Integration of Technology with Pedagogical Perspectives: an Evaluative Study of in-house CALL Professional Development

Pir Suhail Sarhandi
School of Higher Education Studies
The University of Free State, Bloemfontein, South Africa

Imran Farooq Khan
School of Higher Education Studies
The University of Free State, Bloemfontein, South Africa

Majid Hussain Buledi
School of Higher Education Studies
The University of Free State, Bloemfontein, South Africa

Jabreel Asghar
Department of Education
The University of Warwick, Coventry UK

Abstract
This study examines the impact of Technological Pedagogical Content Knowledge in-Action model based in-house professional development workshops on teachers' practices of technology integration at a Saudi university. The study uses questionnaires to gather feedback on the participants' pre and post training workshops, coupled by semi-structured interviews to highlight factors that determined the outcome of the training workshops. The findings show that despite the participants being qualified in pedagogy, they were unable to successfully use their expertise to beneficially incorporate technology in their teaching. The failure partly occurred due to apparent misunderstanding of confusing the knowledge of an application with the pedagogical skills of using the application, and partly due to the lack of concrete guidance by the administration on what and how to integrate technology in regular teaching. The study recommends to structure training workshops incorporating pedagogical handling of technology alongside technical training on how to use an application. The study also suggests that an institutional policy regarding the use of technology is inevitable to make such ventures successful. Such a policy needs to be devised and incorporated in regular syllabus, and should be clearly addressed in all training workshops on professional development.
Keywords: CALL, TPACK, Teacher development, Teacher training, Technology integration

1. Introduction

In order to face the growing challenges of educational institutions, teachers are expected to develop their pedagogical practices and approaches to meet the learners' needs. For this, it is important to provide teachers with regular opportunities to update their professional knowledge and skills. To further support our view, Richards and Farrell (2005:1) state, "opportunities for in-service training are crucial to the long-term development of teachers as well as for the long-term success of the programs in which they work". The impact of professional development is likely to be significant if the training is incorporated in the teaching practices. Moreover, these aspects of professional development are so much interrelated that any deviation can affect the teaching and learning process. In view of the rapidly growing needs of technological integration in education, it is essential to address the same in planning teacher development programmes in order to keep pace with the latest research in teacher education. In this respect, Computer Assisted Language Learning (CALL) integration has been an important component of teacher education by a number of researchers (e.g. Hubbard & Levy, 2006; Kessler, 2006; Beatty, 2013).

With this theoretical framework, the present study investigates the impact of in-house CALL professional development workshops based on Technological Pedagogical Content Knowledge (TPACK)-in-Action model on the EFL instructors at an English language institute in a Saudi university from two different viewpoints whether the in-house CALL workshops: (a) covered participants' professional development goals; (b) met participants' expectations in helping them integrate CALL in their classrooms. In this regard, literature was reviewed that focuses on the studies emphasizing teacher education in CALL, TPACK and TPACK-in Action model.

1.1 Literature review

The inclusion of technology in language teaching is by no means novel in its essence. However, it has been massively evolved into its current form where teachers have a wide range of computer/mobile device applications, and learning management systems available to them. Today, being digital natives (Prensky, 2008) students want to learn through technology (Ahmed, 2012), rather than through conventional methods of language teaching because technology is more convenient, more enjoyable and allows greater freedom to manipulate the learning material. A number of researchers (e.g. Hubbard, 2008; Kozma, 2003) observe that CALL is unavoidable in the current educational settings, hence its integration in teacher education is inevitable to meet the needs of the digital era (Mishra and Koehler, 2006). Reinders (2009) maintains that successful integration of technology depends on teacher's ability to incorporate it not only for the delivery of content but also to improve learners' skills in a language classroom. In other words, effective integration of CALL in the classrooms largely depends on the trainings offered to the teachers. Moreover, with the effective trainings, teachers' knowledge and perception of CALL integration may play a crucial role in their technology integration and the degree of success (Atkins & Vasu, 2000; Lam, 2000; Liu, Theodore, & Lavelle, 2004; Milbrath & Kinzie, 2000). Therefore, a complex issue such as integration of technology in the classroom necessitates a thorough understanding of complicated amalgamation of various factors (Koehler, Mishra, & Yahya, 2007).

A number of studies (e.g. Kamhi-Stein, 2000 ; Lam, 2000) have focused on teachers' beliefs, attitudes and efficacy about CALL, but there are a few of such studies that have focused

on the impact of CALL teacher education programs (Hegelheimer, 2006; Kessler, 2007; Kilickaya, 2009; Tai, 2015). With an aim to fill the gap of exploring the impact of CALL oriented teacher training plans, the focus of this study is to investigate whether the in-house professional development workshops have any impact on the EFL teachers' integration of CALL in the classrooms at the English Language Institute (ELI).

1.2 CALL in Teacher Education

The field of CALL teacher education has been growing rapidly in both size and importance, yet there is a dearth of technologically advanced professionals. Research on CALL in the field of English language teaching shows the positive impact on teacher professional development (Hubbard & Levy, 2006; Guichon & Hauck, 2011; Thang & Gobel, 2012; White & Reinders 2009). Teachers should know how technology integration works in order to support language learning through dedicated courses and seminars: CALL course series, CALL certificates, and CALL graduate degrees (Hubbard & Levy, 2006). Teacher professional development should not be merely learning novel tools and skills; rather, it should meet the needs of the actual classroom in order to achieve maximum benefits.

Hubbard and Levy (2006) highlight that language teachers are not technologically well trained to meet the future needs. Hubbard (2008) further illustrates that teachers generally feel more comfortable with the teaching methods they have acquired during their experiences as students or teachers, and even in-service trainings assumingly do not change such fixture. Kessler (as cited in Hubbard & Levy, 2006) states that CALL requires right amount of knowledge of technology and its integration in pedagogy. In other words, the use of technology merely for technology sake is not beneficial unless it is effectively directed by pedagogical perspectives. Egbert, Paulus, and Nakamichi (as cited in Kessler, 2006) believe that teachers learn better in informal settings where they get an opportunity to benefit from their colleagues contrary to any formal form of technology training events. Notably, teachers are more prone to implement the materials learnt from the former setting as compared to the latter. They further believe that teachers do not supplement their use of technology with the newly acquired knowledge even they are adequately proficient to do so due to certain limits such as scheduled deadlines, curricula, organizational restraints and unavailability of resources. Wong and Benson (as cited in Hubbard and Levy, 2006) further criticize that short courses do not enable teachers to integrate technology in the classroom, as they are unable to change teachers' strong pedagogical beliefs.

1.3 TPACK (Technology Pedagogy Content Knowledge)

The TPACK framework is designed on Shuman's (1986, 1987) concept of Pedagogy Content Knowledge (PCK), which has been further stretched by adding another domain that is technology; to make an acronym, 'A' was added to call it TPACK. It gives enhanced understanding to the teachers to provide better learning environment.

Koehler and Mishra (2009) state that technology, pedagogy and content are interwoven and form an ideal learning environment. Many teachers assume that using technology only could suffice, disregarding content and pedagogy. Researchers (such as; Matherson, Wilson & Wright 2014; Carr, Jonassen, Litzinger, & Marra, 1998) also supplement this idea that technological skills alone cannot guarantee the effective integration of technology into the classroom. The

general impression of technology integration is merely substituting conventional material to digital form without considering the learning objectives. Some researchers (Mishra & Koehler, 2006; Zhao & Frank, 2003) assert that knowledge of technology; content and pedagogy are pivotal to integrate technology. This notion suggests that technology has to be supported by content and pedagogy for effective learning and teaching process.

1.3.1 TPACK-in-Action model

       The TPACK-in-Action model proposes that a workshop entails: a) Modelling; b) Analyzing; c) Demonstrating; d) Application; e) Reflection to achieve the goal of helping English teachers' competency required to inculcate CALL into their classrooms (figure 1)
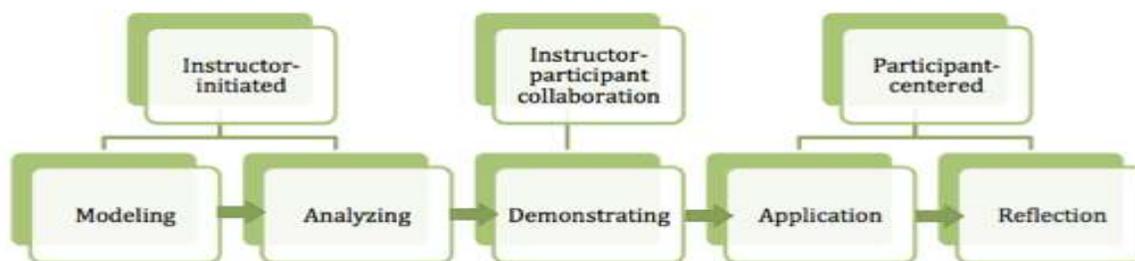

Figure 1 **TPACK-in-Action Model (Taken from Tai, 2013)**

       The same TPACK-in-Action Model (Tai, 2013) was used to guide and design these in-house professional development CALL workshops. With this model in view, the present study investigates the impact, if any, on TPACK-in Action CALL workshops offered by the professional development unit (PDU) on the EFL instructors teaching English at a Saudi Arabian university, and investigates to what extent the series of workshops has helped the teachers to meet their professional development goals in their professional routine.

2. Methodology

       This study used mixed methods design, adopting Convergence Model (Creswell and Clark, 2011) , in order to collect and analyse different but complimentary data. Quantitative data were collected through survey questionnaires before and after the given workshops, triangulated by the qualitative data developed from semi-structured interviews and document analyses at pre and post workshop stages.

2.1 Settings and Participants

       This study was conducted at an English language institute (ELI) at a university in Saudi Arabia. The participants of this study were fifteen EFL instructors teaching English in a Preparatory Year Programme (PYP). These teachers, with their consent, were selected for the study because they had previously mentioned technology integration in their teaching as their annual professional development goal for the academic year 2014-2015. Setting annual professional development goals prior to the start of the academic year are mandatory for all the language instructors at the ELI. The PDU organises the workshops for the instructors to help them achieve their stated goals every academic year. The participants attended in-house CALL

professional development program consisting of five workshops on the technology integration spread over five weeks.

Due to the gender segregation policy in Saudi Arabian education system, only male participants were selected for this study. Seven participants were aged 43 or more and six were between 37- 42 whereas the rest were under 37 years of age. Eleven out of fifteen participants hold a Masters level qualification in ELT/TESOL or Applied Linguistics and three-held Bachelors level qualification, and one participant held a PhD in Linguistics. Their qualifications suggest sufficient content knowledge and command over the language.

2.2 In-house CALL professional development workshops at the ELI

A series of workshops was organized by the PDU over the period of one semester (four months). This program was shaped on the expectations that the trainees will use the learnt knowledge of technology integration in their classrooms and share their experiences for further improvement of such courses. The whole program was executed through the following five two-hour training workshops in five sessions: Audio-visual Interference in Language Teaching: A Practical Approach using TPACK, Interactive Videos: Getting the Most out of any Video, Socrative: Everything you Need to Know, Flipping the Classroom: the Nearpod Way, Planning and Organizing Writing using Mind Genius. It is worth mentioning that each earlier session gave a foundation to the coming sessions. Besides, teachers' feedback helped the organizers to keep the track of teachers' progress throughout the program. Apart from providing the foundation to properly understand the integration of all components of TPACK (technology, pedagogy and content knowledge), every in-house CALL PD workshop focused on the TPACK-in-Action Model (Tai, 2013) and followed the five proposed steps in that; (1) Modelling; (2) Analysing; (3) Demonstrating; (4) Application; (5) Reflection. (See figure.1).

Keeping the CALL integration goals of the trainees in mind, the workshops followed a standard structure of modelling a lesson with a sound pedagogical decision and a particular content objective. After completing each workshop, trainers aimed to rationalise and make the trainees understand the selection behind the design of the lesson by analysing it. The first two steps were modelled, followed by a rationale behind the way the lessons were designed. At the next stage, trainers demonstrated the features and usability of the integrated technology in the lessons. After demonstrating the affordances of the technology, participants were engaged to plan a CALL lesson corresponding technology with appropriate pedagogy and specific content and also imparted these lessons to their peers. Next, participants were asked to reflect on their learning. Participants played a pivotal role in the last two steps by developing their own knowledge and tying knowledge and practice together.

2.3 Data collection procedures

Data was collected over a period of four months from January 2015 to April 2015. Before the workshops, five-point Likert-type scale on TPACK Survey (adapted from Schmidt, Thompson, Koehler & Shin, 2009) was distributed to only those teachers who previously had mentioned 'technology integration' as their professional development goals for 2014-15 academic years. The questionnaire was divided into four parts with 12 questions; PCK, TPK, TCK and TPACK. The adapted version of the survey was carefully reviewed to ensure the context specifications. The questionnaire was piloted with six EFL teachers at the ELI to ensure validity and internal reliability. It was sent to the participants on Google Forms. The survey

aimed to investigate teachers' perceived knowledge about the Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and TPACK

The participants attended a series of workshops spread over a period of two months. After attending each workshop, participants were asked to complete a post-workshop survey to get their feedback on that particular training. They were given a course of two months to implement introduced technology in their classrooms. At the end of the four-month semester, individual face-to-face semi-structured interviews were conducted with the participants. All the interviews were recorded and transcribed for data analyses. During the data analysis, pseudonyms have been used to ensure the anonymity of the participants.

2.4 Data analysis

This section discusses the data in three subsections. The first section presents the findings from the pre-workshop survey; the second section deals with the data gained from post workshop feedback; and the last section discusses the participants' feedback gained through the semi-structured interviews
.

2.5 Pre-workshop survey on TPACK

In the pre-workshop survey, while answering the question whether they could learn the technology easily, 14 respondents expressed a positive consent to the question whereas only one respondent remained neutral (Figure 2). A clearly vast majority of the respondents perceived themselves updated with the latest technological developments.
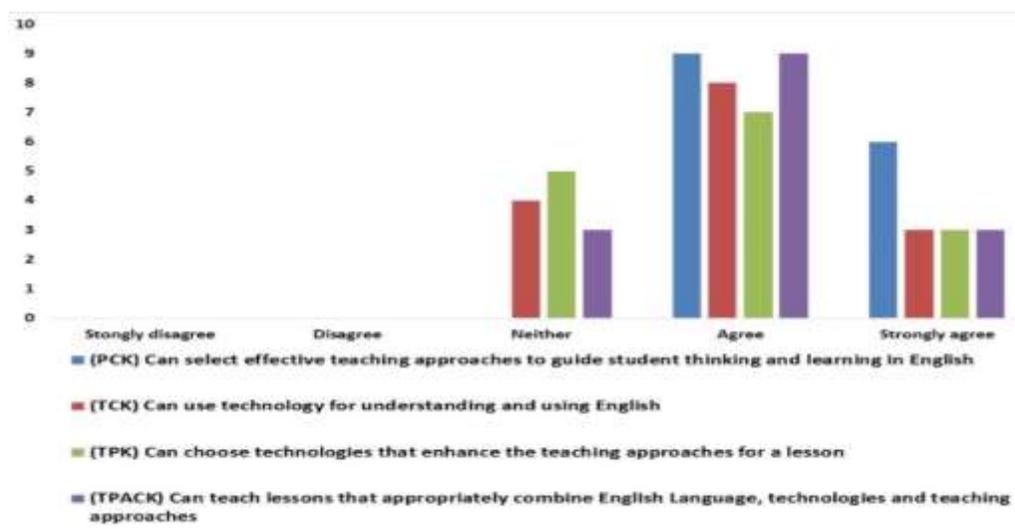

Figure 2 **Responses on TPACK survey**

Responding to the question about their teaching knowledge, all the respondents stated that they were pedagogically sound and familiar with the different teaching styles, approaches and methodologies. It was probably due to the fact that all of them are well qualified and experienced. In this respect, they claim to have the skills required to assess learners' needs, and their learning styles in multiple ways. Moreover, they were familiar with technology integration

into teaching, and all the respondents expressed that they could choose the technologies for the lesson content to enhance the teaching approaches to achieve their lesson objectives.

Their perceived knowledge of TPACK framework seemed to have immensely impacted on their perceptions about the technology influence on their teaching approaches as depicted from their feedback. Approximately 12 respondents were positive about using strategies that combine content, technologies and teaching approaches that they learned from their in-house professional development events in their classrooms (Figure 1 above).

2.6 Post-workshops feedback

Considering the impact of in-house professional development events, about nine respondents believed in the effectiveness of the events, representing an effective model of combining content, technologies and teaching approaches in their teaching (Figure 3 below) whereas only five respondents believed in the events being slightly less effective. Only one respondent fell under 25% of the effectiveness of the events as an effective model of combining content, technologies and teaching approaches in their teaching.
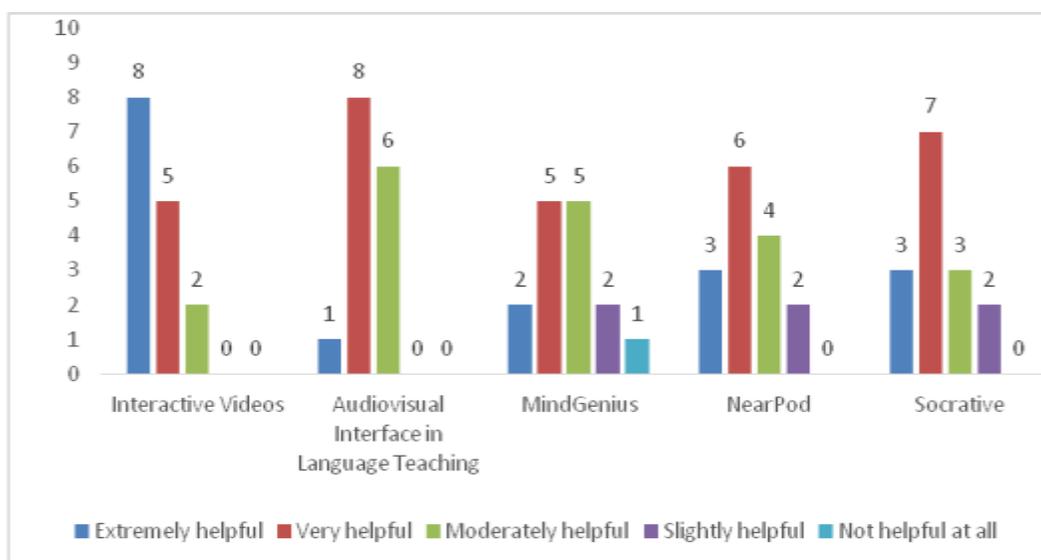

Figure 3 **Teachers' responses on relevance of the workshops**

In order to analyse the data at micro level, all participating teachers were asked to give their feedback on each of the workshops. In the feedback on workshop "Audio-visual Interference in Language Teaching: A Practical Approach" eight teachers considered it helpful and six teachers marked it as moderately helpful. Only one teacher indicated that the workshop was extremely useful. In response to the question on how useful the workshop for the classroom teaching was, an overwhelming majority of twelve out of fifteen teachers marked it as very useful, two teachers considered it somewhat useful, and only one participant believed that it was of a little use.

Similar questions were asked about "Planning and Organizing Writing Using Mind Genius" workshop. In respond to first question two teachers think that it was extremely useful, five teachers graded it as very helpful, and only two teachers believed that the workshop was

slightly helpful, whereas one respondent considered it as not useful at all. Hence a significant segment deemed the utility of this workshop to their classroom practices.

The third workshop "Flipping the classroom: the NearPod Way" also got diverse feedback on both the questions. It is interesting that 3 teachers deemed it as extremely helpful on the first question, six teachers rated it as very helpful whereas six teachers valued it as moderately helpful. The second question also got interesting and similar feedback. Out of fifteen, seven teachers graded it as somewhat useful, four teachers considered it very useful, and the rest of the teachers marked it as useful.

The fourth workshop was on "Socrative". In response to first question, six teachers ranked it as extremely helpful; seven teachers categorized it as very helpful whereas, only two teachers considered it as not useful at all. In response to second question, again six teachers marked it as very useful, five teachers found it useful, and the last four teachers deemed it as somewhat useful.

The last workshop was on "Interactive Videos". Answering to the first question seven teachers graded it as extremely helpful and six teachers marked it as very helpful whereas only one teacher considered it as moderately helpful. While replying to the second question, eight teachers found it very useful and five teachers rated it as useful; only two teachers ranked it as somewhat useful.

Figure 3 shows that the workshops on Interactive Videos and Audio-visual Interference in Language Teaching have been more popular among the complete series of workshops whereas the workshop on MindGenius was somewhat least relevant in the series.

2.7 Thematic analysis of semi-structured interviews

All participating teachers were interviewed at the end of the semester to gain further insight of application of these workshops in their teaching. About four teachers used a few of the introduced or taught technologies in the class. The frequency of using these technologies scale permeates as once a week, more than once a week, once or twice a module and never. As the figure 4) shows that only half of the teachers used it either once a week or once or more than once a week in their teaching.

Which applications have you used and how frequently?	Audio-visual interference	Interactive videos	MindGenius	NearPod	Socrative
	2	2	2	3	1
	Once a week	More than once a week	Once or twice a module	Never	
	2	3	5	5	

Why have the applications not been used?	Do not meet required needs	Pacing guide	Technical problems	Students' comfort	
				Positive	Negative
	3	8	6	2	2
Level of satisfaction	Extremely satisfied	Satisfied	Somewhat satisfied	Not satisfied at all	
	0	4	11	0	
Reasons of satisfaction/ dissatisfaction level	**Satisfaction**		**Dissatisfaction**		
	New ideas about technology integration	Engaging and motivating	Not enough focused training	Not enough time due to pacing guide	Context of ELI
	4	4	9	5	1

Figure 4 **Thematic analysis of semi-structured interviews**

About a quarter used it once or twice a module and the last quarter never used it. When asked about the impediments to applying these technologies in the class, four striking themes were sprouted which were: inadequately addressed required needs, pacing guide, technical problems, and students' comfort whether it was positive and/or negative. Subsequently, most of the teachers were somewhat satisfied, whereas, only four teachers were satisfied with the workshops. Furthermore, when inquired what reasons of satisfaction and dissatisfaction were; two separate themes came into limelight. Almost all the teachers were of the view that they learnt new ideas about the integration of technology, and these workshops were engaging and motivating. However, about half of the participants believed that these workshops were not focused and the technologies learned were difficult to be merged in the prescribed pacing guide. It is noteworthy that one teacher deemed that these workshops were not designed specifically in the context of the ELI.

3. Discussion and recommendations

Referring back to our research question regarding the impact of in-house CALL PD workshops on the participants and the degree of professional development they acquired, the data analysis above seems to suggest that before the workshops were conducted, more than 90% respondents claimed their confidence in being updated on technological advances, and pedagogical knowledge of the subject with skills in assessing learners needs and identifying various learning styles, assumingly including assessment through technological learning materials. Likewise, in their feedback given right after the workshops, a vast majority of the respondents found every workshop useful and relevant to their teaching situations. However, when the same respondents were interviewed at the end of the modules, interestingly they did not demonstrate a high degree of technology integration. It was expected that these respondents

would be motivated to experiment with using newly acquired techniques, which was however resulted the otherwise. This confirms Kessler's (2007) claim that teachers often tend to rely upon the skills and knowledge related to technology that they had acquired for their personal use. Despite being confident and capable with technologies, they are less likely to implement newly learned practices.

As figure 4 shows that apparently 10 teachers used three applications at various occasions, and 5 teachers never used any of the applications, there is a possibility that these 10 teachers might not be 10 different individuals but the same few teachers who tried to test the applications in class. Even if it is assumed that 10 different individual teachers tried three different applications, the frequency of using the application cannot be actually considered technology integration in daily teaching practice. As teachers did not have any record of such sessions, but only their reflective thoughts on what they did and how it went. Interestingly, teachers did not seem to have concrete evidence of how far the use of these applications was successful and whether they should continue them or not. This issue is likely to occur due to what Kessler (2007) calls teachers' inability to identify when to use technology and when to rely on non-technical methodologies.

In their feedback during the interviews, the respondents gave various reasons for not using the applications systematically in their daily teaching routine. Out of 15, eight teachers mentioned that the pacing guide did not allow adequate time to incorporate other activities than the prescribed ones, a problem also identified by Hegelheimer (2006). The pacing guide is detailed document dividing the syllabus in weekly segments with all the reading and writing tasks, in addition to covering specific units from the textbook as well as conducting grammar and speaking quizzes and other continuous assessment tasks. Hence, the document is highly intensive with step-by-step guidance but no clear directions as well as policy to integrate technology in classroom teaching. Six respondents pointed out that they were unable to try the applications because of various technological problems including unavailability of the internet in classroom, non-functional electronic equipment and a lengthy procedure to get the instruments repaired which demotivates teachers and students to incorporate technology in lessons. It is also interesting that in immediate post workshop feedback (Figure 3) 13 teachers gave positive consent (ranging from extremely helpful to slightly helpful) on the utility of workshops on NearPod and Socrative, however, none of them used it in classroom, showing least level of satisfaction in their end of module feedback during the interviews. A major concern in this respect was referred to the pacing guide, which does not allow sufficient time to use the applications.

Discussing their overall satisfaction level regarding the workshops, 8 teachers in their interviews mentioned that using technology is motivating, enjoyable and it provides new ideas to integrate their learning material with technology. However, all the 15 teachers mentioned that their experience did not reach at satisfactory level partly because of squeezed pacing guide schedule and partly because of unfocused training on the use of integration of technology. This brings a serious note on the contents of the workshops, which were viewed positive in the immediate post-workshop feedback but eventually emerged as less beneficial in terms of focused training on technology integration. This response by the participants also highlights the significance of training not only on the operations of the application, but also on pedagogical

sides of using these applications in relation to the teaching and learning contexts, considering the syllabus, time available and the assessment of teaching conducted through technological mode. This finding confirms Kessler's (2007)claim that teachers need to be trained in using technology that is pedagogically focused and informed by the literature. Though in the pre-workshop feedback, almost all the teachers asserted to have good knowledge of pedagogy and technological advances in education, it is evident that it was a superficial and too general self-assessment. At the end of the module, all the teachers realised that integration of technology does not mean merely knowing how an application works, rather how it involves complete knowledge of developing and adapting materials not only to suit the needs of their learners but also to skilfully adapt according to their specific teaching context.

The findings also offer recommendations to the administration to develop a clear policy of when, what and how to integrate technology in the learning materials and process. Such a policy should clearly allocate realistic time in the pacing guide alongside other guidelines. Furthermore, the professional development management also needs to re-consider their philosophy of structuring workshops not only to train on operating applications, but also training on the pedagogical aspects of using the application/s with the possible scenario in which a particular application is likely to be a success or a failure. It means that the workshops need to train teachers on assessing each application to make decision on whether or not it should be used in their lessons. Despite the training workshops clearly followed the TPACK-in-Action model (Figure 1), they did not seem to address the context specific factors due to which the participants were temporarily overwhelmed with excitement to have known something innovative and useful for their students, but eventually were disappointed when they actually tried to use the applications in real classroom.

Considering the limited time of six weeks allocated for each module, the professional development management may also consider selecting various applications and piloting them before introducing to the teachers. Last but not least, it is a mutual planning between the curriculum developers and professional developers to make informed decisions to draw policies on to what extent technology needs to be integrated and which modes of technology should be used. Without a clear policy with concrete guidelines regarding the use of technology in classroom, and without providing favourable environment as well as resources to the teachers, it is unrealistic to expect teachers having set their professional goals to integrate technology in their teaching. Teachers could voluntarily set these goals at personal level, but appraising teachers on such goals does not justify the decisions because teachers do not have sufficient opportunities to concretely demonstrate their expertise in the area.

4. Conclusion

This paper looks at the practice of implementing in-house CALL PD workshops based on TPACK-in-Action model at a Saudi university. The data shows that though the participants of the study initially expressed their motivation and knowledge in TPACK area and appreciated the worth of this in-house workshop; they faced difficulties in implementing taught courses on technology due to both lack of focused training and administrative constraints. The study also highlights that the concept of integrating technology in education needs to be clearly defined with full consideration of the contextual specifications. The study also brings into notice that integrating technology should not be taken for superficial knowledge of operating an application, as apparently misunderstood by the participants of this study, rather it involves thorough

understanding of material development to assess the application in hand in pedagogical as well as contextual perspectives.

About the Authors:

Sarhandi is a Ph.D. scholar and pursuing his doctorate in the area of mobile learning in ESL. He is currently teaching at English Language Institute at the King Abdulaziz University, Saudi Arabia. His areas of research are teaching technology, mobile learning, computer assisted language learning and teaching methods.

Khan is a postgraduate student at the University of Free State, South Africa. He is interested in professional development, teacher education and technology integration in the EFL.

Buledi is a postgraduate student at the University of Free State, South Africa. His areas of research are computer assisted language learning, professional development and syllabus design.

Asghar has been in English teaching for more than a decade. He has taught in the UK, the Middle East and Pakistan at tertiary level. His research interests include critical discourse analysis, language and power, critical pedagogy and IT in education. He has widely published in scholarly journals.

References

Ahmed, P.S. (2012). The Way we Teach, the Way they Learn. Procedia - *Social and Behavioral Sciences,* 47, 1554–1557. http://doi.org/10.1016/j.sbspro.2012.06.860

Atkins, E., & Vasu, S. (2000). Measuring Knowledge of Technology Usage and Stages of Concern about Computing: A Study of Middle School Teachers. *Journal of Technology and Teacher Education, 8*(4), 279–302.

Creswell, W., & Clark, P. (2011). *Designing and Conducting Mixed Methods Research.* SAGE.

Guichon, N., & Hauck, M. (2011). Teacher education research in CALL and CMC: More in demand than ever. *ReCALL, 23,* 187–199.

Hegelheimer, V. (2006). *When the Technology Course Is Required*. In C. A. (foreword)

Hubbard, P., & Levy, M. (2006b). The scope of CALL education. In P. Hubbard & M. Levy (Eds.), Teacher education in CALL, 3-21. Amsterdam: John Benjamins.

Hubbard, P. (2008). CALL and the Future of Language Teacher Education. *CALICO Journal, 25*(2), 175–188.

Kamhi-Stein, D. (2000). Looking to the Future of TESOL Teacher Education: Web-Based Bulletin Board Discussions in a Methods Course. *TESOL Quarterly, 34*(3), 423–455. http://doi.org/10.2307/3587738

Kessler, G. (2007). Formal and Informal CALL Preparation and Teacher Attitude toward Technology. *Computer Assisted Language Learning, 20*(2), 173–188.

Kilickaya, F. (2009). The Effect of a Computer-Assisted Language Learning Course on Pre-Service English Teachers' Practice Teaching. *Educational Studies, 35*(4), 437–448.

Koehler, J., Mishra, P., & Yahya, K. (2007). Tracing the Development of Teacher Knowledge in a Design Seminar: Integrating Content, Pedagogy and Technology. *Computers & Education, 49*(3), 740–762.

Kozma,. B. (2003). Technology and Classroom Practices: An International Study. *Journal of Research on Technology in Education* (International Society for Technology in Education), 36(1), 1–14.

Lam, Y. (2000). Technophilia vs. Technophobia: A Preliminary Look at Why Second-Language Teachers Do or Do Not Use Technology in Their Classrooms. C*anadian Modern Language Review, 56*(3), 390–420.

Liu, Y., Theodore, P., & Lavelle, E. (2004). Experimental Effects of Online Instruction on Teachers' Concerns About Technology Integration. *International Journal of Instructional Technology and Distance Learning, 1*(1). Retrieved from http://www.itdl.org/journal/Jan_04/article03.htm

Milbrath, Y.C. L., & Kinzie, B. (2000). Computer Technology Training for Prospective Teachers: Computer Attitudes and Perceived Self-Efficacy. *Journal of Technology and Teacher Education, 8*(4), 373–96.

Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record, 108*(6), 1017–1054. http://doi.org/10.1111/j.1467-9620.2006.00684.x

Prensky, M. (2008). *The Role of Technology in teaching and the classroom. Educational Technology.* Retrieved from http://www.marcprensky.com/writing/Prensky-The_Role_of_Technology-ET-11-12-08.pdf

Reinders, H. (2009). Technology and Second Language Teacher Education. In A. (ed. and introd. . Burns & J. C. (ed. and introd. . Richards (Eds.), The Cambridge Guide to Second Language Teacher Education (Vols. 1–vii, 1–325 pp., pp. 230–237). New York, NY: Cambridge UP.

Tai, J. (2013). From TPACK-in-Action workshops to English classrooms: CALL competencies developed and adopted into classroom teaching (Ph.D.). Iowa State University, United States --Iowa. Retrieved from http://0-search.proquest.com.wagtail.ufs.ac.za/docview/1450065611/abstract/BE6487CEFE534D39PQ/1?accountid=17207

Tai, J. (2015). From TPACK-in-Action workshops to classrooms: CALL competency developed and integrated. *Language Learning & Technology, 19*(1), 139–164.

Thang, M., & Gobel, P. (Eds.) (2012). Selected Glocall 2010 conference papers: Specific applications of technology in second/foreign language educational settings [Special issue]. *Computer Assisted Language Learning, 25*(3)