Technology integration in education: Effectiveness, pedagogical use and competence – A cross-sectional study on teachers' and students' perceptions in Muscat, Oman

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This cross-sectional study examined primary and secondary teachers' and students' views regarding technology integration into teaching and learning in Muscat, Oman. The target group consisted of teachers (N=44) and students (N=219) from two bilingual and two international schools in Oman. Results showed that the majority of students use technology to do projects and research. Both teachers and students enjoy the use of technology in teaching and learning, they feel competent in using it and they similarly evaluate the effectiveness of available technologies. Although the majority of teachers agreed that teaching has become easier and faster with technology, only a small percentage integrates technology into teaching. Factors hindering technology integration concern curriculum design, network issues, time constraint and other. In theory, the study contributes to our understanding of the reasons why teachers' and students' find it challenging to use technological innovations in school. Methodologically, this study provides the basis for examining Technological Pedagogical Knowledge in certain socio-geographical contexts. In practice, the study provides educational authorities with suggestions on how technology can be used to support, enhance and extend the curriculum.

Keywords: Technology integration; educational technology; primary and secondary school; students; teachers, TPCK, TPACK

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1 Introduction

The aim of this paper is to discuss primary and secondary teachers' and students' perceptions regarding the effectiveness of technology integration into teaching and learning in Muscat, Oman. The socio-geographical context of Muscat, Oman allows us to examine the cultural change that is taking place with the evolution of technology with regard to teachers' Technological Pedagogical Content Knowledge (TPCK).

The TPCK framework is concerned with the way the three main aspects of teachers' knowledge (content, pedagogy, and technology) interact between them. The framework refers to the way teachers understand technology and to the way they build an effective teaching lesson with the use of technology (Koehler, & Mishra, 2009). The present study provides the basis for examining Technological Pedagogical Knowledge (TPK) which refers to teachers' knowledge about the pedagogical use of technology

tools. Pedagogical Content Knowledge and Technology Knowledge are combined as they relate to teaching, learning, information technology mastery and they're between interactions.

In this paper technology refers to the multiple technological resources that teachers use in the school setting to support teaching and learning (Leask, 2013). Effective technology integration refers to the way technology is used by teachers and students to best support the learning process and achieve the learning goals. There are numerous and various changes related to the integration of technology as rearrangements and modifications need to take place in the daily school community life for both the students and teachers. Therefore, in establishing more general theories about the cultural revolutions with reference to technology, more evidence from different cultural and socio-geographical contexts is necessary.

Research carried out in different socio-cultural contexts during the past decades offers mixed results on whether educational technology is effective in teaching and learning (e.g. Ahmad & Nisa, 2016; Gebre, Saroyan & Aulls, 2015; Ghavifekr, Kunjappan, Ramasamy & Anthony, 2016; Li, Worch, Zhou & Aguiton, 2015; Mac Callum, Jeffrey, & Kinshuk 2014; Tunmibi, Aregbesola, Adejobi and Ibrahim, 2015; Zhu, 2010). Methods of teaching are constantly changing and ways to improve learning and teaching are in high demand. Ansari and Malik (2013, p.67) show that the need to keep "abreast with the advancement, expansion and growth" of the technologies that are introduced is one of the most effective attributes a 21st century teacher should have. Kivunja (2014) argue that teachers' attributes are important in teaching the students effectively in order to equip them with the right skills that can sustain them in life after school. Thus, students should be offered with the most productive opportunities to enhance their learning through the integration of technology (Alemu, 2015). To this end, teachers, according to their cultural context, play a critical role in warranting that the learning experience is robust.

Effective teaching delivered through the use of technology supports optimal learning outcomes irrespective of the situation e.g. teaching/assessment, and context e.g. primary/secondary/higher education (Raymond, 2016; Tunmibi, Aregbesola, Adejobi & Ibrahim, 2015; Scott, 2015). For example, Tunmibi et al., (2015) support that educational technologies such as androids tablets and personal computers improve critical thinking, motivate learners and help in making connections with the subject taught because they give to both teachers and students access to limitless educational resources. Furthermore, findings show that technology integration into

teaching and learning is successful upon teachers' perceptions, values, and attitudes (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur & Sendurur, 2012). Hence, the effectiveness of integrating technology into teaching is related not only to the sources of the technology the teachers use but also to their perceptions on whether and how technology can be successfully integrated in the teaching and learning process.

The pedagogical way technology is used in the school setting is related to participation and motivation issues as there is an opportunity for all students to be included in the learning process (McNeely, 2005). Andrew & Jones (2015) affirm that mobile phone facilitates collaborative learning. This qualitative study investigated students' use of the mobile devices through a seminar. The participants were 68 University students composing of 18 students in the BA (Hons) Primary Initial Teacher Education programme and 50 students in the BA (Hons) in Education Studies programme. The researchers asked the participants if they use their mobile devices only for academic purpose or other activities. It was shown that participants acknowledge the collaborative learning environment mobile use allows for them e.g. producing videos and taking photos of a group work. Therefore, students' perceptions about the role of technology in learning is equally important.

Davies & West (2014) investigated the efficacy of technology integration for both teachers and students. The authors indicate that due to the mandate from educational bodies to schools to integrate technology, the educational bodies, solely, focus on professional training aiming at enhancing teachers' technological skills, mentoring teachers' skills of technology integration and supporting collaborative learning. The authors assert that the goal of professional training was to make teaching practitioners use technology more by changing teachers' attitude towards technology integration. The findings suggest that, even though unintended, inappropriate use of technology occurs in a learning environment. The authors reveal that although the teachers had the required professional training, the focus was not on 'sound pedagogically technology practice'. This leads to the conclusion that TPCK is of paramount importance to the learning process as teachers need to be able to both understand the subject matter and transform this into teaching material through the application of specific technological tools which are identified as the most relevant (Koehler & Mishra, 2009).

There is a number of technological tools that can be used to nurture and stimulate the learning experience. Numerous applications are used to pass across and share information, show images, videos, sounds and any kind of media (Kola, 2013). These

applications are time-saving and allow production of projects in larger numbers. Recently electronic books took over paper books among the modern teachers and digital learners. In a quantitative study, Tunmibi, Aregbesola, Adejobi & Ibrahim (2015) investigated the impact of e-learning and digitalization in primary and secondary schools. The results show that 81.25% of the respondents indicated that these applications are mostly used due to their portability and ease of access to unlimited information of varying degrees. Gebre et al. (2015) study agrees with Kola's (2013) conclusions on computer technology. Similarly, Okoro, Hausman and Washington (2012) examined whether social networking tools and social media affect the standard of teaching and learning. The experiences and effective practice advice from innovators in a business school were shared. The findings identify social media and networking applications like Web 2.0 technologies to be wildly used by teachers and students. For example, technological applications like Facebook, blogging, Google+ (hangouts and visual charts) and Websites were integrated into daily teaching. Corroborating this finding is Khodabandelou et al. (2016). Taken together, the above findings show that the study of teachers' and students' perceptions of technology integration is of vital importance because learning is enhanced through the use of technology under appropriate educational circumstances such as limitless access to educational technologies, use of technology for instructional purposes, use of technology for personalized instruction and assessment (e.g. Davies & West, 2014), teachers' perceptions, values, and attitudes (e.g. Ertmer, et al., 2012) and teachers' understanding of how to successfully use technology for transforming the subject matter into teaching resource (e.g. Koehler & Mishra, 2009).

From the above it is shown that while in some countries teachers encourage the use of technological tools such as androids tablets and personal computers because they understand how the application of particular technologies can facilitate the subject matter (TPK), in other countries teachers warn against the misuse of these technologies and state that students be given proper guidance on when to use technology to prevent distractions (Tunmibi, Aregbesola, Adejobi & Ibrahim, 2015). However, more studies need to be carried out in specific cultural and socio-geographical contexts to support the evidence that culture influences technology use in a country/community. Socio-cultural differences exist not only with regard to the use of technological tools in Education but also to teachers' and students' perceptions regarding technology integration into teaching and learning (e.g. Zhu, 2010). While there has been extensive research on the role of technology in the classroom, there are

arguments that education is a continuing process that goes beyond the classroom. Lisenbee (2016) argues that one way to change how teachers and learners feel about technology is to give them adequate training which increases their self-confidence. Therefore, more evidence from empirical studies carried out in different cultural and socio-geographical contexts is required in an attempt to establish more general theories about the use of technology and the application of TCPK in the school setting.

To conclude, in view of the need for more cross-sectional studies in different contexts to investigate students' perceptions on the use of technology in Education and teachers' understanding of the interaction between the technology and content with regard to TPCK, the present study sets to investigate teachers' and students' perceptions on the impact of technology in teaching and learning in a context where research on this topic is limited; Muscat, Oman.

More specific, the following research questions were established to guide the scope of study:

1. How does technology aid teaching and learning in Oman primary and secondary schools according to teachers and students?
2. Do teachers and students in Oman primary and secondary schools feel competent in using technology in the learning process?
3. Is the use of technology in education effective according to teachers and students in Oman primary and secondary schools?

2 Method

2.1 Participants

Participants were 44 teachers, 15 males and 29 females, and 219 students of grade six to twelve, 133 boys and 86 girls. The data were drawn from two bilingual and two international schools in Muscat, Oman; all teachers and students were invited to participate in the study. The schools were purposefully selected because they are known for their technology inclusivity in education. Oman has a centralised educational system meaning that the same curriculum is delivered in all schools (bilingual and international) across the country. The Ministry of Education oversees, monitors and approves the teaching methods and the examination process. ICT was first introduced into mixed gender Basic Education schools in September 1998 for grade one to 10. Due to the unified educational system mandated by the ministry, all

schools provide computers, LCD projects, smartboards, projectors or any other technology suitable for learners and teachers.

2.2 Design

To elicit teachers' and students' views and perceptions about the effectiveness of technology integration into teaching and learning in Muscat, a cross-sectional survey was designed. Theoretically and empirically it is highly important to examine whether differentiation exists in different cultural contexts with regard to technology integration in the school setting as it is well known that cultural context affects behavior, attitudes and perception among groups of people. The research aim was examined with questions falling under three themes:

1. Pedagogical use of technology in learning and teaching, e.g.

   Student questionnaire: What do you do with technology for learning? You may tick as many as you use. (Do homework; Give presentation; read/ do research; Check my scores; submit assignments; talk to teachers; Share ideas with mates; do projects; study on my own)

   Teacher questionnaire: On average, how many hours per week do you spend using a technology for teaching activities? (I don't use it; 1 hour; 2- 5 hours; 5-10 hour; 10-15 hours; 15 hours or more)

2. Technology competence/mastery, e.g.

   Student questionnaire: How well can you use technology? (Very good; Good; I don't know; Bad; Very bad)
   Teacher questionnaire: Please rate your competency level with technology use. (Unfamiliar; Newcomer; Beginner; Average; Advanced; Expert)

3. Perceptions regarding technology efficacy, e.g.

   Student questionnaire: How has technology changed your feelings about school?
   Teacher questionnaire: What role do technologies play in your teaching? You may tick as many as applicable (e.g. Engage the students; Assess students; motivates the student; Monitor students' activity; facilitate learning etc.)

2.3 Measures and Procedure

Self-administered questionnaires in a printed form were administered. There were eight multiple closed-ended questions, three open-ended questions and one Likert scale question for the teachers and seven multiple closed-ended questions, five open-ended questions and one Likert scale question for the students. The multiple closed-ended questions provided a check box to make selections easier, e.g. *Yes, No, I don't*

know. The open-ended questions provided participants with three lines indicating that answers should be short. The Likert scale provided a choice of five pre-specified answers ranging from 'Strongly disagree' to 'Strongly agree' with the neutral point being 'I am not sure'. An added consent and anonymity form were attached to the bottom of each questionnaire that was distributed to the participants. Questionnaires were given to the participants with enough time to fill it out. Further explanation without bias was provided by the researcher to any participant who was confused when filling out the questionnaire

The questionnaire was distributed in the school setting during the morning break. The participants needed 15-20 minutes to complete it. The teachers helped with the student distribution of questionnaire in cases where the researcher was unable to go around the whole school. The first author was always available on the school premises to answer any question the participants had. The questionnaires were piloted with a group of three teachers and three students in order to ensure that were not any ambiguous items.

2.4 Research Strategy

Content Analysis was used to analyse teachers' and students' qualitative responses. With the use of this research strategy information is easily coded, summarized, compared and reported. The first step concerned the display of the material at disposal: the data were summarized, and the unrelated information was omitted. The second step concerned the coding of the data: words and phrases were used to achieve a pattern; codes of four words at the most, such as 'makes learning fun', 'improves academic performance' etc. were used to describe the text. We chose small units of analysis so that accuracy of the described data would be more successfully achieved; the short answers led to this decision. We also used original codes to ensure validity and reliability; validity was achieved due to the reflected meaning of the codes and reliability was achieved because a) there was no need for a specialized coder in the case of this study and b) inter-rater reliability (IRR) was 100% meaning that both authors reached the same level of agreement with regard to the their judges. Lastly, the second author ascertained that there was correspondence between the text and the codes and between the codes and the identified themes. While the coding was taking place, memos / ideas were noted down to move on from the descriptive to the inferential stage. After that, the authors counted which codes occurred more often, and to trace any patterns we examined the codes which occurred together more often.

Among the codes that occurred more frequently concerned ‘makes school fun’ and ‘easy and faster access to resources’, ‘provides better understanding’.

Next step to content data analysis was the classification of codes into categories/themes in order to achieve a link between the units of analysis. As such, we used units such as sentences to group the codes and these were very specific, i.e. ‘Both teachers and students support that technology is effective and has improved academic and teaching performances. During the final stage of data analysis, we ensured that the researcher effects were minimized after the second author checked the correspondence of the conclusions with the codes and the inferred categories. This allowed us to conclude that the results were logically explained, and we achieved coherent and concise summarizing of the content.

With regard to quantitative analysis, the data was put into categories according to schools. Each category (fours schools) consisted of two groups, one for the teachers and one for the students. This enabled us to compare the categories and examine the similarities or dissimilarities between the schools as opinion or perception may differ due to school or region.

3 Results

3.1 Content Analysis

The responses to the most important open-ended questions addressed to students and teachers are presented below.

3.1.1 Students’ views on the effectiveness of technology integration into teaching and learning

For the question ***Do you think technology is good for learning?*** responses were summarised and coded using small units of analysis. After that, each unit of analysis was quantitatively analysed. From the 219 participants, there were 33 missing responses. Table 1 shows that the majority of the respondents believe that technology is good for learning because they get ‘fast access to information’ and they ‘learn and search new things’.

Table 1. Themes/Units of Analysis for the question "Do you think technology is good for learning?" (N=186).

Themes/Units of Analysis	Code
Learns/search new things	21%
Fast access to information	23%
Better understanding	14%
Easy to use	10%
Improves academic performance	8%
Confirms answers	8%
Monitor activities/Motivates to complete task	3%
Makes learning fun	8%
Other	5%

The Themes/Units of Analysis for the question How are the technologies more helpful for learning? are shown below. From the 219 participants, there were 20 missing responses. Table 2 shows that the overwhelming majority of the participants find technology helpful for learning because they get new and quick information.

Table 2. Themes/Units of Analysis for the question *How are the technologies more helpful for learning?* (N=199).

Themes/Units of Analysis	Code
Helps with presentation/project	13%
Get new and quick information	39%
Easy use and access	18%
Helps to complete task/Monitor activities	16%
Increase in academic performance	7%
Learn better/more	6%
Other	1%

For the question ***What are the thing(s) that makes you not want to use technology?*** the identifed Themes/Units of Analysis are as folows. From the 219 participants, there were 24 missing responses. Table 3 shows that the majority of the respondents are not hindering of using technology (nothing). However, 15% of the respodents stated that they face connectivity issues.

Table 3. Themes/Units of Analysis for the question What are the thing(s) that makes you not want to use technology? (N=195).

Themes/Units of Analysis	Code
Distraction	13%
Virus/Hackers	6%
Connection problem	15%
No enough technology	6%
Nothing	33%
Limited time/excess homework	10%
Popo-up adverts	6%
Don't know how to use it	2%
Bullying	2%
Not sure	3%
School authorities	3%
Other	3%

The Themes/Unit of Analysis identified for the question ***How has technology changed your feelings about school?*** are shown below. There were 20 missing responses. The majority of the students support that technology 'makes school more fun/good'. A similar number of students state that technology 'makes learning better. Only a small percentage reported that technology has made no change.

Table 4. Themes/Units of Analysis for the question How has technology changed your feelings about school? (N=199).

Themes/Units of Analysis	Code
Makes school fun	26%
Makes me smarter	5%
Makes learning better	21%
Learning has become easier	13%
Not sure/no change	10%
Makes me love/like school more	13%
Feel sad/Bored/I hate homework	7%
Makes me want to go to school more	5%

3.1.2 Teachers' views on the effectiveness of technology integration into teaching and learning

For the question ***What are the factors that prevent you from integrating (more) technology into your teaching?*** responses were summarised and coded using small units of analysis. After that, each unit of analysis was quantitatively analysed. There were no missing responses. Table 5 shows that the overwhelming majority of teachers do not have time to integrate technology. Limited availability of technology/network was the next most popular factor for not integrating technology. Also, a small number of teachers stated that nothing prevents them from using technology into the classroom.

Table 5. Themes/Units of Analysis for the question What are the factors that prevent you from integrating (more) technology into your teaching? (N=44)

Themes/Units of Analysis	Code
Nothing	11%
Time constraint	43%
students' destruction	5%
Limited availability of technology / Network	23%
Lack of professional support	2%
Lack of maintenance	7%
Curriculum	9%

For the question ***Is technology effective for teaching?*** the identifed Themes/Units of Analysis are shown below. From the 44 participants, there were 7 missing responses. Results (Table 6) show that most of the teachers think that technology is effective because it provides better understanding. It can be seen from the survey that a similar number of teachers recognise that technology motivates students, provides quick access to information and that technological resources make learning easier.

Table 6. Themes/Units of Analysis for the question Is technology effective for teaching? (N=37)

Themes/Units of Analysis	Code
It enhances learning	11%
Keeps me updated	8%
It provides better understanding	30%
It makes earning easier	16%
It motivates students	19%
It provides quick access to information	16%

For the question ***How are the technologies you have chosen in question 8 more helpful for teaching?,*** the identifed Themes/Units of Analysis are as folows. There were no missing responses. According to the results (Table 7), the majority of teachers support that their chosen technological resources provide easy and fast access to information. Similarly, a large number of teachers support that with the specific tools, teaching and learning is made easier.

Table 7. Themes/Units of Analysis for the question How are the technologies you have chosen in question 8 more helpful for teaching? (N=37)

Themes/Units of Analysis	Code
Student learn better	16%
Detail instruction	16%
Helps students visualise subjects	5%
Teaching/Learning easier	23%
Motivates/Make learners interested	14%
Easy and faster access to resources	26%

3.2 Statistical analyses

The responses to the most important closed-ended questions are presented below.

3.2.1 Students' views on the effectiveness of technology integration into teaching and learning

The results in Table 8 shows that the majority of the respondents use technology to do projects and a similar number of students read and do research and also use technology to do their homework and prepare presentations.

Table 8. What students do with technology when learning (N=219).

		Frequency	Percentage
1.	Do homework	186	14.9
2.	Give presentation	170	13.7
3.	Read/Do research	194	15.6
4.	Check my scores	77	6.2
5.	Submit assignments	93	7.5
6.	Talk to teachers	64	5.1
7.	Share ideas with mates	127	10.2
8.	Do projects	195	15.7
9.	Study on my own	139	11.2
	Total	**1245**	**100.0**

The present research shows that the majority of the respondents (39%) wrote that it helped them to get new and quick information; 13% of the students stated technology helps with doing presentation and project; 18% of the students wrote technology is easy use and they get quick access; 16% uses technology to complete tasks/ monitor activities; since using technology, 7% of the respondents have seen increase in their academic performance and 6% of respondents learn better/more.

As illustrated in Table 9, Likert questions 1, 2 and 3 indicated the majority of the respondents (89.5%) strongly agreed and agreed they enjoy learning with technology. Also, 75.4% of the respondents strongly agreed and agreed that they learn better with technology. A significant number of participants (N=46 / 21.0%) were not sure if they learn better. 80.3% of the respondents strongly agreed and agreed that technology makes learning easier.

Table 9. Perceptions regarding the impact of technology in learning (N=219).

Question	M	SD
Question 1 of 10: I enjoy learning with technology	4.44	.977
Question 2 of 10: I learn better with technology	4.15	.922
Question 3 of 10: Technology makes learning easier	4.23	1.064

The illustration in Table 10 for the Likert questions 4, 5 and 6, showed that the majority, 76.2% of the respondents strongly disagreed and disagreed with the statement that they do not know how to use technology. 78.1% of the respondents strongly disagreed and disagreed that they are afraid of using technology. The respondents' answers to the availability of technologies in schools indicated a mixed

opinion. The majority, 44.7%, of the respondents agreed and disagreed that there were no adequate technologies in the schools. 24.2% indicated, they were not sure, 31.1% disagreed and strongly disagreed.

Table 10. Students capability in using technology (N=219).

Question (N = 219)	M	SD
Question 4 of 10: I don't know how to use technology	1.83	1.176
Question 5 of 10: I am afraid of using technology	1.79	1.158
Question 6 of 10: We don't have enough technology in the school	3.16	1.346

As far as students' perspective on the importance of technology is concerned (Table 11), the findings showed that the majority of the students, 64.4%, strongly disagreed or disagreed that they do not need technology for learning. 51.6% of the respondents strongly disagreed or disagreed that technologies make them playful in the class. 18.7% were not sure and 29.7% of the respondents agreed or strongly agreed.

Table 11. Students' perspective on the importance of technology (N=219).

Question (N = 219)	M	SD
Question 7 of 10: I don't need technology for learning	1.12	1.283
Question 8 of 10: Technology makes me playful in the class	2.68	1.496

Table 12 shows that the majority (67.6%) of the students strongly agreed or agreed to learning personally with technology while 72.6% of the respondents strongly agreed or agreed that technology improves academic performance.

Table 12. Learning style and technology (N=219).

Question (N = 219)	M	SD
Question 9 of 10: I learn on my own with technology	3.86	1.114
Question 10 of 10: Technology has improved my academic performance	4.03	1.029

Further findings in this research show that the respondents indicated that projector (15.6%) was the most available to all the participants in their schools. The mean was .84 with a standard deviation of .367. Other most indicated available technologies were Google, Laptop, Whiteboard, Computer and Internet. Also, the most helpful technologies indicated by the students were Google (17.0%), Microsoft Word (13.2%),

Laptop (14.1%) and PowerPoint (12.4%). The least helpful technologies were Blogs (2.5%) and WhatsApp (5.2%).

A large number of students (57.5%) responded that they were very good with technology. The mean was 1.50 with a standard deviation of .680. However, 72 of the respondents from the bilingual schools indicated they do not have enough technologies while 60 respondents from International schools indicated they have adequate technologies in the schools. The overall statistical frequency analysis has a mean score of 1.73 and a standard deviation of .759. There was no missing response.

The significant majority (90.9%, N=199) indicated that technology is good (effective) for learning: 46.6% of participants in School A used technology; the majority of the School B respondents' used technology once or twice in a week; half of School C (50%) and School D respondents (72.5%) used technology every day.

3.2.1 Teachers' views on the effectiveness of technology integration into teaching and learning

This research found the all teachers (100%) indicated that technology is an effective tool for teaching. In addition, 30% of the teachers stated technology provides better understanding', 19% indicated technology motivates students, 16% stated technology makes learning easier and 'it provides quick access to information' respectively. 11% of the teachers wrote technology enhances teaching and 8% stated that technology keeps them updated.

Regarding the use of technology in teaching (Table 13), the majority (88.7%) of teachers agreed or strongly agreed that they enjoy using technology when teaching. 79.6% of the respondents agreed and strongly agreed they teach better with technology. Most of the respondents 90.9% agreed and strongly agreed that teaching has become easier and faster with technology and 84% strongly agreed and agreed that technologies increase learners' academic performance.

Table 13. The use of technology in teaching (N=44).

Question (N = 44)	M	SD
Question 1 of 10: I enjoy using technology	4.32	.952
Question 2 of 10: I teach better with technology	4.07	1.108
Question 6 of 10: Technology makes teaching easier and faster	4.45	.951
Question 9 of 10: It can help increase students' performance	4.25	1.081

Correspondingly, for the Likert question 4, 5 and 7, of the 44 teacher participants, the frequency of response showed 88.6% respondents strongly disagreed and disagreed that they do not know how to use technology, 79.5% of the teachers strongly disagreed that they are afraid of using technology for teaching and 54.5% of the teachers respondents strongly disagree that they do not need technology for teaching. Likewise, findings indicate, out of the 44 teacher participants, 66% of the respondents strongly disagreed and disagreed that they do not have enough technologies in the school. 31.8% of the respondents were not sure if they needed more professional training on how to use technology but 25.0% agreed that more training is needed. In addition, 84.1% of the respondents strongly disagreed or disagreed that technology makes classroom management difficult.

Results indicated that the three most helpful technologies were PowerPoint (18.4%), Laptop (17.0%) and Google (15.5%). The least indicated were the Blogs (4.4%), the mobile phones (3.9%), the WhatsApp application (2.4%) and Microsoft Excel (3.9%). Most of the respondents in school C identified IPad while respondents in school D identified ManageBac, Turnintin and Quizlet.

Table 14 shows teachers' most preferable technology tools: laptop, projector, internet, YouTube and Laptop. On the other end, the least used technologies are Twitter, Facebook, SMS Text, Skype and Prezi. Out of the 44 teacher participants (school A, B, C, and D), 26 indicated that there was an adequate (good, very good and excellent) access to technology in the school. On the other hand, School A has mixed result. Equal number of the respondents indicated that technology access was poor and good. Similarly, an equal number of respondents indicated that access to technology was average and very good. Lastly, with regard to the differences between the perceptions of teachers and students in relation to all the questions, results showed that the differences were no statistically significant.

Table 14. Technologies used for teaching (n=44).

		M	SD
1.	Laptop	.89	.321
2.	YouTube	.70	.462
3.	SMS Text	.05	.211
4.	Facebook	.05	.211
5.	Skype	.00	.000
6.	Projector	.75	.438
7.	Twitter	.02	.151
8.	Blogs	.23	.424
9.	Internet	.75	.438
10.	Prezi	.00	.000
11.	Laptop/Desktop	.64	.487

Another finding in this research also showed that the majority of the respondents (29.55%) indicated that they use technology for teaching frequently, 27.27% use it almost always, and 22.73% use it occasionally, 15.91% all the time, 4.55% rarely. Consequently, findings showed that the majority of respondents frequently, almost always and occasionally use technology for teaching. 31.82% participants integrate technology in teaching ten to fifteen hours weekly and 27.27% use technology 2-5 hours weekly.

Almost all the teachers' (21out of 22) of the bilingual schools were averagely or advanced competent in technologies while teachers (12) of the international schools indicated they were advanced competent in technologies. On the other hand, half of all the respondents (50%) sometimes get professional training whereas half (6 of 12 teachers) of the School A respondents have never been given a professional training.

Factors that hinders technology integration, showed '9% of the teacher respondents indicated 'curriculum' as a barrier, 7% of the respondents indicated 'Lack of maintenance', 2% of the respondents stated lack of professional support', 23% of the teachers wrote 'limited availability of technology/network' hinders technology integration, 5% of the respondents stated 'students distraction' was a barrier, 43% indicated 'time constraint' does not allow them to maximise technology use and 11% of the respondents stated 'noting' hinders them from integration technology. Therefore, the most indicated barrier to teachers' technology integration was time constraint.

4 Conclusions and discussions

The aim of this study was to examine primary and secondary teachers' and students' perceptions regarding the effectiveness of technology integration into teaching and learning in Muscat, Oman. While there is a satisfactory amount of empirical evidence on the teacher's and students' perspectives with regard to the use of technology in the school setting, very few cross-sectional studies have been carried out in cultural and specific socio-geographical contexts such as Muscat, Oman.

Results showed that both teachers and students enjoy the use of technology in teaching and learning and they similarly evaluate the appropriateness and effectiveness of available technologies. The participants in this study mostly use technologies such as Google, internet, whiteboard, Laptop, Projector and PowerPoint. Projector in particular is most used by both teachers and students. Similarly, Gebre et al. (2015), Khodabandelou et al. (2016) and Yildiz & Selim (2015) confirm the finding that projector is widely used in formal education. The three most helpful technologies according to teachers were PowerPoint, Laptop and Google and this correlates with students finding. These findings affirm Hastür & Doğan (2016) who showed that technological applications like Facebook, blogging, Google and Websites were integrated into daily teaching. We conclude that in terms of technology use, in line with other studies, the participants in this study similarly select the right and the best tools to achieve their learning goals.

Other important findings concern the choice between new technological tools and the Social Media. Recent technological applications such as ManageBac, Quizlet and Kognity which were available to students of the international schools are preferred against the Social Media tools (e.g. WhatsApp and Blogs) which were not widely used by the teachers and students alike. This finding is in contrast with Andrew and Jones, (2015); Khodabandelou et al. (2016); Mac Callum et al., (2014); Okoro, Hausman & Washington (2012) who showed that social media is preferred in other contexts and is used as a means to facilitate learning.

The majority of teachers agreed that teaching has become easier and faster with technology and that students' academic performance is enhanced. The results show that teachers of international schools are advanced users of technology compared to bilingual teachers with the majority being average users of technology. Teachers also mentioned that they use technology to easily get faster access to teaching resources, motivate and interest students, make learning easier, help students visualize subjects,

give detail instruction and make students learn better. Over half of the teachers indicated that they use technology to plan lessons and monitor activity. As discussed by Davies & West (2014) teachers' competence in technology use contributes to enhancing learning because students in this way are taught how to develop technological skills in order to be benefitted of the effective use of technology. For example, the authors support that the use of technology for instructional purposes facilitates learning, thus, effective teachers need to develop skills for giving lessons, planning, presenting and assessing through technology. Overall, participants are positive towards technology for the promotion of learning and teaching.

The majority of the teacher participants do not regularly but sometimes get professional training. On the other hand, the lack of regular professional training did not hinder technology integration by the teachers. This is in contrast with other empirical evidence outlined in the literature e.g. Davies & West (2014); Mac Callumm et al. (2014); Reinsfield (2016); Sabzian & Gilakjani (2013) and Wahsheh & Alhawamdeh (2015) where professional training was shown to be a barrier to teaching effectively. Although previous studies suggested that professional training contributes to effective teaching, this study supports that lack of professional training is not a factor hindering technology integration. Mores studies in similar settings need to be carried out for confirming whether the socio-geographical context plays a role in this fact.

The majority of students' use technology to do projects, read/do research and do homework. Surprisingly, a limited number of respondents talk to their teachers and check their scores with technology. Some respondents from the international schools in the open question state that technology is used to write exams, do short tests and play educational games (grade six students). Similarly, respondents from bilingual school's state technology is used to watch educational videos (science) and translate unknown words. These findings reinforce Li et al. (2015) discussion of technology as a tool that provides 'rich resources' and 'visual effects' which promote learning.

All teacher and student participants support that technology is an effective tool in education. According to teachers, technology is effective because it enhances teaching, it keeps teachers updated, it provides a better understanding for students, it makes learning easier, it motivates students and it provides quick access to information. Similarly, students support that technologies are effective because it is easy to get fast access to information, technologies help them to learn and search for new things, it gives them better understanding, it is easy to use, they use technologies to confirm

answers to questions or task, technologies improve their academic performance, they also use it to monitor class activities and it motivates them to complete given tasks and some participants sees technology as an effective tool because learning has become fun. Evidence that students feel motivated at school because of educational technology, is also drawn from the question 'how has technology changed your feelings about school' where the second most favorable answer related to better learning through technology. Likewise, students' choice that learning is better with technology was among the first three most favorable answers at another Likert scale question regarding opinions about technology. These findings are in line with Tunmibi, Aregbesola, Adejobi & Ibrahim (2015,) who showed that there is a strong link between effective learning and effective use of the limitless educational activities that androids tablets and personal computers provide.

The majority of student participants say nothing prevents them from using technology. Other factors mentioned were distractions, bad network connection, not enough time given to complete tasks and not having the adequate technology. With respect to teachers, they indicated that among the factors that prevent them from integrating technology into their teaching is limited time, inadequate technology, students' distractions, curriculum and lack of professional support. These findings are in contrast to Mac Callum et al. (2014) study who showed that teachers' and learners' ICT anxiety is a major barrier to effectively using technology.

The main limitation of the present study is that generalisations cannot be made without caution due to the fact that the answers of the survey teachers represent the views of the individuals at the time and place that they gave them, and that the accuracy and honesty of the responses could not be verified since some of the teachers were reluctant to participate because they were afraid of bad or negative results. Lastly, questionnaires were filled at school during break-time. A few students who did not finish filling out their questionnaire before the bell rang for classes were allowed to take it home and the questionnaires were collected two days later. Hence, the researcher has no way of knowing if such students' responses could have been influenced by the change of environment or the people around them at home.

This study contributes not only to theory but also to policy and practice. The study shows that teachers and students have positive perceptions regarding the effectiveness of technology integration into teaching and learning. Also, it is concluded that irrespective of cultural context and the frequency of technology use in the classroom, teachers both understand the subject matter and transform this into

teaching material. The findings support that teachers take into advantage educational technologies for enhancing teaching and learning, thus TPCK is successfully applied in the learning process.

There is a number of challenges in the local context that Policy and Practice should take into account with regard to the National Curriculum. The most important factor that hinders technology integration concerns the limited availability of technology and bad network. Educational authorities need to implement a flexible but qualitative curriculum that enables teachers to integrate more technologies to prevent its limited usage. Furthermore, Policy and Practice should take all relevant measures to provide students with the technological resources which will help in their learning as results showed that teachers have better access to technologies than students; as a consequence, some students do not feel very confident in using technology at school and thus there is a need to be trained.

The findings of this study are in line with results from studies carried out in different cultural and socio-geographical contexts which showed that teachers and students perceptions regarding the effectiveness of technology integration into teaching and learning are positive. Teachers' and students' classroom technology practices aligned with their beliefs, views and perceptions. In terms of the need to establish more general theories about the cultural revolutions with reference to technology integration, this study contributes evidence from a specific cultural and socio-geographical context verifying that teachers and students benefit alike from building an effective teaching lesson by implementing technology.

Finally, it is necessary to investigate further what types of educational technologies do students and teachers use in certain subjects as this will shed light on whether teachers successfully apply their pedagogical knowledge in order to identify the processes that students follow to understand a concept and acquire relevant skills. This will also show whether teachers effectively master information technology for information processing. As TPCK is of paramount importance to the learning process, further cross-sectional and longitudinal evidence drawn from more schools in Muscat, Oman, are needed to verify that teachers understand not only the subject matter they teach but also how the application of particular technologies can further facilitate the subject manner. Considering the three main aspects of teachers' knowledge (content, pedagogy, and technology), the next step to research which would have both theoretical and practical value, would be to further examine whether teachers' use of technology is technological, pedagogical or content driven. Lastly, the

findings of this project would offer the base for investigating whether the teachers' and students' use of technology differs in view of the three bodies of knowledge comprising the TPCK framework.

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