BRIDGING AUTHENTIC LEARNING TASK INTO TECHNOLOGY SUPPORTED TRANSFORMATIVE PEDAGOGY IN FINNISH TEACHER TRAINING

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Abstract

The goal of the Finnish teacher training is to educate autonomous teachers, who have pedagogical competence and theoretical understanding about using ICT in teaching and learning. In this study, we describe teacher students' pedagogical ICT competence as designers of technology supported learning tasks. The study is based on Hughes' RAT model, which is a framework for assessing technology integration. The theoretical definition of RAT model is technology as a) replacement, b) amplification or c) transformation. To define this there are three systematical dimensions to analyze a particular technology use: Instructional Methods, Student learning processes and Curriculum Goals. The data consist of student groups' learning tasks (N=11). Results indicated that technology supported pedagogy as transformation is challenging for most teacher students. The results of the study state that the learning tasks included all three levels of RAT model integration.

Keywords: ICT competence, teacher student, transformation, learning task.

1 INTRODUCTION

This past decade has brought an emerging need for pedagogical model for technology integration in learning. Teachers are called to become critical innovators ([1] and developers of innovative technology integration. At the global level teachers, education programs are criticized for their failure to provide pre-service teachers' skills of use technology in teaching and learning ([2], [3]). Teacher training has reacted slowly to this integration of technology in their teacher training programs focusing mainly on presentation and word processing tools ([3], [4]). The Finnish teacher training has a goal to educate autonomous teachers, who have pedagogical competence and theoretical understanding about teaching and learning [5]. To enable these educators use pedagogical practices, diverse methods and varied learning task for students [6]. The Finnish teacher training leads to a Masters of education degree and is arranged in University context [6].

The Finnish teacher training emphasizes the role of students' former knowledge, research based learning and flexible paths to study. In the recent publication considering teacher education Husu & Toom [6] have suggested that teacher training should be based on meaningful, practical, diverse and collaborative learning methods, learning should combine scientific knowledge and practical competence and teacher training must give roots to a lifelong professional development. That includes both pedagogical and technological ICT skills. The way technology is integrated into the teacher training of University Consortium Chydenius is challenging teacher students to use, create and co-operate using technology during their studies underpinned through technology related education [7]. Chinapah & Odero [8] have argued that the current and future challenges faced in providing ICT-based learning forces educators to move out of the formal structure of teaching and learning. Chinapah & Odero [8] see that teacher must design more active and practical learning environments. While integrating technology into classrooms the following conditions need to be fulfilled; the role of the teacher, the need for professionalization and the need for adapted teaching and learning approaches [9]. Yelland [10] emphasizes authentic context creation for learning where technology using is enhanced into the production of knowledge, communication and ideas. There are many well-designed frameworks for assessing technology integration (see [11], [12], [13], [14]). There is still a little bit knowledge of how the change should be made from formative to transformative technology integrated learning [1] and how teachers are in their day-to-day practice using different assessing models [15]. In this paper, the term that will be used to describe this phenomenon is 'technology supported pedagogy'. The purpose of this study is to find out what kind of technology supported digital learning task teacher students create during the "Media education in teaching and education"-study module (MTL). The background arises from the need to understand how technology supported pedagogy can be educated in teacher training programs. We use RAT model ([13], [14]) as a

theoretical framework of this study and RAT matrix [16] as a model for theory based content analysis. In this study, the pedagogical ICT competence is defined as teacher students' competence to design transformative learning tasks.

We begin with an overview of the theoretical underpinnings of technology supported pedagogy in teacher training and its role in education. Next, we identify the key features of the RAT model and the study module design. Then we explore the results of students' learning task through the lenses of RAT matrix. We conclude with the result of this study and conclusions.

2 THEORETICAL FRAMEWORK

2.1 RAT model

The RAT model explains the fundamental principles of technology based learning plans. The RAT model was developed to help both pre-service and in-service teachers to make decisions adapting technology integration in learning [17]. The model was a conclusion of research both in theoretical and practical field. The theoretical definition of the model is a) Technology as Replacement (R); b) Technology as Amplification (A) and c) Technology as Transformation (T) ([13], [14]) (see Fig.1)

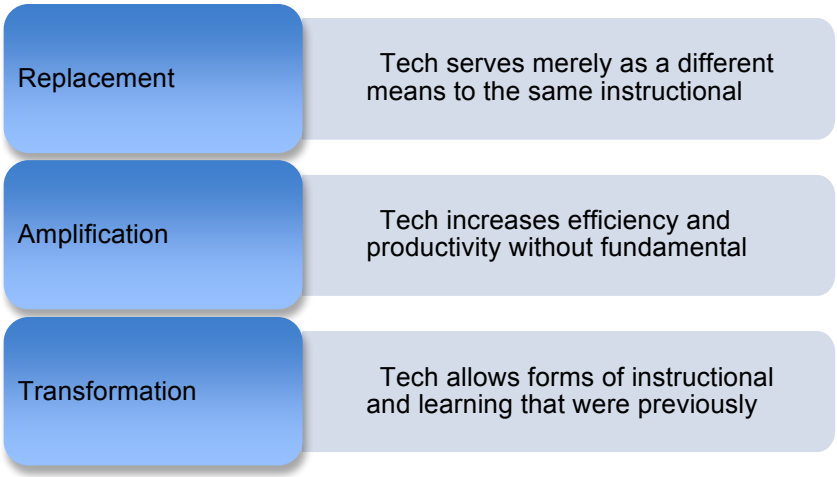

Figure 1. Assessing Technology Integration: The RAT-Replacement, Amplification, and Transformation – Framework.

Transformation creates new pedagogy by changing the goals, structures and roles of doing things into novel solutions to persistent problems [18]. Amplification harnesses technologies to make learning more effective and productive, like using a platform to give students access to teachers learning material to use in their own task but the pedagogy remains the same ([19], [20]). Replacement deploys technologies as a technological means to the same pedagogical end with no apparent improvement ([20], [21].) To understand and reflect whether certain technology integration is replacement, amplification or transformation, following qualifiers defined by Roblyer and Hughes [16] can be used as lenses to reflect that. Technology integration is replacement when you can think about it as proxy, stand-in or surrogates. It is amplification, when you can think about it as enlargement or increases in magnitude and it is transformative when you can think about it as conversion, revolution, change, renovation, restructure and reorganization.

What makes this framework so useful for technology, the embraced assessment of learning is the systematic guiding analysis dimensions. Hughes, Thomas and Scharber [17] emphasizes that it is important to ensure attention to all aspects of the instructional event in which the technology use is embedded through the analyses of these three dimensions: Instructional methods, student learning processes and curriculum goals (Table 1) [22]. In terms of specifying whether a particular technology use is replaced, amplified or transformed practice teachers should assess the teaching plan with these systematic dimensions. The key point is to reflect the technology use in different dimensions that include in instructional methods, students' learning processes and curriculum goals.

Table 1. *Dimensions for Guiding Analysis of Technology Use.*

Instructional methods	**Student Learning processes**	**Curriculum Goals**
Include…	*include…*	*include…*
Teacher's role	Activity task	"Knowledge" to be gained, learned or applied
Instructions with students	Thinking process – mental process	"Experience" to be gained, learned or applied
Assessment of students	Task mileu (individual, small group, whole-class, others)	
Professional development	Motivation	
Preparation	Student attitude	
Administrative task		

As Hughes etc. [21] have stated, RAT model relies on deep knowledge of the context, content, teacher and teaching and because of this practice oriented thinking RAT gives tools to understand the complexity of technology integration change process. Kimmons, Miller, Amador, Desjardins and Hall [23] are holding the view that RAT focuses less on what technologies are being used and more upon what role those technologies are fulfilling in specific context. They came into a conclusion in their study that it is meaningful to students' understanding about technology integration that in teacher education programs technology integration in students learning should be implemented in transformative ways [23]. In this sense, it is significant that students were asked to create transformative learning tasks by using transformative technology integration. This section has attempted to provide a brief summary of the RAT model. The chapter that follows moves on to describe the learning task.

2.2 Becoming a technology supportive pedagogue in MTL-study module

In this study the outcomes of students' learning tasks are reflected through the lenses of the RAT model (([13], [14], [17[) and reflected through RAT matrix. The ICT education in Kokkola consortium Chydenius teacher training is grounded on TPACK-framework [24] and teacher students are well guided throughout their studies to become experts in ICT pedagogy and integration of technology (see [7]). Teachers are in a key role to change the culture of learning to become more child-centered, co-operative and technology integrated.

The study module was designed to give to the students themselves an authentic learning experience of technology integration in to learning and was designed using technology supportive pedagogy thinking. There are many studies supporting the idea of teacher students learning technology integration in authentic settings (see [23], [25]). The study module was grounded in media education. Merilampi [26] defines Media education as a kind of critical pedagogy. As Merilampi [26] sees it, there is a traditional connection between educational technology and it is learning material, open learning environments as well as with the ideology that is culturally relevant. ICT and the use of media in learning should be grounded in solid theoretical and pedagogical thinking. Media education offers practical tools as well as ways to think and reflect media in education and as Merilampi [26] emphasizes media education in teacher training demands not only analytical and critical thinking but also active participation and reflective demolition of things under issue. The idea of using e.g. social media tools should widen from replacing old tools with technological tools to designing new technological environments based on transformative supportive pedagogy (see [27].

The goal there was that students collaboratively designed authentic and technology integrated learning tasks for pupils. The designed learning tasks would be accessible for anyone with the URL-address and the openness and the ideology of shared knowledge lays behind this study module design. In media education and technology utilizing Web 2.0, the audience and purpose of learning activities to shift from a teacher audience for a global, diverse audience [22].

The goals for the learning task were accordance with RAT model. Instructional methods: It should utilize ICT in pedagogically meaningful ways, it should enable authentic learning and it should integrate virtual learning environments into real life learning situations. Students' learning processes: It should challenge pupils to co-operate, create, find and collect new information, produce diverse

outcomes. Curriculum goals: The goals for learning should be clear and driven from the curriculum, it should further the 21st citizenship skills. The learning task should be done on a ThingLink-platform and use of VR360 technology should be utilized. The ground for this task is that technology supported transformative pedagogy where students are seen as the creators, producers, owners and sharers of the information and knowledge [22].

There is a great opportunity in teacher training to promote teachers to become technological-pedagogical-content-knowledge (TPACK [24]) –skilled by offering updated and future-oriented education. The TPACK-framework gives concepts to technology integration explaining why but in-service teachers need also consider how the technology implementation into teaching and learning will be done [1]. This study focuses on the how.

3 METHODOLOGY

3.1 Research question and context

This study sought to understand transformative technology supported pedagogy. It is important that teacher students have knowledge and skills to create learning possibilities where technology is integrated in transformative ways to learning. To ensure that teacher training must enable this. The research question for this study was: What kind of technology supported pedagogy is found in students learning tasks with the sub-question how technology was integrated in students' learning tasks related to RAT model?

MTL- study module contains 15 h of contact lessons and 39 h of independent learning tasks (two credits). The learning task was to create an authentic digital and even virtual learning task for primary school pupils using ThingLink and VR 360 cam. Student worked in small groups on 3-5 students and they were asked to plan and create authentic learning tasks strongly based on Finnish Core curriculum. They had to create a ThingLink page where pupils could enter virtually into different learning environments where they have access to activating and learner centered learning tasks. The student got technical support to learn how to use ThingLink and VR 360 cam. A teacher of MTL- study module (one of the writers) made videos about how to use LG 360 cam for taking pictures and how to use Clips-application for making easy videos. The students in this research had little or no prior experience of ThingLink or 360cam. We offered students an access to ThingLink premium site, so they had access to paid features like uploading 360 pictures. A student had a change to plan this virtual learning task to serve the exact class they were going to be practicing teaching for four weeks on November 2017. Students could then root their goals and content of the task for specific grades. They also had to self-evaluate their outcomes as a group concerning instructions, learning and curriculum through the lenses of using media and technology integration.

3.2 Data and analysis

The research method is deductive, which makes an interpretation of the phenomenon based on theory. Data was collected during the MTL -study module in the autumn of 2017. Data includes 11 digital learning tasks and was analyzed using RAT matrix. The model was developed by Joan Hughes ([13],[14]) for use by teachers who are planning and for someone who co-plans or co-observes the technology supported lessons to assess the role of technology in them (see [16]). In this study, we use RAT matrix to ratify the technology replacement, amplification or transformation in instructions, learning and curriculum in students' learning task outcomes. The use of RAT matrix was justified, because one of the researchers implicated the study module and was co-observing the planning.

Qualitative content analysis was used for analyzing the learning tasks. The analysis was carried out by theory based qualitative content analysis [28]. The structured model of theory was used to define the unit of analysis. Data was categorized by units: replacement, amplification and transformation. First, the data was scanned to become familiar with it a few times. The analysis was defined by using RAT matrix [16]. Data was analyzed to determine how technology integration was part of learning tasks in accordance with the RAT matrix. RAT matrix consisted of three dimensions: instructional methods, student learning processes and curriculum goals. Researchers noticed that each learning task included several instructional methods, learning processes and curriculum goals. Each learning task was defined using the following steps and questions: First, if the learning task was made by using technology, we moved to the next step. In step two, we asked if learning tasks could be introduced without technology. If it was possible, we assigned it as replacement and if it was not possible, we asked the next question. We asked if technology change learning tasks more effective and give

something new that was impossible without technology. If this was not so, we assigned it as replacement. Otherwise, we asked if learning tasks required creativity and problem solving with using technology. If not, we assigned it as amplification. Otherwise, we assumed that learning task was as transformation. Data was quantified by counting how many times replacement, amplification and transformation occurred in data and the results are reported also as a percent. This gives specific understanding about the appearance of RAT- dimensions.

4 RESULTS

Students had to make an innovative learning task for primary school pupils using certain technology. The results clearly show that technology was utilized in all the learning tasks because they were build using ThingLink platform and 360 camera. Overall, it was not possible to compile this task without technology.

All 11 learning tasks formed an independent entity that contained several smaller tasks. The learning tasks were therefore versatile in the integration of technology and the utilization of various applications and instructions. When we look at the results of how the learning tasks created by students included technology replace, amplify or transform in instructions, learning and curriculum, the case here shows promising results. All learning tasks included technology use in some dimensions and the use of technology extended learning or made the learning more efficiency. The result indicates that students have enough competence for creating technology supported learning in amplified (60%) and even in transformative (30%) ways.

The technology integration is transformative when it restructures and changes the way pupils learn [16]. It was seen clearly on two of the digital learning tasks in this study. In one of the two transformative learning tasks technology was used to support transformative ways of learning. The assignment was to use MadPad HD Remix app to tube music they created themselves; the pupils are led to use technology in pedagogically transformative ways and the goals from curriculum can be achieved challenging students to use problem solving skills, creativity and co-operative learning to reach goals. In this matter, the technology integration is transformative supportive pedagogy. Eight of the digital learning tasks were mostly amplified but included R or T in some dimensions. These results bring understanding about the learning task that includes all dimensions of transformative technology supported pedagogy. It is evident according to the results of this study that transformative technology integration in students' learning tasks is challenging as only two learning tasks were fully transformative in all three dimensions and one learning task was replacement. The role of effective technology integration education in real life authentic contexts would serve the possibilities to increase this adaptation (see [27]).

When comparing the different dimensions of each learning assignment, interesting results can be seen. Taking a closer look at the learning processes the results show that technology integration was implemented mostly in amplification ways (70%). These tasks had harnessed technology to increased efficiency and made pupils role more productive and active through technology and that is characteristic of amplification [20]. There were also elements of deploying technology [20] as a replacement (55%) and in those cases the instruction included text-form or an internet page. An interesting result was that in a learning process -dimension, over the half of the tasks were clearly either a replacement, amplification or transformation. A third of the tasks were clearly replacement. In these cases, the technology was used just for writing down notes or stories, search for information or for watching educational videos, the role of technology was surrogates (see [16]). The rest of the tasks included at least two of these elements. The opposite result was in instructional methods. 60% of learning tasks had several instances of RAT model. These results indicate that teacher students produce instructions using technology in diverse ways, but for pupils learning processes they generally use only one instance of RAT model. Many (70%) learning tasks included instructional videos made by students to facilitate guiding pupils virtually. That increases the possibility for students to follow teachers' guides apart from a teacher, time and space. In this sense, many tasks included amplification in instructional dimension.

All learning tasks were based on the Finnish Core curriculum either on the specific subject goals or on 21st century learning goals. Technology goals were mentioned in over the half of the digital learning tasks. All the digital learning tasks also had goals for learning that includes media educational aspects using open learning environments (ThingLink) and challenging pupils to become culturally aware of

the history or culture of their hometown (see [26]). The findings of this study suggest that students have enough competence to connect technology integration into curriculum goals.

5 CONCLUSIONS

This study confirms the importance of authentic learning tasks in teacher training that will help students to progress in implementing technology into teaching and learning [1] and to create technology supported pedagogy. Taken together, these results suggest that students need preparation to face the complexity of using technology in real world learning setting (see [23]). This study shows that students need to be challenged to use new technologies for transformative learning purposes. They need to practice technology supportive pedagogy learning creation, and this study gives understanding how an authentic learning task can be bridged to challenge students to create learning tasks, which integrate technology in transformative ways [6]. Teacher training programs should transform teacher training itself by giving authentic learning experiences in transformative technology integration ([4], [1]). In the absence of research, it can be considered that the practical implementation of students' learning tasks with the pupils did not materialize. This study demonstrates the need for innovative strategies for bridging authentic learning into technology supportive pedagogy in teacher education programs. For further study, it would be interesting to research how students would benefit from using RAT-model as a reflective tool. Moreover, the subject of further research is to find out how teaching practices can promote student transformative technology integration into learning. The evidence presented thus far supports the idea that technology supported pedagogy is indeed an important educational element that needs to be part in teacher training.

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