. Some popular technology implementation learning models were explored and analysed. Later, the technology implementation learning paradigm was proposed for the purpose of promoting learners' engagement in online learning and support the meaningful inclusion of online learning in secondary schools. The proposed paradigm is composed of four interacted fundamental dimensions, attitude dimension, pedagogical dimension, social dimension and technical dimension, which lead to engage learners emotionally, behaviourally and cognitively in a technology-supported learning environment. Attitude dimension is the intentions and the perspectives to understand, interact and manage emotional skills and abilities needed by technology users for the effective usage of educational technology tools. Pedagogical dimension is the active learning process for cognitive development using pre-defined learning objectives and pedagogical theories to identify learning strategies and assessments to achieve planned educational outcomes. Technical dimension intends to create a computer and media literacy that allows learners and instructors to employ online learning without technical difficulties. Social dimension is to create a technological cooperation where learners are networking with other learners and are willing to share positively their experiences with peers and/or with teachers to attain their emotional, social and cognitive engagements that keep them motivated and even inspired.

Keywords: Artificial APTS paradigm, educational technology, learners' engagement, online learning.

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1. Introduction

Information and communication technology (ICT) is increasingly widespread, influencing educational systems worldwide (Yehya, Barbar & Abou-Rjelil, 2018;Yehya, Barbar & Abou-Rjelil, 2019b).Integrating technology into the curriculum improves student collaboration, innovation and critical thinking skills (Yehya,2019).Fu (2013) indicated that the school is an important environment in which students participate in a wide range of computer activities, while the home serves as a complementary site for regular engagement in a narrower set of computer activities.

The use of online learning and the use of traditional classroom methods are seeing exponential growth, leading to blended learning that combines face-to-face and online technology-mediated learning experiences. Many findings on blended learning show an increase in learners' ability to learn collaboratively, think creatively, study independently and tailor their own learning experiences to meet their individual needs (Cleveland-Innes & Wilton, 2018).

Despite the potential and issues of online technology, its implementation in meaningful learning does not occur spontaneously (Yehya, 2019). Educators need to see the importance of online learning beyond the hardware and the expanded definition of the learning management systems. Educational technology is not additional that the educator must include, but is rather integral to the support and extension of learning for all students (International Society for Technology in Education, 2009)Online learning should be shifted from managing and providing information to opening doors for learners to communicate, interact, explore and create a meaningful learning experience. Thus, a technology implementation learning paradigm is needed to move away from the idea of online learning as a place to obtain knowledge to the view that online learning as the place to learn and how to learn in an actual learning environment.

1.1. Theoretical framework

Various technology implementation models exist to enhance technology implementations. To explain and elucidate technology implementations in encouraging student engagement, different models are investigated.

The Substitution Augmentation Modification Redefinition (SAMR) model is one of these models. It offers a framework to evaluate how computer technology might impact teaching and learning and helps educators to reflect on how they integrate technology in their classrooms. The SAMR model is a ladder for the level of technological integration in lessons. The SAMR model shows a progression that adopters of educational technology often follow as they progress through teaching/ learning with technology. This model highlights "how are educators currently using technology?" and "where do we want to go with it?". This model implies that teachers must always modify and redefine their activities. Thus, teachers need always to be innovative and creative in implementing technology and this may frustrate them. Thus, the SAMR model falls short with teachers' attitudes and beliefs towards technology implementations and ignores their abilities and skills for effective implementations.

Resources, Activity, Support and Evaluation (RASE) is a pedagogical model developed to support teachers to plan a student-centred and reliable curriculum. The RASE model was designed with a focus on how best to apply, or integrate, technology to improve student learning outcomes and satisfaction (Churchill, King & Fox, 2013; Churchill, King, Webster & Fox, 2013). Resources should engage learners in meaningful learning to learn with, not just learn from, these resources. Activities are the learning experiences as problem-solving or case studies where learners apply knowledge and develop skills to develop their learning and achieve the expected learning outcomes. Support is the learner–learner or the learner–teacher or the learner–learning resources that learners need to support the learning process. Evaluation is the feedback to guide students' progress to ensure that learning outcomes are being achieved. However, this model should think about the importance of teachers' skills and beliefs

towards the implementation of technology. It should relate to the type of knowledge and skills teachers need to bring to online learning.

In addition, the instructional design of the ASSURE model also highlighted the key considerations for technology implementation in effectively designing and planning technology-rich lessons to improve teaching and learning (Kim & Downey, 2016). The ASSURE abbreviation stands for these six important instructional design components: A–analyse learners; S–state objectives; S–select instructional methods, media and materials; U–utilise media and materials; R–require learner participation; and E–evaluate and revise.

The ASSURE model is a step-by-step process to create a lesson plan that effectively integrates the use of technology and media to improve student learning. Lessons created with the ASSURE model directly align with the National Education Technology Standards for Teachers (ISTE, 2008) and students (International Society for Technology in Education, 2009) as well as curriculum standards or learning outcomes. The ASSURE model is limited to the purpose of planning lessons. It recognises the different learning styles of all students but it does not show the need for a deeper understanding of the teachers' behavioural beliefs and their skills in the context of the use of online learning.

Technological Pedagogical Content Knowledge (TPACK) model developed by Mishra and Koehler (2006) attempts mainly to identify the nature of knowledge required by teachers to improve the performance of teaching and learning processes with technology (SAMPAIO, 2016; TAI et al., 2015), while addressing the complex, multifaceted and situated nature of teacher knowledge. The TPACK model focuses on the use of technological, pedagogical and content knowledge that a teacher must have and use to effectively integrate technology into their lessons. But this model ignores that these three areas are easy enough to identify, and the crossovers become much more difficult to work with. Teachers must be able to flexibly move between technology, pedagogy and content knowledge when presenting a lesson. The integrating technology will not necessarily enhance learning if the instructor does not have a positive attitude and real intention to test its impact (Yehya, Barbar & Abou-Rjeily, 2019a; Yehya et al., 2018). Moreover, the model does not consider external factors as beliefs about infrastructure, support of the staff and the access to technology and online learning. According to Joo, Park and Lim (2016), the TPACK model did not affect pre-service teachers' intention to use technology.

1.2. Research aim

The aim of this endeavour is to propose a paradigm that enables teachers for designing effective technology implementation to engage students in online learning in a more flexible way. The suggested paradigm will generate a new technology implementation learning models that may combine different popular models' dimensions and enrich other necessary dimensions. Moreover, the aim of this research is to link the paradigm dimensions to the emotional, behavioural and cognitive facets of learners' engagement to design better online learning environments. Thus, its aim is to transform the role of technology implementation models as a model of identifying users' knowledge and skills or models of creating lesson plan templates to the view that technology implementation paradigms are to design how to learn in an actual online learning environment.

2. Method

2.1. Research design

This study used the instructional design theory to identify the technology implementation model to support and facilitate learning. It is design-oriented research, focusing on the suggested paradigm components to make the design more directly useful to promote learners' engagement in secondary learning environments. Thus, this study identifies the components of the promoting technology implementation paradigms and highlights the learners' engagement facets to provide more giddiness for users to achieve their implementation of online learning goals.

2.2. Data collection

The research relies on the review of the literature to collect data concerning technology implementation learning models. Some popular technology implementation learning models for facilitating technology implementation were identified and explored. The context of the implementations of these models was analysed.

Data concerning the characteristics and dimensions that construct these technology implementation models were managed. The components were determined and classified and the limitations of these models in some contexts due to the missing components in some models were identified.

In the second stage, the main components for creating and promoting the technology implementation paradigm for online learning were selected and identified. The link between these components and the cognitive, affective and psychomotor domains of learning were recognised and explained. Finally, the model was designed, reviewed and then conducted. The "Results" section shows in detail the transformed technology implementation paradigm for online learning.

3. Results

This section reveals the results in the context to finally propose a paradigm for designing effective technology implementation to engage students in online learning. The Attitude and value, Pedagogical, Technical and Social (APTS) paradigm can be used to guide the implementation of online learning in the secondary school learning environments This paradigm, as shown in Figure 1, focuses on four dimensions, APTS, that embrace the three expected forms of education engagement (emotional, behavioural and cognitive), depending on the well-appropriate socioeconomic learning environment. In the following sections, the dimensions and the education engagement forms are explained.

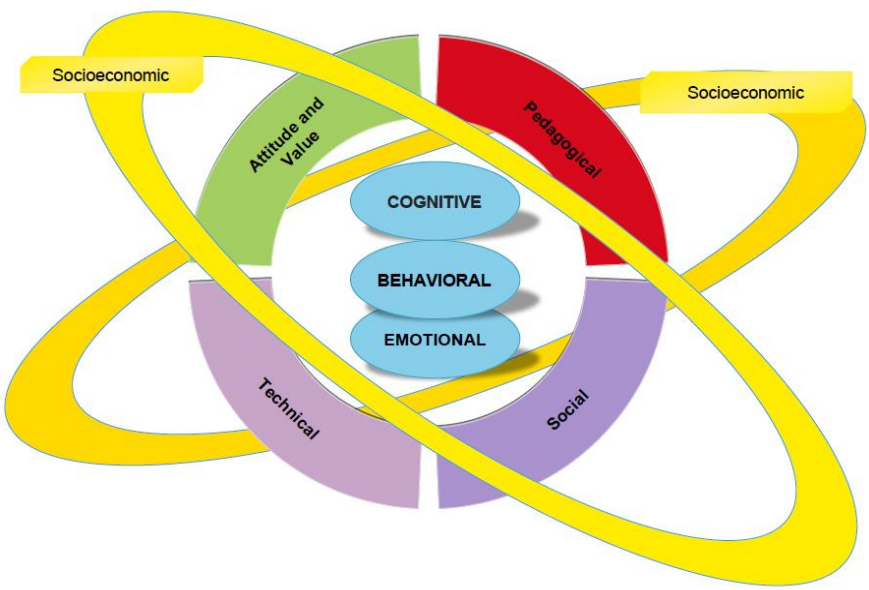

Figure 1. APTS paradigm for effective technology implementation

3.1. Attitude and value, pedagogical, technical and social dimensions

In this section, we begin by looking at what the dimensions of the APTS model are. It is design-oriented offering explanations about the dimensions and the context of implementation.

3.2. Attitude and values dimension

Values represent a single belief that guides actions and judgement across objects and situations and decide what we think as for right, wrong, good or unjust. Values help to guide behaviour and manifest beliefs and attitudes. An understanding of the attitude dimension—how users feel and what affects these feelings—is essential if educators want to provide great user experiences. Different teachers' and learners' attitudes towards the use of education technology can affect technology implementations (Yehya, 2019). The attitude and values dimension is the intentions and the perspectives to understand, interact and manage emotional skills and abilities needed by technology users for the effective usage of educational technology tools (Yehya et al., 2018, 2019a).

The attitude and values dimension attempts to create learning experiences with technology that produce appropriate emotions in order to create a positive experience for the user. Emotions play a central role in the human ability to understand and learn about the world. The user emotions towards technology implementation can strongly influence users' perceptions of it (Yehya, 2019).

Technology users in learning form their emotional connections with technology on three levels: visceral, behavioural and reflective. The visceral emotional level calls to our first reactions when we encounter the technology. It mainly deals with the perceived quality of the technology. In this level, users examine what inner reactions tell us about an item. The behavioural emotional level refers to the usability of the implemented technology, the users' assessment of how well it performs the desired functions and how easily users can learn how to implement this tool. By this level, users will have formed a more justified opinion for the implementation of the suggested tool. Finally, the reflective emotional level is concerned with the users' ability to project the tool impact on learning after use it. At this level, the users maximise their desire to implement it.

3.3. Pedagogical dimension

The fundamental term in the conceptual field of instruction, teaching and learning is the pedagogical dimension. It refers to any systematic use of procedures, methods, recommendations and appropriate devices in order to bring about effective, efficient and productive learning (Kharitonov et al., 2015; Lowyck, 2002).The pedagogical dimension defines the set-up, content and structure of the implementation strategies. It is an action plan that represents the path that should be followed to achieve specific skills and learning objectives by choosing appropriate instructional approaches, designing learning activities and assessing students' learning outcomes. Pedagogical dimension allows greater liberty to teachers in their use of the material in the online environment. With the emergence of online learning and the more educational technology learning environments, pedagogical design undoubtedly needs to be technology promoted and supported. Thus, the pedagogical dimension of the technology implementation learning paradigm is needed to transform the idea of online learning from a place to obtain knowledge to the view that online learning is the place to learn and how to learn in an actual learning environment

3.4. Technical dimension

The technical dimension in the technology implementation learning paradigm is critical for successful implementation for online learning. Educators and learners will be frustrated if they cannot receive quick support when they encounter technical problems (Yehya et al., 2018, 2019a). The technical dimension for online learning must rely on the support of technology by the learning environment and a set of resources selection rubrics. Educators and technology users must consider the availability of the appropriate online resources and tools that are necessary to complete the learning activity. In addition, the quality and alignment of the online material (content and the language) with standards, outcomes and objectives, the alignment of the online material with the age of learners, the accuracy of the online material and their interest for learners, and the ease of use

must be carefully considered. Moreover, the technical dimension must take into consideration online materials that can stimulate learners' creativity, foster collaboration and provide practice and feedback

3.5. Social dimension

Social networking plays an essential role in learners' life. Social networking is built on the idea of how people should know and interact with each other. It gives people the power to share, making the world more open and connected (Zaidieh, 2012). Social innovation networks offer a way to spread education across disciplines in any organisation (Issa, Isaias & Kommers, 2016). Learners do not simply learn from available online resources. But rather, they communicate and interact with their peers and instructors via technological tools to co-construct knowledge (Scardamalia & Bereiter, 2006). The social dimension of a technology implementation learning paradigm is to provide an appropriate and interactive learning environment so that the learners are willing to cooperate with others, share their understanding, negotiate and construct knowledge and skills together. Learners can understand their role, define their engagement and pre-meditate the role they wish to play as creators and facilitators in shaping a future learning experience via online distance learning

Thus, the main concern of the social dimension of the technology implementation paradigm is to alert learners, parents and educators on the importance of privacy of social networking in education. The social dimension of technology implementation paradigm takes into consideration the setting, norms and rules for regulating users' interactions and communication behaviour via the wide online learning tools.

3.6. Socioeconomic status

All the mentioned dimensions of the APTS paradigm must take the government's educational policies, socioeconomic status of the country and its educational system into careful consideration. The socioeconomic status affects positively or negatively the paradigm of technology implementation environment (Gibson, Broadley, Downie & Wallet, 2018).The technology implementation learning environment needs a well-defined educational vision. It needs the recruitment policy of schools to hire an ICT trained person to support teachers and students. The technology implementation learning environment for international learners cannot be the same for a specific country. Thus, instructional designers in the implementation of online learning must consider the cultural perspective of the learners, the available infrastructure and the characteristics of learners to be feasible in the implemented culture.

3.7. Behavioural, emotional and cognitive engagement

The aim of the APTS technology implementation online learning paradigm is to deepen the factors that affect the success of educational transformation from a holistic perspective and engage learners to achieve learning objectives. Engaging learners in learning is a basic principle of effective undergraduate education. Engagement is not like a switch that is either open or closed. Engagement refers to the learners' commitment or effort involved in the learning process (Appleton, Christenson & Furlong, 2008; Fredricks, Blumenfeld & Paris, 2004). It refers to the degree of attention, focus, belief, interest and emotions. When learners are not actively engaged in classroom activities, they become bored. Research has demonstrated that engaging students include meaningful learning experiences and enhanced skills in all learning domains (Fredricks, 2013; Tovani & Moje, 2017). Engaged students in the learning process increase their devotion to learn, encourage the practice of higher-order thinking skills and support meaningful learning experiences to achieve the course's learning objectives and progress in their education (Ismail & Groccia, 2018).Thoughtful use of the APTS paradigm will engage students emotionally, behaviourally and cognitively.

3.8. Emotional engagement

Chase, Hilliard, Geldh of, Warren, and Lerner (2014) and Froiland and Worrell (2016) found that emotional engagement in institutions is interrelated to intrinsic motivation. Emotional engagement gives learners motivation and self-regulation to achieve their learning goals (Larson & Rusk, 2011). Emotional engagement includes learners' feelings, such as interest, happiness, anxiety, frustration and boredom, that learners have about their learning experience, and includes their social connections and interactions with their online learning environment (Stephenson, 2018). Emotional engagement plays an important role in facilitating online learning but its existence is not enough to guarantee meaningful learning (Molinillo, Aguilar-Illescas, Anaya-Sanchez & Vallespin-Aran,2018).Learners may be interested in the fun learning environment but they may learn less content and skills. Thus, emotional engagement is an important factor in the implementation framework for meaningful learning, but it is not the only factor.

3.9. Behavioural engagement

Behavioural engagement comprises many observable behavioural aspects indispensable to academic success, such as learner attendance, participation, problem behaviour and assignment completion (Fredricks et al., 2004).These aspects of behavioural engagement predict the learners' academic achievement (Balfanz & Byrnes, 2006).In technology implementation learning settings, behavioural engagement is challenging. It can potentially be measured by computer-recorded indicators stored in the learning management system, such as assignments completed; frequency of logins to websites; the number and frequency of postings, responses and views; number of podcasts, screen casts or other website resources accessed; time spent creating a post and view webs; and time spent online (Baker et al., 2012; Henrie, Halverson & Graham, 2015). But educators should be aware that technology behavioural indicators may not be accurate and in some cases the indicators of behavioural engagement cannot fully represent the technology engagement level of online learners. They can only give a general sense of the learners' engagement because some learners may have accessed many website resources many times but without deep learning involved or post many messages at a very shallow level.

The behavioural engagement of the APTS paradigm focuses on qualitative measures via tracking frequency of implementation and describing the nature of engagement and how a certain quality of engagement changes over time or how degrees of engagement vary the activity level among individuals or groups.

3.10. Cognitive engagement

Cognitive engagement is the most important part of learning engagement. Cognitive engagement refers to a self-regulated approach to learning and the use of meta cognitive strategies (Park & Yun, 2018). It is the focused effort learners give to effectively understand what is being taught, including self-regulation and meta cognitive behaviours (Cicchinelli et al., 2018; Fredricks et al., 2004).

Cognitive engagement differs from behavioural engagement. Behavioural engagement focuses on the less observable effort expended in the mind (Appleton, Christenson, Kim & Reschly, 2006), whereas cognitive engagement can be assessed by their effects as learners' abilities to provide information, ask and answer questions, contribute, enhance an idea, explain concepts, justify arguments and evaluate situations. All these are considered as important indicators for learners' cognitive engagement (Wang & Eccles, 2012). So, learners' cognitive processing increases as learners engage in active learning activities. They can be active by clicking links, browsing web sites to generate new ideas, constructing knowledge and communicating and negotiating with others in an online appropriate platform. Thus, an effective cognitive engagement should enable learners to immerse

themselves in reflective learning processes that are situated in realistic problem-solving tasks (Pohl, 2020).

4. Conclusion and recommendations

The implementation of technology online learning involves an educational vision that develops secondary teachers' and learners' knowledge and skills to facilitate and improve learning. Although some educators view online learning technology as a cure-all, it is important to note that online learning or other technology tools do not automatically make teachers more capable. Educators need to be skilled in technology engagement learning paradigm. They need to help instructional designers to engage learners in a learning environment so that they are ready to show their intentions and potentials to achieve their learning objectives.

The research explored the need for a new paradigm of technology implementation in learning. We have looked at some popular models of technology implementation and seen some changes are needed. Changes that have profound implications for what models must be modified to meet the needs of facilitating online implementations. Foremost among those implications is the need for users' attitudes and beliefs. Other implications include the need to consider the technology infrastructure and the social support to help users reach their potentials. This article recommends the APST technology implementation learning paradigm for the purpose of promoting learners' awareness and engagement in online learning. In conducting this study, the researcher developed an understanding of technology implementation in online learning that will contribute to the literature of learning with technology. Compared to TPACK, RASE, ASSURE and SAMAR models, the suggested APTS paradigm may enable teachers to be aware of the paradigm components and to design better online learning environments in a more flexible way.

In addition, this paradigm recommends that an actual online learning environment can be designed from the attitude and value, pedagogical, social and technical perspectives, and take the socioeconomic status into consideration. Such an actual online learning environment will have the potential to engage learners behaviourally, emotionally and cognitively. Moreover, understanding the various dimensions of the APTS paradigm might be able to help education programme planners predict who will and will not integrate technology effectively to support online learning objectives and create a better learning environment.

With all these needs for the new paradigm for technology implementation, it is important not to completely discard the old paradigms or to completely adopt the new one. The question arises: Is this model suitable to be applied to all subjects? The new paradigm needs more researchers and teachers working to contribute to this growing model and encouraging users and helping researcher to undertake work in this area. However, additional research should be conducted regarding the impact of the paradigm on enhancing online learning. Teachers need a SWOT approach to analyse the effectiveness of APTS Implementation paradigm on online learning. Hence, a call is made to researchers to continue testing the APTS model in different contexts with an intent to refining it.

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