Readiness for Technology Based Teaching among Undergraduates of Faculty of Education, University of Colombo

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Abstract

Introduction: Technology-based teaching is introducing new pedagogical methods or developing existing ones using Information and Communication Technology (ICT) with the aid of modern electronic media in order to fulfill the educational requirements. In this study, the level of readiness of pre-service teachers was assessed under technological competency, pedagogical competency and technological pedagogical competency which were developed based on the TPACK framework developed by Mishra & Koehla (2006).

Method: Descriptive cross sectional study with an analytical part (correlation) was done at the Faculty of Education, University of Colombo with 196 undergraduates.

Results: The participants showed high level of readiness related to all the three domains considered, 40.3% related to technological competency, 40.67% related to pedagogical competency and 41.4% related to technological pedagogical competency respectively. There was no statistically significant difference between the two academic years related to all three domains considered. There is a strong linear correlation between the level of readiness for technology based teaching related to technological competency and the level of readiness for technology based teaching related to technological pedagogical competency (correlation coefficient=0.78). The correlation between pedagogical competency and technological pedagogical competency is moderately linear. (Correlation coefficient=0.41).

Conclusion: The level of readiness for technology based teaching among undergraduates of Faculty of Education, University of Colombo is in a satisfactory level related to all three domains considered.

Keywords: Technology, Teaching, TPACK, Pre-service, Education.

Introduction

Technology-based teaching is introducing new pedagogical methods or developing existing ones using Information and Communication Technology (ICT) with the aid of modern electronic media in order to fulfill the educational requirements (Bonanno, 2011).

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Currently medical education is rapidly integrating technology into the teaching learning and environment replacing the traditional method while the Medical field is also now becoming highly technology dependent.

So it is important for the future medical professionals; medical students to have their primary and secondary education in a technological background. Teachers themselves need to adapt to the changes and also make the learners ready for upcoming changes. So the teachers should continuously develop themselves, most importantly they should be aware of this need throughout their pre-service teacher training as well (Strakova, 2015).

So the readiness for technology based teaching among pre-service teachers is of utmost importance for the effective integration of technology into teaching and learning. But assessing the readiness for technology based teaching among "pre-service" teachers who will be becoming future educators is an important area which was over looked.

In this study, the level of readiness was assessed under technological competency, pedagogical competency and technological pedagogical competency which were developed based on the TPACK framework developed by Mishra & Koehla (2006).

Technological, Pedagogical, Content knowledge (TPCK) method was introduced as a framework for teacher knowledge for technology integration (Mishra & Koehler, 2006). This was renamed as Technological, Pedagogical and Content knowledge (TPACK) in order to make it easier to remember and integrate Technological, Pedagogical and content knowledge into one (Schmidt *et al.,* 2009). TPACK method displays the relationships between all three components of knowledge; technology, pedagogy and content (Mishra & Koehla, 2006; Schmidt *et al.,* 2009). There are seven components in TPACK framework including the ones at the intersections of these basic three components. They are Technological knowledge, Content Knowledge, Pedagogical knowledge, Technological content knowledge, Technological pedagogical knowledge and Technological, pedagogical and content knowledge (Schmidt *et al.,* 2009). Technological knowledge means knowledge on various technologies. Knowledge on subject matter is content knowledge. Methods used in the teaching process are referred to pedagogical knowledge. Technological content knowledge is teachers using technology to make the learners explore different aspects of content. Technological pedagogical knowledge means technology used to assist teaching methods. Integrating technology to modify teaching a specific content area is Technological pedagogical knowledge (Schmidt *et al.,* 2009).

Objective

To explore the level of readiness for technology based teaching among undergraduates of Faculty of Education, University of Colombo.

Methods

Descriptive cross sectional study with an analytical part (correlation) was done at the Faculty of Education, University of Colombo with 196 undergraduates from the two final academic years as the study population. A sampling method was not used. The whole population was considered as the sample since the whole population was accessible. Data was collected through a self-administered questionnaire and the data was analyzed using SPSS: version 20.

Results

The study population of this study was 196 undergraduates from Faculty of Education, 103 from 3rd academic year, 93 from the 4th academic year. The response rate was 92.35% and results are based on the responses from 181 participants, 95 from 3rd year and 86 from 4th year.

In Faulty of Education, there are only females in the 3rd academic year and 95 of them responded. Out of 86 participants from the 4th academic year 13 are males and 73 are females. Age of participants varies between 23 to 27 years. Majority of the participants are in the age of 24 years.

Regarding technological competency, 100% have agreed that they have the technical skills to use word processing and presentation applications. But 0.6% (n=1) have disagreed on spread sheet while 4.4% (n=8) have disagreed on database management. 4.4% and 14.4% remained neutral about the technical skills to use spread sheet and database management respectively.

Considering the technical skills to use communication applications, a clear majority has agreed that they have the skills to use internet browsing (99.5%), E-mail (100%) and online communication (75.7%). 5.5% have disagreed that they have the technical skills to use online communication while 18.8% remain neutral. Even though the majority agrees on online communication the percentage is less compared to other communication applications.

Regarding using educational tools, similar percentages of participants have agreed that they have the technical skill of using online forum (45.3%) and online journals and databases (43.6%). But a significant number of participants remains neutral (37%) and disagrees (26.5%) on the fact that they have the

technical skills to use learning management systems.

When it comes to instructional designing tools majority agrees that they have the technical skills to use image editing software (59.2%).

But most of the participants remain neutral on the fact that they have the technical skills to use animations (48.1%) and audio video editing software. (44.2%).

Most of the participants (44.2%) know how to solve their technical problems while 35.9%remains neutral. Majority (63.5%) agrees that they can learn technology easily.

Majority agrees that they are aware of new technologies such as smart classroom concept (70.1%) and distance learning (56.4%). But only 47.5% agrees that they know about online learning.

The interesting fact is even though 100% have agreed that they have the skill to use office applications in word processing and presentations only 85.1% and 94.4% have frequently used these applications to make presentations and to complete assignments respectively.

To understand difficult subjects (84.6%) to find answers for questions/ tutorials (92.8%) for further referring (99.4%) and to find attractive learning material (88.4%) majority frequently uses online materials. A clear majority (92.3%) uses electronic devices to carry learning materials. Majority frequently uses E-mail (85.1%) Skype / video calls/ conference calls (75.2%) and social media (90.6%) to communicate with peers.

When comparing the online material and electronic devices to support learning activities 90.1% have used them at home while 98.9% have used them in the university. Usage of online material and electronic devices to support learning activities in the university is higher than the usage at home (8.8%, n=16).

However, in this study 40.3% were with high level of readiness for technology-based teaching related to technological competency. There is no statistically significant difference between the two academic years readiness for technology based teaching related to technological competency (chi square value= 1.250, p value=0.264).

A significant majority of participants (88.95%) have agreed that they can use a wide range of teaching approaches in a classroom setting. 97.23% have agreed that they can adapt their teaching according to the students' current knowledge. Majority have agreed that they can assess students' learning in multiple ways (87.84%)and students' performance (93.37%) in a classroom but the ability to assess students' performance is higher than the ability to assess learning (5.53%) Regarding being familiar with common student misconceptions, majority (76.25%) have agreed and comparatively a higher proportion of participants remained neutral (23.75%). No one has disagreed on above statements. 93.37% have agreed that they know how to manage a classroom while 0.55% disagrees.

Considering different types of learners, majority have agreed in similar percentages that they can adapt their teaching for visual (87.29%), auditory (91.70%) read and write (90.61%) and kinesthetic (89.49%) learners. 1.10% have disagreed regarding kinesthetic learners while all the others remained neutral in adopting their teaching styles.

When considering pedagogical competency, 40.67% were with "high readiness" for technology based teaching. There is no statistically significant difference between the two academic years for technology based teaching related to pedagogical competency (chi square value=0.606, p value=0.436).

Regarding technological pedagogical competency; majority knew how to prepare teaching material using word processing (96.70%) and presentations (86.70%) but competency in using spreadsheets 2.20% (n=4) and databases 7.18% (n=13) was comparatively low.

Considering instructional designing tools, significant number of participants (49.6%) have agreed only to the fact that they know how to prepare teaching material using image editing. Only 27.1% have agreed on the statement that they know how use animations in preparing teaching materials while most of the participants have remained neutral (49.7%). The percentages of participants who have agreed (26.0%) and disagreed (28.1%) on the fact that they can use audio/video editing software in preparing teaching materials remained almost similar.

Only 38.6% have agreed that they know how to find reliable up to date information using online forums. Most of the participants have remained neutral on the fact that they know how to use online journals /databases (38.6%). 35.9% have disagreed that they know how to use learning management systems to find reliable up to date information. Majority (54.7%) knows how to find reliable up to date information using other websites.

Majority knows how to communicate with their students via email (82.9%), Skype/video calls/conference calls (68.4%) and social media (74.0%).

Considering the capabilities to guide students to choose technology to do exercises and assignments (82.87%), retrieve information (90.05%), work in a collaborative way (85.63%), learn in an autonomous way (89.50%) and to do assessments and examinations (75.69%), the majority have agreed.

A significant majority of the participants have agreed that they think critically on ICT use in teaching and learning to make a positive impact on student motivation (87.84%), student achievement (92.26%), ability of problem solving (92.81%), and student centered learning (93.37%).

94.47% have agreed that their university education has caused them to think more deeply about how technology could influence the teaching approaches used in the class and 92.26% agrees that they can successfully adapt to the changes that can occur in the teaching& learning process due to technology integration.

The majority agrees that they can minimize the negative impact on teacher-student bond caused by integration of technology into teaching and learning (85.63%) and also they can minimize students misusing technology (81.21%).
Furthermore, in this study 41.4% were with high level of readiness for technology-based teaching related to technological pedagogical competency. There is no statistically significant difference between the two academic years for technology based teaching related to technological pedagogical competency (chi square value= 0.634, p value=0.426).

An interesting result this study shows is that there is a strong linear correlation between the level of readiness for technology based teaching related to technological competency and the level of readiness for technology based teaching related to technological pedagogical competency (correlation coefficient=0.78). Considering office applications there is a strong linear correlation between having technological competency to use office applications and technological pedagogical competency to make teaching material using office applications (correlation coefficient=0.72). But the correlations between having technological competency to use communication applications (correlation coefficient=0.47), education tools (correlation coefficient=0.49), instructional designing tools (correlation coefficient=0.27) and technological pedagogical competency to make teaching material using above applications are comparatively low.

According to this study the correlation between pedagogical competency and technological pedagogical competency is moderately linear. (Correlation coefficient=0.41).

Discussion

The level of readiness for technology based teaching was assessed in three domains; Technological competency, pedagogical competency and technological pedagogical competency. These domains were developed from the TPACK model introduced by Mishra & Koehler (2006).

In this study we developed an assessment tool with separate sets of questions to assess the level of readiness for technology based teaching related to above three domains. Schmidt (2009) has attempted to develop and validate an instrument for self-assessment of TPACK model among pre-service teachers and the tool which was used in our study was based on the items constructed in his study. In Schmidt's study, there was a total of 75 items in the assessment tool where technological knowledge was assessed under 8 items, pedagogical knowledge under 10 items while technological pedagogical knowledge was assessed under 15 items. In our study these items were further explored with specific questions. As similar to Schmidt's study the participants answered each question using a five level Likert scale.

40.3% of participants were with high level of readiness for technology based teaching related to technological competency. This may be due to, a vast majority of participants having technological competency to use office applications and communication applications while a significant number of participants lacking the competency to use educational

tools (online forums, online journals and databases, learning management systems) and instructional designing tools (image editing software, animations, audio/video editing software). Considering office applications alone participants were confident in their skills of using word processing and PowerPoint presentations while there was a considerable reduction in confidence to use spreadsheets and databases. The study carried out by Al-Zaidiyeen (2010) in Malaysia states that in-service teachers in rural schools mostly use internet (51.8%), presentations (47.3%) and word processing (26.4%) for educational purposes while the use of spreadsheets is significantly low. This pattern of results is compatible with the results of our study but the percentages of our study are very much higher compared to this study. This similarity in the pattern of results may reflect the fact that word processing, presentation applications and internet browsing are commonly used applications among both pre-service and in-service teachers. The difference between the percentages may be because the in-service teachers who participated in Al-Zaidiyeen's study in 2010 and the pre-service teachers who participated in this study in 2018 represent two different generations. Another important point shown by this study was even though the participants have the skills to use office applications their usage was comparatively low.

Smart classrooms, distance learning, and online learning are the modern applications of technology integrated educational system and it is of utmost importance for the future educators to be aware of these new trends. The results of this study reflected that the participants have kept in touch with these modern technologies. Specially in a time where the pilot project of implementing smart classrooms has begun in Sri Lanka, it was a positive sign that a significant number of participants were aware of the concept of smart classrooms.

The responds from the study participants of our study reflects that their awareness on online learning is comparatively low. Similarly, Balajadia (2015) states in his study done in Philippines that online interactive teacher student meeting and professional networking are the most limited and most difficult to perform by pre-service teachers.

Considering the level of readiness for technology based teaching related to pedagogical competency, 40.67% were with high level of readiness. When considering individual questions, participants' responses were satisfactory. But out of the participants who have agreed that they have the pedagogical competency in different subsections, a significant number was not confident enough to respond as "strongly agree". This might have affected towards the reduction of the overall score.

41.4% of participants were with high level of readiness for technology based teaching related to technological pedagogical competency. 58.6% with low level of readiness may have been due to the lack of technological pedagogical competency in using more advance applications such as instructional designing tools to make teaching material and in finding reliable up to date information using electronic material. These findings indicate that pre-service teachers are still reluctant to use more sophisticated electronic applications. Balajadia's study (2015) findings also indicated that pre-service teachers were still reluctant to use more sophisticated electronic applications. Similarity of the results may be because both the studies have been carried out among participants representing junior and senior students in teacher education institutions in Asian region.

As a significant number of participants keep up with new technologies and them thinking critically of using ICT to make a positive impact in student learning, it reflects that they have positive attitudes towards technology based teaching.

At the beginning of the 4th academic year the undergraduates learn ICT as a part of their curriculum. Because of that, an increased level of readiness among 4th year participants was expected, but there was no statistically significant difference between the two academic years in the readiness for technology based teaching related to technological competency and technological pedagogical competency. Similarly, further in Balajadia's study it is mentioned that no matter which course year a pre-service teacher would be, his or her perceived readiness for ICT based teaching will not differ. So in both settings the input provided through the curriculum may not be adequate to improve the level of readiness for technology based teaching of future teachers.

An important fact shown in this study was that there was a statistically significant correlation between the level of readiness for technology

based teaching related to technological competency and the level of readiness for technology based teaching related to technological pedagogical competency. But the correlation between the level of readiness for technology based teaching related to pedagogical competency and the level of readiness for technology based teaching related to technological pedagogical competency was moderately significant. This may be because the pedagogical section of the data collecting tool was not adequate to cover a wide range pedagogical competency unlike in other two domains.

The Results of the Schmidt's study states that the coefficient varied from 0.02 – 0.71 with respect to correlations between subscales of TPACK, where in our study the correlation coefficient was 0.78 between technological competency and technological pedagogical competency and the correlation coefficient was 0.41 between pedagogical competency and technological pedagogical competency. So this is a significantly important fact which affects positively towards the validity of our assessment tool.

Conclusion and Recommendations

The level of readiness for technology based teaching among undergraduates of Faculty of Education, University of Colombo is in a satisfactory level related to all three domains considered; technological competency, pedagogical competency and technological pedagogical competency. Even though the competency in using commonly used applications, (word processing, presentations, internet browsing) can be appreciated, using of more sophisticated applications (Instructional designing tools, educational tools) must be encouraged. Moreover, since their attitudes towards technology based teaching is in a positive level their readiness can be uplifted to a significant level by providing more opportunities to practically use technology in teaching activities during their training period. Since the pilot project of implementing "smart classrooms" has begun in Sri Lanka, by improving competency in technology based teaching of the educators starting from their pre-service training would result in producing teachers equipped with adequate readiness for successful integration of technology into the Education system in Sri Lanka.

References

Badri, M., Al Rashedi, A., Yang, G., Mohaidat, J., Al Hammadi, A., Council, A.D.E. & Dhabi, A. (2014) Technology readiness of school teachers: An empirical study of measurement and segmentation. *Industrial Engineering and Management*, 2, 4, pp.257-275.

Balajadia, D.M. (2015) Gauging the ICT-Based Teaching Readiness of Preservice Teachers in the Light of 21st Century Education. PEOPLE: *International Journal of Social Sciences*, 1, 1.

Baylor, A.L. & Ritchie, D. (2002) What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms?. *Computers & education*, 39, 4, pp.395-414.

Bonanno, P. (2011) September. Developing an instrument to assess teachers' readiness for technology-enhanced learning. *In 2011 14th International Conference on Interactive Collaborative Learning*, pp. 438-443. IEEE.

Childs, S., Blenkinsopp, E., Hall, A. & Walton, G. (2005) Effective e-learning for health professionals and students—barriers and their solutions. A systematic review of the literature—findings from the HeXL project. *Health Information & Libraries Journal*, 22, pp.20-32.

Karaca, F., Can, G. & Yildirim, S. (2013) Technology utilisation in elementary schools in Turkey's capital: a case study. *Educational Studies*, 39, 5, pp.552-567.

Lewin, K.M. (2004) The pre-service training of teachers–does it meet its objectives and how can it be improved. *Background paper for the EFA global monitoring report.*

Masic, I., Pandza, H., Toromanovic, S., Masic, F., Sivic, S., Zunic, L. & Masic, Z. (2011) Information technologies (ITs) in medical education. *Acta Informatica Medica*, 19, 3, pp.161.

Mishra, P. & Koehler, M.J. (2006) Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers college record, 108, 6, pp.1017-1054.

Mishra, P. & Koehler, M.J. (2008) March. Introducing technological pedagogical content knowledge. In annual *meeting of the American Educational Research Association*, pp. 1-16.

Pelgrum, W.J. & Anderson, R.E. (1999) ICT and the Emerging Paradigm for Life-Long Learning. IEA.

Satharasinghe, A. (2006) Census on Computer Literacy of Teachers.

Schaffer, H.R. (2004) *Introducing child psychology*. Blackwell Publishing.

Schmidt, D.A., Baran, E., Thompson, A.D., Mishra, P., Koehler, M.J. & Shin, T.S. (2009) Technological pedagogical content knowledge (TPACK) the development and validation of an assessment instrument for preservice teachers. *Journal of research on Technology in Education*, 42, 2, pp.123-149.

Straková, Z. (2015) The perception of readiness for teaching profession: a case of pre-service trainees. *Journal of language and cultural education*, 3, 1, pp.32-42.

Summak, M.S., Bağlıbel, M. & Samancıoğlu, M. (2010) Technology readiness of primary school teachers: A case study in Turkey. *Procedia-Social and Behavioral Sciences*, 2, 2, pp.2671-2675.

Teo, T. (2010) A path analysis of pre-service teachers' attitudes to computer use: applying and extending the technology acceptance model in an educational context. *Interactive Learning Environments*, 18, 1, pp.65-79.