Inservice Teachers' Perceptions of a Professional Development Plan Based on SAMR Model: A Case Study

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ABSTRACT
Technology integration is an important skill that teachers need to acquire to deepen students' learning and support achievement of instructional objectives. Selecting the best technology tool can be challenging however, teachers face more difficulties to effectively integrate technology into their classrooms. Providing one-time workshops is ineffective as it is based on the idea that the only challenge facing teachers is the lack of knowledge of effective teaching practices. This paper presents a case study of a professional training program that was planned and implemented as an initiative to meet the national reform and improvement goals and enhance teachers' performance and practices. The Smart Teachers 2030 initiative was planned to encourage teachers' integration of innovative instructional strategies using technology by educating and supporting them to substitute traditional educational strategies with a variety of Web 2.0 tools and applications.

INTRODUCTION
Teachers' professional development programs are critical to sharpen their knowledge, skills, attitudes, and self-efficacy for transformative practice. These programs are one of the most important investments of time and money national leaders can make in education. Technology integration is an important skill that teachers need to acquire to deepen students' learning and support achievement of instructional objectives. Selecting the best technology tool can be challenging however, teachers face more difficulties to effectively integrate technology into their classrooms. Providing one-time workshops is ineffective as it is based on the idea that the only challenge facing teachers is the lack of knowledge of effective teaching practices (Richard & Neil, 2011).

Research shows that teachers' greatest challenge comes when they attempt to implement newly learned methods into their classrooms (Fullan,2001). Fullan, (2001, p. 71) referred to this problem as the "implementation dip." This is particularly true in teachers' professional development programs in Saudi Arabia because they are normally planned to provide teachers with knowledge without implementation skills or strategies (Buteal, 2009; Meemar, 2007). Such programs provide teachers with new information on specific skills but fail to provide application approaches. Moreover, current training programs are not planned to provide teachers with continuous and just-in-time support as they implement technology into their classrooms. Thus, reform is needed for effective professional development in typical Saudi classrooms. With the ubiquity of technology in today's interconnected world, it is imperative for teachers to exploit technology to optimize student learning. Teachers must be knowledgeable of the interrelated aspects of teaching, technology, and learning to support positive pedagogical outcomes (Koehler, Mishra , Kereluik, Shin, & Graham, 2014).
The problem is that current teachers' development plans to support teachers' integration of technology into their instruction have not resulted in the effective transformation of instructional practices to adopt technology as part of the teaching and learning processes (Laferriére, Lamon, & Chan, 2006). Professional development plans should be planned and applied to enhance instruction and ensure all students are afforded the opportunity to learn effectively using technology as it is considered as key in high quality education (Ertmer & Ottenbreit-Leftwich, 2010). This study discusses a case study of an iteration during professional development plan that aims to move teachers toward meaningful technology integration using SAMR model through ample, structured, and focused time for professional learning to develop teachers' attitudes, self-efficacy, knowledge, and skills for transformative practice using technology.

LITERATURE REVIEW
Professional development frameworks. Herold (2015) discusses that while technological tools and applications are widely spread in today's classrooms, there is a growing evidence that teachers have not transformed their teaching methods. The technology use is planned for students to perform traditional tasks as completing homework and drill and practice (Ertmer & Ottenbreit-Leftwich, 2010). Several frameworks for moving teachers toward more learner-centered levels of technology integration in the classroom are evident in the literature. The Technological Pedagogical Content Knowledge (TPACK), the Substitution Augmentation

Modification Redefinition(SAMR) model, and the Technology Integration Matrix(TIM) are among the most frequently referenced frameworks in the literature to drive professional development and measure the levels of technology integration in schools by teachers.

The Technological Pedagogical Content Knowledge(TPACK)

The Technological Pedagogical Content Knowledge(TPACK) is based on Shulman's pedagogical content (1986). This framework adds the technology knowledge dimension and extends Shulma's framework to integrate technology into the intersection of teachers' pedagogical and content knowledge. The framework support teachers' practice and serves as a guide in how to effectively integrate technology into the curriculum (Wong, Chai, Zhang, & King, 2015). The TPACK is based on the intersection of technology, pedagogy, and content knowledge and they should be linked together for the technology integration to occur (Kimmons, 2015). Baran, Chuang, and Thompson (2011) note that when teachers are able to navigate the intersections between all types of knowledge (technology, pedagogy, and content) they develop different type of expertise than one solely in a particular knowledge area. The (TPACK) framework is being adopted in the design of teachers' professional development for technology integration to scaffold their understanding as they prepare lessons integrating technology (Wong, Chai, Zhang, & King, 2015). Kimmons (2015) discussed that (TPACK) is an effective model for evaluating teachers' level of proficiency as they prepare technology integration into their classrooms.

The Technology Integration Matrices (TIM) is a framework and a descriptive tool that assess teachers' levels of technology integration toward transformative teaching. It begins with entry level and moves through adoption, infusion, and transformation. The literature categorizes external and internal additional factors impacting technology adoption by teachers (Wachira & Keengwe, 2011). The external factors are typically school level factors related to infrastructure such as, lack of computers with internet access, computer labs, and connectivity concerns. Time is another external factor identified in the literature as time is required to plan lessons and learn the hardware and software. External factors are mostly technology support and leadership. Another proposed model for technology integration is the SAMR model (Puentadura, 2012). The SAMR model is a technology integration framework that has two enhancement stages, substitution and augmentation and two transformation stages, modification and redefinition.

SAMR Model

The SAMR model by Dr.Ruben Puentedura gained popularity in late 2012 and it provides teachers with a framework meant to enhance integration of emerging technologies into their classrooms (Hilton, 2016). SAMR is designed to "…facilitate the acquisitions of proficiency in modern consumer technologies and software for both staff and students with the hope of promoting 21st century skills..." (Cummings 2014). Through the SAMR model, the use of technology is approached as four hierarchal different tasks: Substitution, Augmentation, Modification, and Redefinition. These tasks are grouped under two different areas, enhancement and transformation created by Ruben Puentedura (2013) (See Figure 1.)

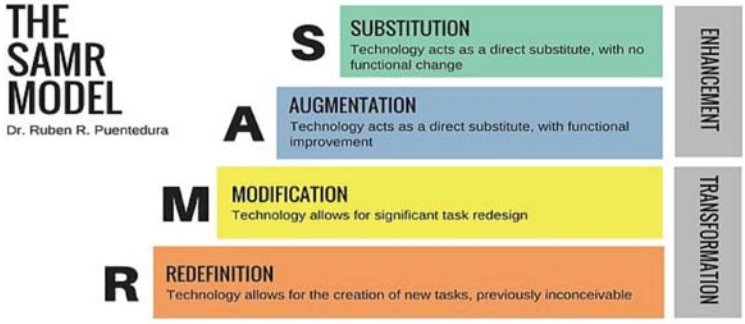

Figure 1. by Leffler, 2016. Creative Commons license CC BY-SA 4.0.

The tasks of Substitution and Augmentation processes are presented as "Enhancement" first stage meant to leverage technology to substitute and/or enhance existing tools in the learning task, while tasks of Modification and Redefinition are assigned under "Transformation", the second stage of the model planned to present new ways and opportunities for learning that are not easily accomplished without technology (Kirkland, 2014). Substitution is the use of technology with the possibility for the learning task to be completed without technology. Augmentation enhances the learning task that can be accomplished without technology. Modification supports the alteration of a previous task in a way not possible without technology. Finally,

redefinition, is the final stage where the creation of new task cannot be accomplished without the use of technology (Hilton, 2016 &Kirkland, 2014). As Kirkland (2014) discusses, "the key to using the SAMR model is not to think of it as a progression to work through. Really using technology effectively means creating the kind of rich tasks that redesign traditional ways of learning and create opportunities that do not exist without the use of technology" (16). The SAMR model presents a framework for the depth and complexity of technology integration of each stage (Kirkland, 2014). SAMR model serves as a roadmap for teachers to gradually enhance their instruction with technology and more importantly, their teaching and learning classroom strategies.

Classroom strategies. The classroom is a dynamic learning environment bringing together students from different backgrounds with various abilities and personalities. This requires teachers to implement creative and innovative teaching strategies in order to meet students' individual needs. teachers carefully consider their students' current levels of learning, strengths, goals and interests and choose the strategies that focus on the development of knowledge, understanding, and skills for the purpose of assisting their engagement with the content, extending their learning, and enabling them to make progress, and achieve educational standards.

The teaching and learning strategies teachers apply in their classrooms can be categorized under the basic elements of inquiry processes; first there are the turning in strategies which are methods implemented to help students both individually and collaboratively to explore their current knowledge, attitudes and values using graphic organizers to record and share information. Second, is the finding out strategies that help students to identify and bridge gaps in their existing knowledge and understand key concepts through self-directed investigation. The third category is the sorting out strategies that help students analyze, organize, review, compare, and contrast information to deduce conclusions and apply their comprehension. The fourth group of teaching and learning strategies are the reflecting strategies that encourage students to identify, discuss, and consider changes in their knowledge, skills, attitudes, and values. These categories of educational strategies are generic entities of a number of activities that teachers usually use in a regular basis such as, games, brainstorming, role-play, shared reading, decision-making model, story map, values continuum, quizzes, mind map, think-pair- share, puppet role-play and etc.

SAMR for classroom teaching strategies

As the role and functioning of schools are in constant change and progress, this change is also expected in teachers' skills and competencies. Teachers are expected to teach in an increasingly changing educational trends and policies with a greater emphasis on integrating technology to make more effective use of information and communication technologies for teaching. In-service professional development plans prepare teachers to maintain high standard of teaching. As OECD's comparative review on teachers explained (OECD,2006) "effective professional development is on-going, includes training, practice and feedback, and provides adequate time and follow-up support. Successful programs involve teachers in learning activities that are similar to ones they will use with their students, and encourage the development of teachers' learning communities". There are multiple advantages for teachers' development programs. They are intended to update teachers' knowledge of the subject matter, update teachers' skills, attitudes, and teaching approaches according to the latest teaching techniques and standards according to new educational policies. Among the most important and basic skills is understanding of technology (Lawless& Pellegrino, 2007) and the teacher is considered as the facilitator of successful integration of technology in the classroom (Inan& Lowther, 2010). While the availability of technology has significantly increased in recent years, teachers' instructional methods has not noticeably changed (Herold, 2015). Therefore, professional development programs should be designed and implemented to enhance instruction to support students' learning using technology as the current programs have not supported the effective transformation of instructional practices to integrate technology as part of the teaching and learning process (Herold, 2015, Mishra & Koehler, 2006). Previous research discussed that teachers have little understanding of how technology should be implemented into the classroom and constructivist teaching strategies based on technology can be a challenge for teachers (Chen, 2008, Herold, 2015).

Herold (2015) discusses that even though technology has increasingly entered schools and classrooms, teachers' adoption of technology and change of traditional teaching methods seemed challenging and teachers have not transformed the ways they are teaching. According to Herold (2105), teachers use of technology is to support traditional instructional strategies which can be a promising starting point for professional development programs to increase teachers' integration of technology. Most teachers need more understanding of how technology should be implemented into teaching and learning to transform their classrooms into student-centered and enhanced with technology (Chen, 2008).

Saudi teachers' context. Knowing that every teaching context is unique, Hamilton, Rosenberg, & Akcaoglu, (2016) highlighted the importance of context for teachers' professional programs to direct and guide teachers in

how to use technology. Opfer and Pedder (2011) discussed that the complex system of teachers' context has an impact on teachers decisions and their learning. Teachers' instructional practices and students' learning experiences are situated within complex systems (Opfer and Pedder2011). Additionally, Kihoza, Zlotnikova, Bada, & Kalegele (2016) stated that teachers' ICT competences, knowledge, skills, understanding and attitudes are critical and has to be situated within the context of classroom and pedagogy.

As Saudi Arabia pursue economy diversification and sustainable development, the Saudi Vision (2030) set out an ambitious road-map for reformed educational system in the Kingdom of Saudi Arabia to progress on these two fronts. Among the strategic objectives and fundamental building blocks of the Vision for education, is to improve the learning environment to stimulate creativity and innovation, improve curricula and teaching methods, shift to digital education to support teacher and students' progress and success, and provide a comprehensive framework for the professional development of teachers as the most important element in the educational process who can support meeting the target goals set for education by the year 2030. The transformation can be accomplished only by leveraging a broad range of skills and competencies and this depends on the success of education.

Saudi teachers are encouraged by the Ministry of Education to use variety of instructional strategies in their classrooms to improve their instruction to be more learner-centered and learning-based and for the teacher to be the facilitator of learning. Therefore, they utilize different teaching and learning strategies to promote students' critical and reflective thinking, research and evaluation skills that will enable students to be active participants in the teaching and learning processes. Students are encouraged to use their personal and social capabilities to work collaboratively with others in learning activities to realize their own strengths and abilities and those of their peers that will support the development of a number of important skills such as, communication, negotiation, team work, and leadership. The main goal of the professional program planned for Saudi teachers discussed in the following case study, stemmed from the necessity of supporting teachers' understanding of technology as an important step that should precede technology use (Inserra and Short 2012).

SAMR Model in Teachers' Development Programs: A Case Study

One of the most effective strategies in teachers' development programs is to involve teachers in learning activities that are similar to the ones they will use with their students. Although teachers attend and participate in different professional development programs in how to successfully integrate technology, they still struggle in how to integrate technology in their classrooms. Additionally, the Saudi Vision 2030 required a reform in education including teachers' instructional strategies and methods and a transform towards digital education to enhance innovation and creativity into their classrooms. The Smart Teachers 2030 initiative was planned and implemented by the In-Service Teachers' Professional Development Unit at college of education in one of the universities in the central region of Saudi Arabia as an initiative to meet and achieve the reform and improvement goals by Ministry of Education to enhance teachers' performance and practice as one of Vision 2030 objectives and goals to reform education. The Smart Teachers2030 initiative was planned to encourage teachers' integration of innovative instructional strategies using technology through educating and supporting them to substitute traditional educational technologies with a variety of Web 2.0 tools and applications. The following section present an example of such SAMR based professional development program supported with community of practice discussions and exchange of expertise and knowledge as a case study for teachers' development program based on SAMR model. The case study of the SAMR-based training program illustrates how SAMR model can be adapted and used in different contexts enhancing technology integration in classrooms.

Context of the case study. The teachers' professional development program, Smart Teachers 2030, provides an example of following SAMR model to improve teachers' performance through a systematic training plan to encourage them to substitute their traditional teaching strategies with a Web 2.0-based teaching strategies. Most Saudi teachers' use traditional educational technologies in their classrooms and they mostly lack knowledge and skills of available Web 2.0 applications that can support their teaching and enhance student's achievement of educational objectives. Although some teachers have the knowledge of some educational Web 2.0 applications and tools, they lack the knowledge of possible implementation strategies. This training program was initiated as a response to Ministry of Education demand for colleges of education among the country to participate in improving teachers' professional development programs to improve their skills and raise their awareness of available educational technologies. The college of education in this case study has six programs that provide bachelor of education degrees and prepare preservice teachers with multiple teaching skills of different subject matters to be fully prepared to apply their knowledge in their future classrooms. In addition, there is an established unit for improving in-service teachers' skills and capabilities. The college provides professional development workshops on a regular-basis in different areas and skills.

Design and implementation. The training program was designed to include six training sessions of three hours for each respective session. The total program's time lasted for 18 hours. The first session was planned to provide teachers with introduction of learner-centered teaching and learning methods, procedures, educational videos explaining the teaching strategy, its positive outcomes, core principles, learning and teaching tools, teacher and students' role, classroom setting, learning outcomes and assessment. Each session was concluded with questions, answers, and discussion ideas mostly about compare and contrast each entity with the teacher-centered approach. The second session's topics were planned around teaching and learning strategies, definition of each strategy, application ideas, and concluded with discussion questions and exchange of ideas in how teachers are using these strategies in their teaching. The third and fourth sessions were dedicated for educating teachers about a variety of Web 2.0 tools that are useful in improving teaching and learning processes. Teachers were taught how to download, use, and implement these tools in their classrooms and the sessions were concluded with a discussion and application ideas in their classrooms. Teachers were given the time to use and navigate the features of each application. The fifth and sixth sessions were dedicated for the introduction of SAMR model and TPACK and how each model can be used to encourage and guide technology integration in teaching. Finally, teachers were asked to write their reflections and answer the 20-items questionnaire on the professional training program.

Study design and results. A survey research design was selected for this study to investigate the perceptions of teachers regarding the effectiveness of the professional training program based on the first stage of SAMR model. The teachers' questionnaire with open-ended questions has been implemented as a primary survey instrument. In-depth interviews, teachers and supervisors' questionnaire and qualitative analysis of teachers' usage of Web 2.0 tools are further data collection methods planned for the second phase of the professional development program during which, teachers will be invited to the second workshop for the Augmentation stage following this initial substitution stage. Workshop announcement and invitations were sent to 35 teachers across the district schools and a number of 33 teachers attended the workshop. The participating teachers represented different subject matters such as, math, religion, English, and social studies. Teachers were asked to bring their own tablets or laptops. All teachers submitted complete questionnaires with return rate 100%. All items were assessed on a 5-point Likert scale from 1 "very high" to 5 "very low". The preliminary descriptive results based on learners' responses show that 90% rated their positive experience as very high, 90% rated the adoption of SAMR model as a training framework is very effective improving their knowledge of possible technological tools for teaching strategies. Teachers also strongly agreed that the workshop materials and training portfolios were effective in providing them with ample knowledge in how to use the discussed Web2.0 tools. Additionally, 56% agreed that workshop improved their skills in how to use the Web 2.0 applications and 91% rated the workshop in general as excellent training program with effective resources. Most teachers (93%) found the invested time in learning as appropriate.

	https://www.powtoon.com	PowToon	Cartooned Concepts
	http://popplet.com	popplet	Concept Maps
	https://getkahoot.com	Kahoot!	Learning through Games
	https://www.pixton.com	Pixton	Comics

Quick Access	Website	E-learning Application Substitute	Educational Strategy
	www.edmodo.com	edmodo	Collaborative Learning
	https://padlet.com	padlet	Brainstorming
	www.sutori.com/education	Sutori	Adapted Lecture
	http://kidblog.org/home/	Kidblog	Group Discussion

	http://zunal.com	Webquest	Self-learning
	http://edu.glogster.com	Glogster	Case Study
	http://www.livebinders.com	LiveBinders	Supported Activity
	http://web.seesaw.me	Seesaw	Learning Contract

The content was informative for them and 89% enjoyed learning and having discussion and exchange of application ideas with other teachers in the group. The majority of teachers (90%) believed that the content was

important for preparing them to integrate technology in their classrooms. All participating teachers stated that they felt well supported by moderators, had the opportunity to express their ideas, share information from their expertise, and stated that they would recommend this type of workshops to their peers. **Responses to open-ended question.** Teachers provided their answers to the three open-ended questions that were planned to qualitatively explore teachers' opinions regarding the acquired knowledge, skills, their suggestions, and recommendations for better future application.

Acquired Knowledge

For the first question regarding knowledge acquisition, 30 teachers reported that they gained knowledge of learner-centered teaching strategies, how to use Web 2.0 tools in education, learned design strategies, and how to transfer face to face teaching strategies to the web. One teacher expressed that she was surprised by the variety of Web 2,0 tools that can be applied in different classes. Another teacher expressed that she found the discussed web 2.0 tools as easy to use. Two teachers expressed that they gained more knowledge of application strategies of previously known applications. One teacher expressed that she thought about using the programs for other classroom activities such as, preparing lessons and following up with students. Another teacher discussed that she learned how to integrate, substitute, and make effective a number of different strategies by using one application. Another wrote that it can also be used as a communication tools to stay connected with students outside classroom. Another teacher explained that utilizing such tools make learning and class activities more effective for students. Another discussed that she liked the tools very much and saw that it is highly supportive for both teachers and learners and she felt very motivated to use in her classroom. Additionally, six teachers expressed that they gained the benefit of exchanging expertise, implementation ideas, and effectiveness of the web strategies with other teachers. They also expressed that the discussion enriched their knowledge of educational technology. Finally, one teacher expressed that she gained knowledge of the availability of multiple educational applications and how she liked their simplicity and their potential to transform education. Additionally, she mentioned that she learned about how technology can save teachers' time and efforts. She added that she gained a rich conceptual knowledge of web applications, technology integration into curriculum and how they can facilitate teaching and learning to be more effective. Another teacher added that she created a general understanding of teaching skills through the web and gained knowledge of available educational applications

Acquired Skills

Regarding acquired skills, three teachers expressed that the workshop improved their ability of using the technology, two stated that they gained the skill of how to design, plan, and apply educational technologies. One teacher stated that she learned how to apply face- to- face strategies through the web. Another expressed that she gained technical skills and technological literacy. She reported that she was trained on important teaching strategies using technology and multiple application strategies. Another expressed that the discussed web applications support diversifying teaching methods and add both fun and learning to the classroom. One teacher stated that she learned how some applications can solve teaching challenges in the class such as, time limitedness with intensive curricular content and other extra-curricular activities.

Suggestions and Recommendations

The participating teachers provided a number of suggestions and recommendations to improve the next training workshops. For example, two teachers suggested that planning the training to be around one tool at a time. One suggested making a specific workshop for each subject and give examples of lessons for this subject. In addition, 12 teachers suggested providing trainees with computers, network connection, and technical equipment for immediate application time during the workshop time and 10 recommended assigning the next day for one-on-one application time. Another suggested extending the training hours and add more application and discussion time. Additionally, 32 teachers suggested providing more workshops in the future on educational technologies that can substitute traditional teaching strategies. One teacher suggested providing more training time to be spent on certain applications such as, Edmodo. Finally, 31 teachers expressed that they benefited from the workshop in general and expressed that it raised their awareness of available educational technology tools and will apply them in their classrooms.

CONCLUSION

The goal of this professional training program is to transform teacher's instructional practices to use technology in a more student-centered manner and apply constructivist method of teaching. The training program was planned and applied as an initiative for change in teachers' training programs according to national transformation plans. The program focused on the substitution stage of SAMR model to examine teachers' perspective of the substitution of traditional instructional strategies in the classroom with Web applications to add technological variety and transform their teaching into learner-centered method. This framework impacted

teachers' attitudes, self-efficacy, and knowledge and skills for transformative practice using technology and they generally rated their experience as positive and informative training experience. The next stages of SAMR levels should be examined by surveying participating teachers' perceptions of the impact of the training program on their teaching with technology skills and how they are modifying or redefining the use of Web apps in their classrooms.

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