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USING TOOLS FOR MEASURING TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE OF ENGLISH LANGUAGE TEACHERS

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Abstract

Integration of information and communication technology into other than Information Technology subjects taught at schools of all levels in the Czech Republic has become of great importance. As schools are equipped with information and communication technology (ICT) much better than ever before researchers have focused on the way they are used in the classes. Development of technology is fast and not all teachers from schools have undergone education on how to integrate technology into the teaching process. These are the reasons why it is necessary to find a system for training teachers in this field. We provided such a training course for secondary school English teachers. This article brings information about the impact of this course on one model teacher's lessons. A questionnaire, which was specially developed for the purpose of evaluating technological pedagogical content knowledge (TPACK), is introduced in this article. It assesses the TPACK development perceived by the teacher. We describe in detail how the new knowledge and skills reflect in her teaching. The results are demonstrated on the Technological pedagogical content knowledge framework.

Key Words

EFL, ICT, secondary schools, teaching English, TPACK

Introduction

This article deals with the way teachers use information and communication technology (ICT) in the classes. Under the term ICT we understand all digital tools of hardware and software used for creating, storing and retrieving data. In case of this article we discuss mostly computers, the Internet, word processing software (MS Word), the interactive whiteboard (IWB) and its original software (Smartnotebook 11). Different means of ICT are divided by function and role. Chroust (2008) elaborates on their affordances and constraints in education. We use the terms ICT, digital technology and technology interchangeably as opposed to traditional technology (books, a blackboard and chalk).

Niess (2011) states that faculty modelling plays a role in the way teachers handle ICT in their lessons. The term faculty modelling means what behaviour students are exposed to at university. However, many contemporary in service teachers have not learned content with ICT. As a result, they are not prepared to strategically think of how to implement technology into their teaching. Niess then poses the question on how to encourage in service teachers to develop TPACK strategic thinking. She also refers to classroom observation as one of possible research tools.

Teacher's training on ICT integration has started to become more domain specific in the last years (Zounek, 2009). However, in the region of South Bohemia there have been offered only ICT courses only for teachers of all subjects together (Carbová, 2012). Thus we organized an ICT course for in service teachers of English offering special tools and strategies for English as a foreign language lessons (Carbová and Betáková, 2013). We needed to assess its impact on the teachers TPACK so as to improve the quality next time and to transfer the experience to pre service teachers. The ICT integration course included these topics: using the interactive whiteboard (6 lessons), creating a high quality printed material (2 lessons), using web based tools available free of charge (4 lessons), putting the MOODLE e-learning system into practise (6 lessons) and opportunities offered by oxfordenglishtesting.com (2 lessons).

A very well-developed example of evaluating impact of educational training on various aspects of a business company system has been implemented by Staňková and Drdla (2012). They dealt with a slightly different topic of measuring the motivation and requirements on company education, methods and forms used in training courses and attitudes of the participants towards evaluation of company training. They obtained data interviewing the participants using semi closed questions and the free interview technique and carrying out a questionnaire survey using closed and semi closed questions.

For evaluating the development of teachers' Technological pedagogical content knowledge we applied three evaluation instruments: semi structured interviews, a specially developed questionnaire, which was given to the teachers before the beginning of the intervention and one month after its end, and lesson observations of 4 teachers. In this paper we focus on one of these teachers in a greater detail.

For understanding and describing the changes in teachers' ICT implementation into teaching we use the Technological Pedagogical Content Knowledge. This consists of 7 areas (Koehler and Mishra, 2008). Pedagogical knowledge (PK) is knowledge of methods and practices in teaching and learning as well as purposes, values and aims. Technology knowledge (TK) means how a person can work with ICT, how they can overcome technical problems and how they learn new skills in this area. Content knowledge (CK) represents knowledge of the subject being taught, concepts, theories and a ways of

developing such knowledge. The term of Pedagogical content knowledge (PCK) (Shulman, 1987) represents the endeavour of connecting content and pedagogy including ways of presenting content, choosing and adapting appropriate learning materials to comply with students' nature and current level of knowledge. Technological pedagogical knowledge (TPK) deals with how using technology and its affordances and constraints influence teaching and learning. Technological content knowledge (TCK) presents the notion of how technology and content influence and constrain each other. Technological Pedagogical Content Knowledge (TPACK) connects all previously mentioned areas and thus integrates what to teach with which technology and how this influences the situation of teaching and learning. It involves considering how content, technology and pedagogy interact with each other.

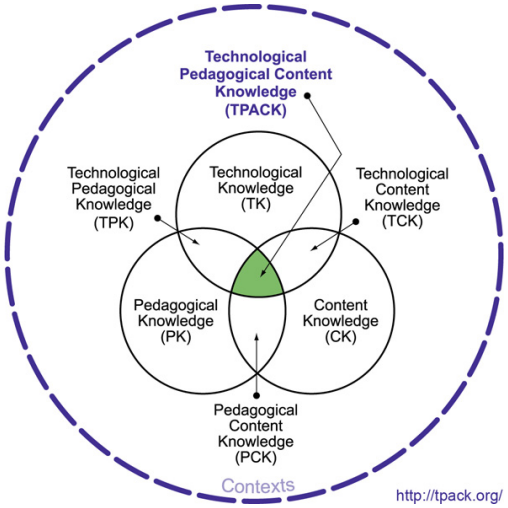

Fig. 1: Graphic representation of the TPACK scheme. Source: http://tpack.org/

Materials and Methods

We obtained data for this research by observing 16 lessons taught by one of the course participants. The observations took place over two months starting in the middle of the ICT training course and proceeding afterwards. In the observations we focused on the activities from the beginning to the end of the lesson, the way the teacher gave instructions but mainly on the way technology was used, who used it and students' reactions to ICT based activities. We also noticed any difficulties with ICT and how they were dealt with. After each observed class we asked the teacher to give brief comments on the lesson in an interview. To sort out the obtained data we used the TPACK framework.

The teacher, who we call Natalia for research purposes, teaches at a secondary school in České Budějovice. This school prepares students of four-year secondary school study and three year follow up study for the maturita exam in English. In the lesson observations there was a minimum of 2 and a maximum of 10 students. Natalia has 11 years of teaching experience in secondary schools. Natalia had been to these training courses prior to our intervention: Using the interactive whiteboard, working with Microsoft Office and using free web-based tools.

At the beginning and two months after the training course the teachers were asked to fill in a questionnaire in order to self-evaluate their knowledge development. The questionnaire is divided into several parts. These parts focus on the single areas of TPACK and teachers' beliefs referring to using ICT in the classes. The individual items were taken from other researches and possibly adjusted to suit the current situation of secondary teachers in the Czech Republic. The reason for using items from

other authors' questionnaires is the process of their validating, which requires a significant amount of respondents. This process has been carried out with all of the resource questionnaires.

The questionnaire

The questionnaire starts with explaining what ICT means in the context of our research. It was given to the teachers in Czech to avoid misunderstanding caused by the language barrier. Most of the items were taken from the Survey of Preservice Teachers' Knowledge of Teaching and Technology questionnaire (Schmidt et al, 2010). This evaluation instrument is constructed based on the individual TPACK domains. It examines the state of these areas: technological knowledge (TK), content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), technological pedagogical knowledge (TPK), technological content knowledge (TCK) and technological pedagogical content knowledge (TPACK).

In the process of developing the TPACK questionnaire three experts in the field were asked to assess the single items based on their information value. These experts worked independently on each other. The items, which are stated below, were recast and some of them were eliminated with the aid of other two experts. After trying the questionnaire out in practise a factor analysis with varimax rotation of the single items was carried out and a Cronbach-alfa test was used to calculate the items' inner consistency. The questionnaire was constructed so that it would suit several subjects or could be easily adjusted to suit more subjects. One of its essential features is the respondents' auto-evaluation which brings certain subjectivity. The items are formulated in a very general manner, e.g. "I can teach lessons that appropriately combine mathematics, technologies, and teaching approaches." From this questionnaire we acquired the following items which are to be answered on a five-level Likert scale: 7-11, 14, 16, 17-21, 23-29 and 32-34. Item number 41 was adopted from the same questionnaire but this question needs a longer answer from the respondent. Answering this question requires knowledge so it shifts the subjective nature of the questionnaire to a more objective level.

Another resource for our evaluation instrument is the Levels of Technology Implementation (LoTi) Questionnaire (Keller et al, 2008), which was used in the TICKIT program. Its authors are teachers of a technology implementation course taking place in Indiana. TICKIT stands for The Teacher Institute for Curriculum Knowledge about the Integration of Technology. They used this questionnaire to evaluate the outcomes of the training course for teachers. The second part of the questionnaire was created by Moersch. It focuses on the use of ICT in the curriculum (Moersch, 1995). The aim of this questionnaire is to continuously assess the impact of an ICT integration training course. Its items are divided into five categories:

- technology integration
- technology limitations
- technology resistance
- computer proficiency
- learner-centered instruction

The authors of the innovated questionnaire (Keller et al, 2008) carried out a factor analysis to assess the reliability of the single areas.

The last source of items for our questionnaire is the Teachers' Attitudes Toward Computers Questionnaire created by Knezek and Christensen (1998). It comprises of seven different areas:

- enthusiasm
- anxiety
- avoidance
- using E-mail for teaching
- negative impact on society
- increasing productivity
- semantic perceiving of computers

Considering the early date of the questionnaire origin we chose only several items which deal with timeless questions. These relate to the teachers' attitudes towards using ICT in the classes. The numbers are: 35-39. Regarding the extent of the questionnaire and its complexity we included only these five items to indicate whether there has been any change in the attitude towards using ICT in the curriculum.

The questionnaire organization

In the first part of our questionnaire the teachers are asked to answer contact questions, which also introduce the topic of research. They ask about former education in ICT integration, find out the state of equipment at the respondent's school and they serve for substantiation of our training course. The term ICT is explained at the beginning of the questionnaire. These are the parts of our questionnaire.

The introductory part

1. How long have you taught English?
2. Have you taken part in a professional training course in the last two years? If so, didi it include training on ICT integration into teaching? If so, describe which skills it focused on.
3. Which hardware equipment do you have at your disposal in the classrooms?
4. Which software equipment do you have at your disposal in the classrooms?
5. Has your school obtained any hardware, software or professional development courses on ICT integration from a public grant?
6. What has, in your opinion, the biggest influence on the way you use ICT in the curriculum?

The next part of the questionnaire is in the form of a five level Likert scale. The options are: SD= strongly disagree, D=disagree, D/A=neither disagree nor agree, A=agree, SA=strongly agree. The following seven areas proceed according to the TPACK model. First we find out the state of each domain in isolation (content knowledge, technological knowledge and pedagogical knowledge) and then these domains are connected (pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge). The last domain connects all the previous together in technological pedagogical content knowledge.

Technological knowledge (TK)

In this part we ask about technological knowledge. We survey not only the current state of the user's skills but also their ability to acquire new skills. The last two questions guide the respondents to think about particular skills.

7. I learn quickly to work with ICT.
8. I keep up with new ICT.

9. I know about many different ICT.
10. I have the technical skills to work with ICT.
11. I have had enough opportunities to work with many different ICT.
12. I can solve problems with hardware (e.g. connecting the printer, headphones, microphone).
13. I can solve problems with software (rendering, compression, decompression, system management, working in multiplatform environment).

Content knowledge

The next part of our questionnaire surveys how the teacher perceives his or her content knowledge. There are only two items. This should be enough as we do not consider this area problematic.

14. My knowledge of English is sufficient so that I can teach the subject.
15. I dispose of strategies that allow me to develop my English knowledge and skills.

Pedagogical knowledge

The following six questions deal with teaching skills and they contain the topics of evaluating, understanding preconceptions/ misconceptions, adjusting the curriculum to the students' needs and classroom management.

16. I know how to evaluate students and how to guide them towards self-assessment.
17. I can identify students' typical mistakes.
18. I can adjust the methods, styles and techniques to the momentary level of students' knowledge.
19. I can organize and manage teaching.
20. I know how to support autonomous learning of English.

Pedagogical content knowledge

Only two items in the questionnaire focus on the teachers' perceiving of their pedagogical content knowledge. We refer to the source questionnaire here (Schmidt et al, 2010), which contains only one item as a reliable indicator of how well a teacher can transfer their knowledge onto the student. The second item was taken from the LoTi questionnaire (Keller et al, 2008).

21. I can choose an efficient way of teaching in order to lead students to thinking and to acquiring English language.
22. Apart from traditional forms of evaluation my students get a chance of alternative evaluation, which motivates them to show their knowledge and skills in nonconventional ways.

Technological content knowledge (TCK)

The area which represents connecting content and technology contains three items. They find out "what" is being taught using "which technology

23. I can choose ICT which enrich teaching methods in the curriculum.
24. I can employ ICT effectively to enrich my lessons.
25. I can adjust using ICT to various teaching methods.

Technological pedagogical content knowledge (TPACK)

The following items in the questionnaire refer to technological pedagogical content knowledge. This area includes the ability to assess which technologies to apply and in which context. We

also assess the ability to advise others and the teacher's self-growth in this area. The item "I use primarily exercises which focus on drill and practice or learning software when using computers in the lessons" has an opposite scoring then the other items on the list.

26. I can employ strategies which combine content, ICT and teaching methods in my lessons.
27. I can assess effortlessly whether a piece of computer software or other technology is suitable for my students to develop their critical thinking and to enhance their ability to solve authentic problems.
28. I can give others advice on how to connect the curriculum with using ICT.
29. I search for activities which support problem solving and students' critical thinking when working with ICT.
30. I use primarily exercises which focus on drill and practice or learning software when using computers in the lessons.
31. I myself search for further education concerning ICT integration into the curriculum/peripherals/software which maximizes the effect of using ICT in the classes.
32. The tasks I give my students include using various software programmes.
33. My students' authentic problem solving is supported by using ICT.
34. The way students use information and their ability to inquire determines the type of technology I use in my teaching.

Teachers' beliefs about using ICT in the curriculum

We assume that when being educated on how to integrate ICT into teaching there will be a shift in attitudes towards using ICT in teaching, The following six questions determine whether the shift has really happened. The statements are indirect and were chosen from different areas. The statements "Using ICT in the curriculum is not a priority to me", "I would like to use ICT in my teaching but there is not enough time" and "When using ICT in the lessons I feel uncomfortable and tense" have opposite scoring than the other items on the list.

35. Learning to use ICT is exciting for me.
36. Using ICT in the curriculum is not a priority to me.
37. I would like to use ICT in my teaching but there is not enough time.
38. When using ICT in the lessons I feel uncomfortable and tense.
39. Learning to use ICT is like learning any other skills: the more time we devote the better results we get.
40. My next professional goal is to learn to use whatever limited ICT equipment there is at my disposal.

Items dealing with actual situations

In the last question the teachers are asked to describe real situations and give their comments to these situations.

41. If you remember a situation when you or anybody else performed a successful demonstration of connecting ICT, learning content and methods, please, describe it. Write down which ICT were used, what content was taught and which teaching methods were used.

The interviews

As this was the first time we conducted such a training course and its evaluation, we did not want to limit the teachers by asking very specific questions. After each observed lesson we first created a friendly atmosphere by praising the teacher for some achievements in the lesson. Then we asked the following questions:

1. What was the goal of your lesson?
2. Why did you include technology?
3. Please, comment on the progress of the single activities. (Here we helped the teacher by reminding her of them.)
4. Was there anything difficult about using technology for you? Is there anything you would change next time?
5. Do you have any additional comments or observations?

The interview would always end by thanking the teacher and giving some positive feedback.

Results

First we could observe changes in Natalia's Technology knowledge (TK). Although she had already been to an interactive whiteboard (IWB) training course before the intervention, she had not used the whiteboard at all. In our training course the teachers were asked to do homework using the IWB, which they then presented and got feedback from the trainer. Natalia has used the IWB in her lessons since then. Lessons number 2, 5, 8, 9 and 12 were based on this technology. Natalia and her students were using it all the time in these lessons. For the 12 lessons Natalia prepared 15 different types of games or activities using the original software for the IWB. In the sixth, seventh and ninth lessons she used some new activities which had not been taught in the course. It seems that in her development of the activity types she created, she copied the ICT course syllabus. There we started with more simple "do it yourself" types of activities and then went on to more complex ready-prepared types of activities. Natalia also managed to embed data into the IWB software in three different ways, two of which had not been shown in the course. She also started creating crossword and wordfind puzzles, which she had learned in the course. Moreover, there has been a change in the layout of the handout materials created by the teacher. In lesson 3 a table with 6 sentences filled up a whole A4 page. Progressively, Natalia provided materials that were more space-conscious and in the end distributed only necessary sizes of paper. Finally, we could observe progress in Natalia's confidence in using the interactive whiteboard and her ability to react quickly to technical problems, which occurred several times.

In the area of Technological pedagogical knowledge Natalia seemed to transfer traditional ways of teaching to ICT tools. From the first post-intervention lesson we could see that she had recognized the opportunity to provide more visual support using the interactive whiteboard in the classroom. Natalia instinctively uses the IWB for different functions. This is very well illustrated in lesson 2 when the students learned vocabulary of furniture and fittings and revised the "there is/are" structure. This lesson was taught to the first year students of a two year follow up study, who will do the maturita exam after the second year. They are 19 to 20 years old and are at the pre-intermediate level. Let us look at the course of this lesson, which is structured by single technology based activities (slides, games etc.).

1. *Introduction.* Ask and answer conversations. The teacher asks students simple questions about their past holiday. She calls on single students and they answer questions from her. There is **no technology** used.
2. *Vocabulary revision.* On the IWB students can see 12 pictures of household appliances and pieces of furniture with the English word for the item in the picture under each illustration. Students first listen to the teacher pronouncing these words and then they repeat. The aim is to practise the pronunciation. Afterwards they are asked to look at the pictures for 30 seconds and memorize the words. **The IWB is used for presenting content** in this activity.
3. *Vocabulary practice. Translation.* On a new slide on the IWB we can see a table with the Czech translations of the vocabulary from the previous activity. Next to each word there is the English equivalent but it is covered with a coloured rectangle so the English word is not visible. The students are asked to say the English translation of the Czech word, then they have to spell it and finally they can tap on the coloured rectangle, which then disappears, so they can see the correct answer. In this activity **the IWB is used for vocabulary and spelling practice with the possibility to check the correct answer.**
4. *Vocabulary practice. Crossword puzzle with definitions.* In another slide students are presented with a crossword puzzle with clues in the form of definitions next to the puzzle. The puzzle contains the same vocabulary as previous activities. Each student first reads the definition then says the word out loud, writes it into the puzzle and crosses out the definition. This time **the IWB is used for vocabulary and spelling practice.**
5. *Vocabulary practice. Wordfind puzzle.* In a field of 16 by 16 letters the students are looking for specific words, which are given next to the field. This vocabulary concerns items around the house different than the previously practised vocabulary. Students read the word, translate it into Czech and find it in the puzzle. Then the teacher asks a question about the word, e.g. "When do you switch on the lamp?" or "What do you use the microwave for?" Now **the IWB is used for presenting vocabulary and initiating using it in context.**
6. *Vocabulary practice. Matching pictures and words.* The IWB shows three pictures of a house interior with numbers inside the rooms. On the side there are words like *carpet, cushion, shower etc.* Students then have to drag the number from the room next to the item to show in which room this item can be. However, by dragging the number, it duplicates so there are the numbers in the single rooms and next to the vocabulary list there are numbers matching the rooms as well. **The IWB helps to practise vocabulary** in this exercise**.**
7. *Describing pictures.* We can see the same pictures as in activity 6. Above them there are three example sentences and a list of vocabulary as a hint. Students then make sentences using "there is/there are" and words from the list, e.g. "There is a microwave on the shelf in the kitchen". Here **the IWB serves as visual support for practising vocabulary and grammar in context.**
8. *Categorizing vocabulary.* At the top of this slide on the IWB there are three columns titled "kitchen/living room/ bedroom". At the bottom, there is vocabulary from this lesson, which the students drag and drop in the correct column. This exercise **aims to practise vocabulary with checking the results at the end.**

9. *The memory game.* The current version of software for the IWB which is installed in Natalia's classroom can create the memory game from the words given. For this lesson Natalia prepared an English-Czech version using the same vocabulary as in previous exercises. **Playing the memory game on the IWB helps students practise vocabulary, offering them feedback and adding the element of competition.**
10. *Listening to a song.* The students are handed a copy of a song related to the topic of housing. They are asked to fill in missing words in the text. Natalia plays them the song from the Internet, the link being embedded into the IWB software file. **The video recording with the song displayed on the IWB serves for practising listening for detailed information.**

Referring to the way of using the technology in this particular lesson Natalia used the interactive whiteboard for presenting content, practising vocabulary, spelling, for a listening task and as visual support for speaking activities. The vocabulary to be acquired actively was connected alternately with pictures, translations and definitions. With three activities the students get feedback from the technology. The crossword puzzle, wordfind puzzle and the memory game add a feature of competition and play. The lesson is then closed with a listening activity, which brings some balance to numerous vocabulary practise activities. It can be stated that Natalia is aware of the advantages and unique functions of the interactive whiteboard.

The progress in the field of Technological content knowledge has proved somewhat complicated to observe. The difficulty lies in the fact that in many cases the interactive whiteboard offers very similar functions as a data projector, CD player or a classical blackboard. Moreover, observing lessons gives us information about how ICT is used rather than how the teacher thinks about the relation between technology and content representation. However, from the variety of activities we can conclude that Natalia is aware of the impact on teaching and learning which is specific for the interactive whiteboard. In the first few post-intervention lessons students work either on the IWB or with other (traditional) technologies, e.g. books, notebooks etc. In lesson 8 she started transferring some of the exercises from textbooks onto the IWB sometimes combining visual support on the screen with example texts or pictures in the textbook. She discovered the advantage of adding more clarity by one student working in front of the classroom and the other students doing the same exercise in their student's books at the same time. In lesson 12 Natalia wanted to teach the students conversations in the restaurant like asking about a free table, ordering a meal and so on. She transferred one conversation from the textbook (putting sentences into the correct order) and made use of the drag-and-drop and automatic checking functions. The exercise then became much more visual than its textbook version and the students could work with instant feedback. This means the students could see changes step by step and make decisions based on the feedback. Moreover, Natalia rewrote other conversations from the book into this same exercise so each student could work with the IWB once. We can see that in the course of time she is becoming more and more aware of the differences in practicing skills and subskills with aid of traditional technologies and with aid of the interactive whiteboard.

Let us now look at the area connecting all previous categories which is Technological pedagogical content knowledge. First, we would like to comment on Natalia's way of using ICT

in the classroom. It has obviously become much more natural over the two months of our observation. This can be judged from who actually was operating the IWB. In the first few lessons, it was almost only Natalia herself working with the IWB. Probably as she got more confident she started letting the students physically touch the screen. In the end we could see that Natalia consciously chose who would do the exercise in front of the class. Whenever it was an exercise which the whole class did together or the objects were difficult to manipulate it was the teacher who moved the objects on the board. If the students took turns to do an exercise, she called on students so that everybody could get a chance to work on the IWB. We could also see a change in the frequency and length of using the IWB in the classes. As the chart above shows, lesson number two was based only on the interactive whiteboard. Then there were a few lessons without technology and afterwards Natalia started preparing one or more activities for each lesson. At the end of lesson 11 she agreed with the students that they would have a revision lesson on the IWB after every unit in the student's book. This all indicates that the teacher is systematizing the use of technology. There have been researches showing that ICT actually becomes an amplifier of the teachers teaching style (Zounek, 2009). It must be connected to the type of school and nature of students that Natalia's teaching style is rather drill based, the teacher being the main authority and source of information and slightly pushing the students to work in the lessons with lots of question and answer activities between the teacher and one of the students and a lot of Czech to English translation. It is remarkable that with the use of the IWB the students became more motivated and even Natalia's role slightly changed as she was now more united by learning to operate the IWB. The teacher agreed afterwards that the atmosphere in the classroom seemed to become friendlier. In the first lessons the instructions were spoken in Czech. However, in lesson 11 when Natalia wanted to explain instructions to a matching exercise, she instinctively started speaking English and showing the students on an example sentence how to do the exercise. In our conversation after the lesson she did not know why she did it.

As we stated above, Natalia disposes of extensive experience in teaching. Thus she has internalized didactic rules which she then transfers to using technology. She tends to progress from passive to active knowledge, from revision of separate features to creating more complex units and she usually combines drill-based activities with more attractive and enjoyable activities. She understands that it is not desirable to work solely with ICT in the classes. After each class we can notice her coaching process when she gives comments on what worked well and what did not go as she wanted. Her teaching experience also appears in what we call extension activities. These are activities after the main activity which in this case is a game on the IWB. It can be a question-answer session using the material on the slide, making definitions of the vocabulary or trying to memorize information from the slide and then recollecting it speaking in English or writing it down. In one activity the students first sorted out words into appropriate categories and when this was done the teacher moved the words one after another back. This time the students had to make a sentence using this word. The extension activities point at Natalia's sense of efficiency and her ability to make use of whatever material available to the maximum. We also noticed that Natalia reused some pictures (not activities) when she was teaching different groups of students. When asked about her motivation to create

new digital learning materials and use them in the classes she said that she had observed a substantial increase in the students' motivation and this motivates her to continue in her work.

So far we have discussed only the skills initiated at the course workshops which were reflected in Natalia's own teaching. She made use of the first two workshops which focused on the IWB and creating a handout. The material from the three other workshops was not embedded into her teaching. It is partly because the tools available on the Internet need an ICT classroom with equipment for every student and Natalia does not have this option. She could use MOODLE as the school already uses it but she said she did not find it efficient enough. We must also consider the influence of our lesson observations on the teacher's ICT integration process. After lesson 2 Natalia remarked that our presence in the lessons did not bother her at all. "On the contrary", she added "knowing that you would come made me start using the interactive whiteboard".

Discussion

In this case study there have been several facts which surprised us. Firstly, only two out of five ICT tools took hold in Natalia's teaching practice although it was not for constrictions at her school. The reason then must be that the way these tools were presented did not accord with her teacher's beliefs. On the other hand, we recognize that accepting so many new technologies would take up a lot of time and we know that secondary school teachers are burdened with many administrative tasks.

Another finding showed that although Natalia did start using some new technologies and was further capable of developing further on her own, these changes refer mostly to technological knowledge but her pedagogical content knowledge stayed intact. As the development should always be balanced we will take this into account and take steps to avoid it in the next training.

Classroom observations to assess the level of TPACK are a relatively new phenomenon. Most studies in this area relied on self-reported data in the past (Tai, 2013). However, it has been found essential that the observation component complements other data sources as discrepancies have occurred in what teachers reported and what was observed in the classrooms (Wong and Benson, 2006). It is difficult to compare the results of our case study with other author's reports as each technology integration course is set into a different context and thus has different goals and course content as well as other variables. We can compare research methodology and data presentation, though. Tai (2013), who also uses a questionnaire, interviews and classroom observations in her study, offers a summary of content, pedagogy and technology covered in the course and explores which of these items were used during classroom observations. Then the data is presented based on the tools and how they were used by single teachers. Finally, the study presents the tools organized by the role of their use: teacher preparation, teacher productivity, student productivity and student-centered environment. In this article we reported on one case study in an in-depth approach. After processing other case studies, however, we will adopt a similar approach as described above.

Let us now shortly consider some limitations of our research. The time span allotted to the training course was not sufficient to prove any profound changes in the teaching practice. This could be avoided by covering less ICT tools and giving more space to getting acquainted with them. The results of this research might be also influenced by the facts that the questionnaire has

a subjective nature. The survey items have been adopted from other studies and modified. In the sitting there was only one researcher present at a time which means some information could have eluded the researcher. When interpreting the results of this case study we must consider the participant's unique features, which is an essential quality of this research design. Finally, the partaking teachers did not know the exact purpose of the research, however, they knew that we were interested in the use of technology in the classes. We must not forget these facts when drawing conclusions from our research.

Conclusion

In this part of our research we wanted to see what impact would our ICT course have on the participant's use of ICT in their teaching. By observing one teacher's lessons we have found the changes which are summed up in the following table.

area	changes observed in the lessons	changes discovered from interviews
Technological Knowledge	the teacher actually started using the IWB afterwards she learned 3 new activities the teacher learned to format content in MS Word the teacher learned to deal with minor technical problems with the IWB	the teacher learned to make 12 activities in the ICT training course the teacher learned to make crossword puzzles
Technological Pedagogical Knowledge	the teacher learned to transfer and modify activities from the student's book onto the IWB the teacher started to provide more visual materials on the IWB the teacher uses the IWB for presenting content, practising vocabulary, grammar, listening and prompting conversation the teacher recognises the opportunity to motivate students through games and competition the teacher adds clearness by having a student doing the exercise on the IWB while other students are doing it in their books	
Technological Content Knowledge	the teacher adds more visual support through images the teacher recognises the instant feedback options of the IWB and using them the teacher uses drag-and-drop type of exercises, which enhance the learning process	
Technological Pedagogical Content Knowledge	the way the teacher uses technology has become more natural the teacher considers who will work with ICT in the class the teacher chooses when to use ICT, she does not use it for every activity the teacher systemizes the use of the IWB when giving instructions on ICT the teacher was speaking English and was demonstrating the activity at the same time the teacher applies didactic rules from other technologies when using ICT the teacher maximizes the potential of prepared materials by doing extension activities the teacher thinks of what she needs the ICT to do for her and then finds a way of doing it	the teacher thinks critically of how the intended aims were fulfilled when using ICT The teacher speaks about activities which she will use again and which not the teacher has become aware of students' increasing motivation

Tab. 1: Natalia's TPACK development summary

We have found out that, in Natalie's case, our ICT training course has made an impact on two of the four areas developed in the course. It has proved that the teacher can continue developing

on her own after the course has finished. However, this development relates only to Technology knowledge. Otherwise Natalia tends to keep her teaching style. We agree with Koh and Divaharan (2011) that when the course partakers are not familiar with the new technology they first need instruction combined with self paced exploration. In the repetition of this course with new participants we will include micro teaching sessions when teachers perform their trial lessons and other participants play the roles of pupils. This will help them get a better vision of how their lesson plans will work. In the next training with the current participants we will adopt the learning by design approach focusing more on the pedagogical aspects of using ICT in the lessons. This lesson observation is only a part of the whole study. The results from other research methods we used for evaluating other aspects of the intervention are now being processed and will be published in our next article. Our aim in this study was to show the organization of the technology integration course, show the evaluation instruments and present partial results of the course impact. This approach can be adopted in similar courses. The evaluation instruments can be also adjusted and applied for similar purposes, even for other foreign languages, as long as they suit the research goal purpose.

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