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Published online: 31 Oct 2016.

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The effectiveness of PowerPoint presentation and conventional lecture on pedagogical content knowledge attainment

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ABSTRACT

In English language teaching settings, the type of lecture is important since students should be exposed to instantly recognisable linguistic features in the target language through interaction. This quasi-experimental study was designed to compare the effectiveness of PowerPoint presentations (PPP) and conventional lecture/discussion sessions on the pedagogical content knowledge of the student-teachers of English. PPP were used in the experimental group and conventional lecture/discussion sessions were employed in the control group (CG). The findings revealed that the treatment process was effective on both groups, but the CG achieved better in the post-test. Following the treatment process, the efficiency of the applications was also tested by means of a questionnaire. The CG reflected more positive attitudes towards the conventional lecture/discussion in terms of the quality of instructional strategies, academic language use, professional development, professional perception and problem-solving.

Introduction

Educational technology offers practical applications for educational resources, teaching strategies, transferring information, content determination and interaction. Technology-enhanced learning which involves web-based technologies, mobile devices, computers, tablets and other digital devices (Kirkwood & Price, 2014) may create collaborative or self-directed, didactic or practice-based learning environments (Marusic' & Slisko, 2012) and may promote authentic learning (Pillay, Bozalek, & Wood, 2015). Moreover, technology-enhanced learning offers students different ways for communicating with their classmates and teachers by providing access to interactive and multimedia content (Bayne, 2015; Conole, 2013). Technology use in language teaching settings has also been expanded to foster cross-cultural awareness, to improve writing skills, to discover authentic texts, to develop speaking and listening skills, and to increase motivation (Chun, Smith, & Kern, 2016; Yang & Chen, 2007, 2014).

The use of educational technology has undergone an evolutionary process. Initially visual devices, overhead projectors and Powerpoint slides, were used to explain difficult material as concretely as possible, and then audio-visual devices, films and videos, were combined with a visual component to enhance a person's attention span and retention of the content (Bester & Brand, 2013). However, using technology in the classroom may not always result in beneficial outcomes from the students' perspective. While some students may prefer learning through technological aids, other students may prefer conventional lecture/discussion. Therefore, the present study aimed to investigate and to compare

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the benefits and drawbacks of PowerPoint presentations (PPP) and conventional lecture/discussion sessions in the teacher training process.

PPP and education

PPP have become usual instructional aids in educational settings. A PPP is a combination of text, graphics, explanations and advanced software features, to engage with the audience (Farkas, 2006). In PPP instruction, students are concurrently exposed to various forms of information which is visually organised. An outstanding PPP may have the power to highlight the remarkable points in order to capture the attention of students (Stein, 2006). Additionally, an animated PPP may prompt students' analysing/synthesising capabilities, thus improving audience focus and increasing spontaneity (Adams, 2010). PPP may provide a platform to display effective and appropriate written material and/or visuals. Moreover, teachers may deliver the lecture slides before the class and students can comprehend the lecture notes on their own which leads to self-study (Mottley, 2003).

The effectiveness of PPP lectures has been the concern of many educational studies. PPP instruction was found to be extremely helpful for taking notes (Clark, 2008; Frey & Birnbaum, 2002) and prompting learning through recalling and recognition (Szabo & Hastings, 2000). Additionally, a number of studies determined that students have positive attitudes towards the PPP instruction (Can, 2010; Kahraman, Çevik, & Kodan, 2011). In a study carried out by Alkash and Al-Dersi (2013), it was reported that PPP lectures helped EFL student-teachers easily comprehend the main concepts and theories of teaching and increased their achievement level. Likewise, Bester and Brand (2013) who investigated the role of technology on academic achievement in three different courses declared that in each instance the average achievement score of those who received technology instruction was significantly higher. Moreover, the study by Susskind (2008) revealed the positive effects of PPP on developing self-efficacy but without any effect on academic achievement.

Chigona and Davids (2014) investigated the impact of PPP instruction on teachers, and the study ascertained that the use of technology could be rewarding and increase teacher motivation. However, there may be various drawbacks of PPP; for instance, PPP slides may force the teacher to read the slides without providing any opinion or explanation on the issue; slides may include more information than necessary, which could create confusion or even distract students from the central information; and the given input can submissively be perceived and internalised by students. In this respect, several studies proclaimed some concerns on PPP; for instance, Savoy, Proctor, and Salvendy (2009) emphasised the negative effects of PPP instruction on information retention and asserted that student-generated orality seems to have been downgraded by the unidirectional nature of the discourse which accompanies most PPP. It is also claimed that PPP slides are often devoid of paragraphs, pronouns, punctuation, conjunctions, auxiliary verbs and articles (Craig & Amernic, 2006). Additionally, Bartsch and Cobern (2003), Shallcross and Harrison (2007) ascertained the negative effects of PPP on students' exam scores. The studies in which both positive and negative aspects of PPP in terms of efficiency were reported (Apperson, Laws, & Scepansky, 2008) concluded that the students displayed poor performance as a result of the PPP instruction but high preference for being instructed through PPP.

Conventional lecture/discussion

An alternative to the PPP lecture is the conventional lecture, which uses a whiteboard and teacher talk. While PPP lecture is more trouble-free for the teacher, s/he may face some linguistic and thematic difficulties in conventional lecture. The difficulties of conventional lecture and the facilities of PPP are the concern of teachers; as for students, PPP may make it harder to have an open exchange between the presenter and the audience for conveying ideas (Norvig, 2003). The obstacles of PPP for students may create difficulties to figure out the given information.

Particularly in language teaching settings where students should be exposed to instantly recognisable linguistic features in the target language through interaction, the PPP lecture may cause poor

performance. Therefore, lecturing without PPP may yield better results in students' achievement. Some studies support this view; for instance, in a study by Amare (2006), it was reported that students' performance was higher in the courses taught in a conventional lecture, although they stressed their preference for PowerPoint. Similarly, in another study by Xingeng and Jianxiang (2012), the researchers stressed the disadvantages of PPP and expressed that lectures by means of PPP neglected interaction with students and makes a lecture monologue, for the strict order of slides may limit the extemporaneous performance of the instructor.

Based on the claims made on the advantages and disadvantages of the PPP lecture and conventional lecture/discussion, this study aimed to investigate experimentally the effects of both approaches in teacher training process for teaching pedagogical content knowledge (PCK). The need to address to this issue is due to the limited number of the studies carried out to explore the impact of using PPP on English language teacher training.

Methodology

Design and procedure

This study was carried out in the English Language Teaching (ELT) Methodology course in which student-teachers of English are trained on the PCK themes. PCK development is an important source of gaining teaching experience (Banegas, 2009; Lui, 2013). For Shulman (1987), PCK integrates content and pedagogy into an understanding of how particular teaching topics are presented for instruction. Ball, Thames, and Phelps (2008) distinguish PCK into two sub-domains: knowledge of content and students, and knowledge of content and teaching. Pertaining to the significance of PCK in teacher training, the present study attempted to explore a special perspective by examining the impact of the PPP and conventional lectures on the PCK development of student-teachers of English.

This study was carried out in three stages: diagnosing the student-teachers' preferences about the type of lecture in the ELT Methodology course; designing treatment interventions for both control and experimental groups (EG) regarding their preferences; and evaluating effectiveness of the treatment by means of pre and post-tests. Additionally, the positive or negative impact of the treatment process were also investigated by means of a questionnaire. In the study, a mixed methods sequential explanatory design, considered to be highly popular among the researchers (Creswell & Clark, 2011), was selected to seek answers to the research questions addressed below:

(1) How effective was the conventional lecture/discussion in the PCK courses?
(2) How effective was the PPP instruction in the PCK courses?
(3) Was there a significant difference between the two applications in the academic achievement of the student-teachers?

Participants

The participants of the present study were 89 ELT students enrolled in the third year of an ELT programme at a Turkish university. The participants were nearly at the same age level (about 20s) and 81% of the participants were female. It is stated that if the participants in a study are nearly same on a given characteristic, that characteristic is accepted as constant, not a variable in the study (Gliner, Morgan, & Leech, 2010); therefore, the variables 'age differences' and 'gender differences' were not evaluated as variables in the study. The participants were recruited from two classes of the same department and taught by the same educator in the ELT Methodology course, in which they were exposed to theory-oriented PCK. All participants completed a consent process wherein they allowed their work to be published. Additionally, owing to the experimental nature of the study that would result in variation in the participants' learning, ethical and consent procedures with the institution were accomplished.

The study is quasi-experimental in nature as there was no true randomisation. Instead of random selection, matched-groups design was used for grouping the participants based on the dependent variable – the participants' preference for the PCK lecture. Before placing the participants into the control and EGs, they were asked to declare their preferences about the type of lecture in the course: PPP or conventional lecture/discussion. To get their ideas, they were invited to a pre-course meeting. During the meeting, they were asked to write their preferences on a piece of paper and to express their reasons. After evaluating the responses, it was reported that 38 student-teachers strongly desired the conventional lecture/discussion; 46 preferred the PPP-enhanced instruction; and 5 students were in between. To close the numerical gap of the participants between the groups, the ones who did not have a strong preference for any type were assigned to the conventional lecture/discussion group. Thus, the effectiveness of the PPP lecture was evaluated in the EG and the conventional lecture/discussion sessions in the control group (CG). Before their placement, they had been instructed conventionally. Following the placement, they were tested on the PCK awareness to determine their pre-treatment scores which would be used as the pre-test scores in the study. The lectures in both groups were carried out in four-hour sessions for five weeks, and after the treatment process, they took a midterm exam which was used for the post-test evaluation. The midterm exam was the parallel form of the pre-test on PCK. The content and style of both pre and post-tests comprised the PCK themes which were lectured in the courses using PPP and conventional lecture/discussion.

Findings and results

Paired samples *t*-tests were used to calculate their performance scores separately before and after the treatment, to find out whether there was a significant difference between the mean scores. Since both groups were initially instructed in the same way by the same educator before the placement, their ability and background knowledge were assumed to be similar. The concern of the study was to evaluate the impact of PPP and conventional lecture/discussion sessions; therefore, merely the data from exam scores were evaluated; other factors which may have had possible effects on their overall performance and improvement were not evaluated. Paired samples *t*-test was calculated to check the improvement of the CG in PCK, and the results are displayed in Table 1.

The observed difference between the scores of pre-test and post-test was statistically significant, $t_{(43)} = -6.53$, $p < .01$. The effect size was calculated and the value was found to be big, $d = 1.62$; according to Green and Salkind (2005), $d < 0.2$ is small; $0.2 < d < 0.8$ is medium; $0.8 < d < 1$ is big; $1 < d$ is large.

Paired samples *t*-test was also calculated for the EG in order to check whether there was any difference between the pre and post-test mean scores and to validate whether the improvement was statistically significant. The results are presented in Table 2.

The difference between the scores of pre-test and post-test was statistically significant, $t_{(46)} = -4.56$, $p < .01$. The effect size was calculated and the value was found to be big, $d = 1.08$. To compare the mean scores of the control and EGs from both pre and post-tests, independent samples *t*-test was used and the results are demonstrated in Table 3.

Table 1. Paired samples *t*-test for CG.

	X	Std.	Std. error mean	t	df	Sig. 2 -tailed
Pair 1 Pre-test Post-test (control group)	−4.31	2.64	4.62	−6.53	42	.000

Table 2. Paired samples *t*-test for EG.

	X	Std.	Std. error mean	t	df	Sig. 2 -tailed
Pair 1 Pre-test Post-test (experimental group)	−2.51	1.98	4.57	−4.56	45	.000

Table 3. Independent samples *t*-test analysis for control and EGs.

	Groups	N	X	S	SD	t	df	p
Conventional talk lecture	Control	43	−4.31	.76	2.64	2.58	87	.000
PPP	Experimental	46	−2.51	.43	1.98			

Table 4. MANOVA results of control and EGs.

	Wilk's Lambda		
Value	F	SD	p
.744	14.076ᵃ	4.002	.000

Note: Critical values of *F* (α= .05).

As displayed in the table, there is significant difference between the groups' performances ($t_{0.0187}$ = 2.58). The scores of the EG were reported lower than ($X_{(46)}$ = −2.51) than the CG ($X_{(43)}$ = −4.31). In order to validate the scores of both groups, MANOVA analysis was employed and the results are displayed in Table 4.

Pertaining the MANOVA test results, significant difference was found between the control and EGs, (λ) = 0.744, F = 14.07 and $p < 0.01$. The mean scores in independent samples *t*-test and MANOVA test results denoted that the PPP lecture in the PCK development was not so efficient as the conventional lecture/discussion sessions.

The mean scores of the pre–post-tests simply indicated the achievement levels of the groups in the PCK. In order to validate the results and to ascertain their views about the benefits of the lecture types, a 20-item questionnaire was administered to the participants in both EG and CG. The responses of both experimental and CGs were cross-tabulated in order to give clear indications about the responses relatively. The items in the questionnaire were classified by two experts in five categories which measured the comprehensibility of the lecture types in terms of reasoning, explaining, informing, detailing and decision-making. Since the PCK courses addressed to teaching profession themes, the evaluation criteria were included into five interrelated sorts: instructional strategies, academic language use, professional development, professional perception, and problem-solving for both experimental and CGs.

A very high proportion of the percentage belongs to the CG who were exposed to conventional lecture/discussion sessions in all PCK theme sets, though the EG also had comparable values in intelligible reasoning (EG = 54.7%; CG = 694%), lucid explanation (EG = 55.3%; CG = 83.3%), and reasonable decision-making (EG = 55.9%; CG = 733%). In the other theme sets, directive information for professional development (EG = 46.7%; CG = 73.3%) and comprehensible details for professional perception (EG = 45.9%; CG = 72.5%), the highest values were assigned to conventional lecture/discussion sessions by the CG.

Discussion

The study results were primarily discussed to address the research questions designed for assessing the quality of both the conventional lecture/discussion and PPP lecture for teaching PCK. The first and second research questions attempted to find answers about the effectiveness of both lecture types. The data exhibited interesting results that the student-teachers who were exposed to the conventional lecture/discussion benefited more than the EG who were exposed to the PPP lecture. The preferences of the CG already displayed their eager attitude towards the conventional lecture/discussion at the beginning of the research process. Comparatively, the EG participants were eager to be lectured through PPP. In this respect, preferences may not be thought as the sole determining factors for success, but it could contribute. The astonishing result is that the EG did not receive much benefit from the PPP treatment contrary to the previous experimental studies (Alkash & Al-Dersi, 2013; Can, 2010; Kahraman et al., 2011) that have argued the benefits of the PPP treatment.

The third question sought for the differences of the two applications in terms of academic achievement. The paired *t*-test results indicated that the conventional lecture/discussion was more effective on the student-teachers' achievement in PCK. The participants' views also confirmed that the conventional lecture/discussion on PCK was more beneficial than the PPP lecture. They emphasised that the conventional lecture/discussion was more informative, reasonable and comprehensible. Thus, comprehending the course themes and making reasonable decisions when any problem encountered could be accomplished thoroughly. Furthermore, the CG benefited more than the EG while dealing with instructional strategies, professional awareness and development and academic language use. During conventional lecture/discussion sessions, ample opportunities and facilities could be offered to explain the subject matter and themes in detail through interactive discourse. This suggests that when students are exposed to interactive courses, they achieve well.

The EG who preferred being lectured through PPP showed lesser enthusiasm towards the PCK themes than those of the conventional lecture participation. However, for noticing the PCK terminology, the PPP lecture was more beneficial for the EG; they could concentrate on the slides when it was difficult to follow the lecture, as it is argued that the use of PPP slides tends to speed up more precise and lucid delivery (Basson, 2009). Depending on the results, PPP can also be acknowledged as facilitative technological tool but may not offer extreme benefits for students all time.

Contrary to the studies in which the positive impact of the PPP instruction on students' academic success was reported (Can, 2010; Clark, 2008; Frey & Birnbaum, 2002; Kahraman et al., 2011), the data of this study did not show any significant contribution of the PPP instruction to the PCK development when compared to the CG. The results of this study are consistent with the study by Apperson et al. (2008) where the PPP instruction was found to be not so efficient on the participants' performance, despite their preference for being instructed by means of PPP. Unlike the studies by Bartsch and Cobern (2003) and Savoy et al. (2009) where the negative effects of the PPP instruction on the students' exams were discovered, no negative impact of the PPP instruction was reported in this study.

In this study, it was assumed that the low performance of the EG in PCK resulted from the reason that PPP made it harder to have an open exchange between the lecturer and the student-teachers as stated by Norvig (2003). The student-teachers who were exposed to the PPP instruction had limited opportunities for discussion because of the strict order of slides and the monologue nature of the PPP instruction where the lecture was not independent from slides. Additionally, focusing the attention on the slides, as claimed by Xingeng and Jianxiang (2012), might have caused the low performance of the EG, though the PPP lecture was more trouble-free for the lecturer and the input was enhanced and visualised for the student-teachers. As Zhongling and Jianzhong (2016) argue the student-teachers' cultural norms might also have played a role in their inclinations. Contrary to the EG of this study, the conventional lecture/discussion kept the interaction with the student-teachers in the CG alive.

Based on the results of this study, both PPP lectures and conventional lecture/discussion can be suggested in teacher training programmes, though the latter one seems to be more favourable and effective for PCK courses where more discussion and interaction should be practised with the engagement of student-teachers. Although PPP slides may enrich the input, offer numerous dynamic visual opportunities and make the instructor more confident, the conventional lecture/discussion may be more convenient for students to be engaged in interactive learning occasions independent of general configuration of slides.

To sum up, the use of technology cannot be excluded from educational settings; nevertheless, the extent of its facilities should be determined well in advance to enhance the key components of learning. Conceivably, educators in PPP lectures can focus on the content, since the slides provide guidelines. For students, particularly for visual students, PPP slides may offer more facilities to follow the course, but it may not be suitable for reflective, impulsive, or auditory students. A well-designed PPP lecture may have an impact on short-term memory of students (Nouri & Shahid, 2005); it may also allow dynamic and innovative lectures in the classroom for taking the attention of students. In a similar fashion, Adams (2010) stresses that as teachers become more informed about the affordances of the technology, their teaching practice is simultaneously improved by the given technology-in-use. Additionally, a high

degree of interaction with students can also be realised during the PPP lecture, if slides are designed with brief notes on the topic instead of writing the full text.

The advantages of both approaches for the classroom lecture should also be evaluated by considering the expectations of students, the course content, the styles of students, the impact of learning outcomes and students' academic achievement. This study simply aimed to discover the effectiveness of PPP and conventional lecture/discussion; however, some other issues such as motivation, affective domains and psychological attitudes need to be investigated in further studies in order to find out the correlation of PPP and conventional lecture/discussion with other factors.

Conclusion

In some courses, students may prefer to be instructed without any technological aids. The same instance was also appreciated by the participants of this quasi-experimental study which compared the effectiveness of both PPP and conventional lecture/discussion for the PCK instruction. In both practices, the groups demonstrated progress; however, the progress of the CG supported the idea that conventional lecture/discussion can be evaluated as more comprehensible and informative, since such lectures may create interactive learning environments in which pieces of slides are excluded. Instead of choosing only one type of lecture for interactive and enriched lecture sessions, it would be better to design courses with a mixture of the two; in other words, a course can be carried out through conventional lecture/discussion and supported by means of technological aids.

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

Muhlise Coşgun Ögeyik is a professor of teacher training at the Faculty of Education, Trakya University. Her research interests are English-language teacher training, technology use in the language classroom and research methods.

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