

DESIGNING TRAINING ON TECH TOOLS – A DIALOGUE WITH A MODEL

**University of Tartu  
Faculty of Social Sciences  
Institute of Education  
Curriculum of Educational Technology**

**Alisha Faridhussain Navodia  
DESIGNING TRAINING ON TECHNOLOGY TOOLS FOR TEACHERS –  
A DIALOGUE WITH A MODEL  
MA thesis**

**Supervisor: Senior Research Fellow Dr. Emanuele Bardone**

**Tartu, 2021**

### **Abstract**

The thesis is a reflective and reflexive work in making sense of a pilot training idea that was designed to help teachers learn and explore a technology tool. For this, the TPACK-in-Practice Workshop Model was used as a dialogue partner. In this dialogue, similarities and differences were identified and analysed, and questions emerging especially from the differences were explored in the light of other perspectives. The outcomes are in the form of a personal discussion leading to some key aspects that can help develop the author's future practice of designing such training. These include a renewed emphasis on the meaning of use of technology in education and about enabling dialogue of teachers with the technology tool in the training design.

Keywords: training design, technology tools, dialogue, model

## Table of Contents

<b>Abstract.....</b>	<b>2</b>
<b>Introduction.....</b>	<b>4</b>
<b>Theoretical Overview.....</b>	<b>5</b>
<b>Dialogue.....</b>	<b>5</b>
<b>Technology Integration Models .....</b>	<b>6</b>
<b>Technological Pedagogical Content Knowledge (TPACK) .....</b>	<b>7</b>
<b>TPACK-based Professional Development .....</b>	<b>8</b>
<b>TPACK-in-Practice Workshop Model .....</b>	<b>10</b>
<b>Methodology .....</b>	<b>11</b>
<b>Training Design .....</b>	<b>11</b>
<b>Training Implementation .....</b>	<b>12</b>
<b>Action Research.....</b>	<b>13</b>
<b>Dialogue with the Model – Reflections and Discussion .....</b>	<b>14</b>
<b>Modelling a Tech-Enhanced Activity Type .....</b>	<b>15</b>
<b>The Pedagogical Dialogue.....</b>	<b>17</b>
<b>Tool Demonstration and the TECHSlam.....</b>	<b>20</b>
<b>The Practice Task Using the Technology.....</b>	<b>22</b>
<b>Conclusion - Illuminating the Dialogue .....</b>	<b>24</b>
<b>Acknowledgements .....</b>	<b>27</b>
<b>Author’s Declaration .....</b>	<b>28</b>
<b>List of References.....</b>	<b>29</b>
<b>Appendices.....</b>	<b>33</b>
Appendix 1. The TPACK Diagram.....	33
Appendix 2. Knowledge Types in TPACK.....	34
Appendix 3. Screenshots of Training Design.....	35
Appendix 4. Interview Questions.....	37

## Introduction

This thesis roots from a project in one of my courses in this master program, in which I prepared a short training for teachers on a technology tool called hypervideo or interactive video.

I got introduced to it in the course and got interested in its potential to engage learners more actively when learning through videos.

With several teachers in my network having transitioned to teaching online, I felt that knowing about hypervideo could be of interest to them. Based on some preliminary discussions with one of them, I decided to create a short training on this technology tool and shared it with them.

As a personal initiative, it turned out to be a first experience designing a training on a technology tool for me. I consider this as a pilot training that I designed, implemented, and received feedback on.

The objective of this thesis is to reflect on my experience of designing and implementing it. Alongside my personal reflections, I would like to look at my training design by engaging in a dialogue with the TPACK-in-Practice Workshop Model. This model is based on the Technological Pedagogical and Content Knowledge (TPACK) and TPACK-in-Practice frameworks. It provides a practical workshop approach consisting of four sequential experiences that seeks to engage teachers in developing their tech-enhanced teaching practice (Figg & Jamani, 2013).

In taking inspiration from David Bohm's (1996) ideas on dialogue, for this thesis, the objective of a dialogue with a model is to enable a better understanding of my training design.

In this dialogue, the model is an already established thought, whereas I am describing a practice which is ongoing, about which I am thinking - *how to design training for teachers on technology tools?*

The conversation is not about agreeing with the design of the model or to see the extent of similarities. The intent is to see the similarities and particularly the differences and to probe further on the reasons for these. It is an opportunity to bring forth my thinking process in the design of the training. I am looking at this dialogue as a creative process. It is also to have the model provide another lens to look at and make sense of my work. In trying to do so, I hope to also articulate new perspectives for the design of such future training. Thus, a reflective and reflexive approach on my work will guide this dialogue.

The dialogue will serve as a step in building for the future by first understanding the current pilot and future directions better.

The overall goals and research aims of the thesis work can be outlined as below:

- To engage in a reflective and reflexive dialogue with a model with regard to my training design.
- To make sense of my practice and articulate areas of further development for future such training.

The thesis is organised in four chapters. In the section called ‘Theoretical Overview’, the key theoretical concepts and frameworks that are relevant for this research are described. In the section on ‘Methodology’, the training design, implementation and the methods for this research are elaborated. The section ‘Dialogue with the Model – Reflections and Discussions’ is on the dialogue between my training design and the TPACK-in-Practice Workshop Model. The last section ‘Conclusion – Illuminating the Dialogue’, is a culmination of the overall thesis work and summarises the key discussions.

## **Theoretical Overview**

The purpose of this section is to provide an overview of the key theoretical concepts and frameworks that are relevant for this research.

### **Dialogue**

In understanding what a dialogue is and what such a dialogue looks like in the context of this thesis, I refer to the work of the physicist David Bohm in his book *On Dialogue*.

According to Bohm (1996), dialogue comes from the Greek word *dialogos*: *logos* meaning ‘the word’ or ‘meaning of the word,’ and *dia* meaning ‘through,’ suggesting a stream of meaning flowing among, through, and between us (p.6). Such a dialogue, Bohm suggests, can take place among any number of people, between people and inanimate objects or nature and one person can also have a dialogue within himself.

Bohm further describes the process of dialogue to be creative in nature, through which some new meaning and understanding can emerge. To help understand the significance of such a dialogue, Bohm (1996) says that in a dialogue,

... when one person says something, the other person does not in general respond with exactly the same meaning as that seen by the first person. Rather, the meanings are only *similar* and not identical. Thus, when the second person

replies, the first person sees a *difference* between what he meant to say and what the other person understood. (p. 2)

Here it becomes clearer that seeing the difference is an important aspect of a dialogue. Bohm further continues that considering these differences can enable one to see new ideas and thoughts.

In this thesis, I seek to apply such perspectives of a dialogue and engage in a dialogue with a model with regard to my training design, as I have also elaborated in the introduction section.

### **Technology Integration Models**

In literature on technology integration models, terms such as model, theory, paradigm, and framework are used by authors interchangeably (Kimmons, Graham & West, 2020).

In natural and social sciences alike, models and frameworks are used to make sense of the complex, dynamic and disorganised natural and social worlds (Kimmons et al., 2020). They also serve as “the connective tissue that meshes theory and practice” (Cherner & Mitchell 2021, p.91). The field of educational technology is no exception and is constantly evolving and changing with new technologies, teaching-learning needs and requirements. For that, a number of models and frameworks have been proposed and adopted “to ensure thoughtful technology integration practices in existing educational contexts” (Kimmons & Hall, 2016, p. 51).

However, there are several such models and frameworks that have been proposed and adopted. Kimmons and Hall (2016) advise on embracing theoretical pluralism, meaning that “various models are appropriate and valuable in different contexts” (p. 54) as the different models provide unique perspectives on technology integration efforts. The field of educational technology is also quite diverse involving researchers, practitioners, administrators, policymakers and so on (Kimmons & Hall, 2018). Consequently, several models are proposed and used as no one model can meet the needs and requirements of all the stakeholders. Some well-known models that provide different opportunities to understand and interpret technology integration efforts include the Technological Pedagogical and Content Knowledge (TPACK), Substitution Augmentation Modification Redefinition (SAMR), Replacement Amplification Transformation (RAT), Technology Integration Matrix (TIM), Technology Acceptance Model (TAM), and Technology Integration Planning (TIP) (Kimmons & Hall, 2016). There are also several others. Amongst these, Mishra and Koehler’s (2006) TPACK and Puentedura’s (2010) SAMR frameworks are most commonly

used by the research community, with TPACK being especially popular with researchers (Cherner & Mitchell, 2021).

Models and frameworks serve as a lens for researchers and practitioners to understand the role that technology plays in the learning process and its consequences on learning outcomes and experiences (Kimmons & Hall, 2016). Furthermore, these empower researchers and practitioners to ask questions and guide their thinking on the use of emerging technologies in education (ibid). In this sense, these frameworks could help one engage in further inquiry and thinking on technology integration practices.

In a recent study, Cherner and Mitchell (2021) analysed nine frameworks of educational technology using a content analysis methodology and presented their findings to include details such as who created these frameworks, what features do they use to draw attention to them, and which frameworks would key stakeholders find most useful. Such criteria and analysis are helpful when learning about different technology integration models and their potential usefulness. Kimmons and Hall (2016) also propose six criteria that can help choose a model based on the needs and interests of the different stakeholders involved. These criteria are: compatibility, scope, fruitfulness, role of technology, student outcomes and clarity. They identify TPACK as an example of a fruitful technology integration model for its potential to span disciplines and being able to generate and sustain “meaningful conversations” around technology integration (Kimmons & Hall, 2016, p. 59).

As a technology integration model, TPACK has been widely adopted across disciplines by researchers and practitioners, and also in the context of teacher professional development. It thus presents as a suitable choice of model to engage in a dialogue with my training design.

### **Technological Pedagogical Content Knowledge (TPACK)**

TPACK (originally called as TPCK) is a framework developed by researchers Mishra and Koehler (2006). They build upon the work by Shulman (1986, 1987) on pedagogical content knowledge (PCK) that explains the relationship between teachers’ content knowledge and pedagogical knowledge, and added technological knowledge to this relationship. As teaching is a complex activity that requires a wide range of knowledge, the framework explains the types of knowledge that teachers need to effectively teach with technology (Mishra & Koehler, 2006).

The most common representation of the TPACK framework is a Venn diagram with three overlapping circles (See Appendix 1), each representing a different type of teacher knowledge, namely pedagogical knowledge (PK), technological knowledge (TK) and content knowledge (CK). The interactions among these three core knowledge types leads to four additional types of knowledge, namely pedagogical content knowledge (PCK), technological pedagogical knowledge (TPK), technological content knowledge (TCK) and technological pedagogical content knowledge (TPACK) (Koehler & Mishra, 2009; Mishra & Koehler, 2006). The diagram is enclosed with an outer dotted circle called contextual knowledge (XK) referring to “everything from a teacher’s awareness of available technologies, to the teacher’s knowledge of the school, district, state, or national policies they operate within” (Mishra, 2019, p.76). A brief description of each of the knowledge types represented in the framework are described in Appendix 2.

Thus, TPACK offers a framework to plan and implement instruction effectively by combining technology, content and pedagogy. On a conceptual level, TPACK can be easy to understand as integrating these knowledge domains related to pedagogy, content and technology. However, the literature also points that TPACK definitions are broad, ill-defined and fuzzy, lacking clarity about what the different knowledge types mean and represent (Angeli & Valanides, 2009; Graham, 2011). According to Angeli and Valanides (2009), TPACK does not address how the technology tool affordances can transform content and pedagogy.

This has however, not deterred researchers and practitioners alike to embrace TPACK. Since 2009, TPACK has been the central construct in over 1200 journal articles and book chapters, over 315 dissertations, and 28 books (Harris & Wildman, 2019, as cited in Mishra, 2019). The TPACK framework has also had a particularly strong influence on teacher education and professional development research and practice (Mishra, 2019). Several models and frameworks have thus been developed for teacher professional development based on TPACK.

### **TPACK-based Professional Development**

Several professional development approaches and strategies have been proposed to help pre-service and in-service teachers develop TPACK.

Based on the professional development approaches found in existing literature, Koehler and colleagues (2013; 2014) have classified these into three broad categories



depending on the starting point and sequence of different TPACK knowledge types being built:

(a) from Pedagogical Content Knowledge (PCK) to TPACK (b) from Technological Pedagogical Knowledge (TPK) to TPACK, and c) developing Pedagogical Content Knowledge (PCK) and TPACK simultaneously

According to Koehler et al. (2013; 2014), the categories (a) and (b) build on teachers prior knowledge and experiences and category (c) is a holistic approach to develop TPACK. In the ‘PCK to TPACK’ approach, teachers build upon their existing pedagogical content knowledge to learn and understand how technologies can help them enhance their current teaching strategies being used in the classroom. In the ‘TPK to TPACK’ approach, teachers build on their existing knowledge of technology to further understand their application and use in learning contexts. With this knowledge, teachers then identify and develop specific content that could benefit from teaching with the technology. In the simultaneous PCK and TPACK approach, teachers develop all the aspects of TPACK interactively by defining and designing solutions to their learning problems in small groups. This categorization helps us understand the different knowledge types that teachers build when participating in these professional development experiences.

Harris (2016) found these categories to be general and proposed the need for a more “fine-grained classification system” (p. 5) that can provide researchers and teacher educators a more pragmatic knowledge about particular strategies for TPACK development. She further classified these into eight approaches based on TPACK-related professional learning literature: collaborative instructional design, pedagogical content knowledge (PCK)-focused learning, technological pedagogical knowledge (TPK)-focused learning, reflective/reflexive learning, problem-based learning, computer-adaptive learning, instructional planning, and workplace learning.

These categorizations help us understand the different existing approaches to develop TPACK. Despite these several approaches, researchers have however, not yet recommended an ideal route to develop TPACK in teachers (Koehler et al., 2014).

One such professional development approach that falls under the category of PCK-focused learning (Harris, 2016) is considered for this research.

### TPACK-in-Practice Workshop Model

The framework of TPACK-in-Practice has been derived from the PCK (Shulman, 1986) and the TPACK models (Mishra & Koehler, 2006) (Figg & Jaipal, 2012).

As this framework was developed by observing the practice of teachers, it is referred to as the framework of TPACK-in-Practice (Jamani & Figg, 2013). The authors (Figg & Jaipal 2009, 2012; Jaipal & Figg 2010a, 2010b, 2012) conducted longitudinal studies with pre-service and in-service teachers with a view to bridge the gap between the theory based knowledge components of TPACK and the actions that exhibit these in practice (ibid). The results from these informed the development of this framework.

The framework of TPACK-in-Practice describes “practice-based characteristics and actions representing TPACK-in-Practice, TCK-in-Practice, and TPK-in-Practice” (Jaipal-Jamani & Figg, 2015, p.141). These components are described in Table 1 (Jaipal-Jamani & Figg 2015, p. 142) below:

**Table 1**

*Components of TPACK-in-Practice*

TPCK-in-Practice	Knowledge about how to design technology-enhanced instructional experiences for different models of teaching (e.g., Direct Instruction, Problem-based Learning, Inquiry-based Learning) to meet content learning goals
TCK-in-Practice	Knowledge about content-appropriate technologies (knowledge of tools of a discipline and ability to appropriately repurpose tools across disciplines) and teachers’ ability to use the tool (personal attitudes, skills, and comfort level with these technologies)
TPK-in-Practice	Knowledge of practical teaching competencies (use e.g., classroom management, differentiated support, and assessment) to plan and implement technology enhanced lessons

According to Jaipal-Jamani and Figg (2015) these general characteristics can be applied across grade levels and subject area disciplines for successful tech-enhanced teaching. These can also be taught in a variety of professional learning areas. The framework has also been used to design technology workshops. The pilot implementation of the framework with pre-service teachers led to the identification of a sequence of four experiences that can help teachers transfer knowledge from the technology workshops into their practice (Jamani & Figg, 2013).

According to Jamani and Figg (2013, p.221), these are as follows:

- (a) facilitator modelling a technology-enhanced activity type (learning with the tool) to set the context and purpose for tool use,
- (b) participants engaging in ‘pedagogical dialogue’ about the modelled activity,
- (c) facilitator using short tool demonstrations to develop TK (in context), and
- (d) participants applying acquired technical skills and knowledge in additional practice tasks using the same activity type (Figg & Jaipal 2012; Jaipal & Figg 2012)

The TPACK-in-Practice Workshop Model (Jamani & Figg, 2013) or also called the TPACK-based Professional Learning Design Model (PLDM) (Figg & Jaipal, 2013) demonstrates these four elements in a sequence of corresponding four workshop stages. The goal of this workshop model is to help teachers leave the workshop learning to teach with the technology. It promotes a content-centric approach of how to teach content with the technology (Jamani & Figg, 2013). It seeks to engage teachers and teacher candidates in developing their tech-enhanced teaching practice. The focus is on one tech-enhanced activity in a workshop. The workshop model can also be used in a variety of contexts such as pre-service teacher education courses as well in technology workshops for in-service teachers, college and university faculty (Jamani & Figg, 2013).

This workshop model will be used as a dialogue partner for my pilot training design. Further details on these four stages will be elaborated when engaging in a dialogue with each of them in the section ‘Dialogue with the Model – Reflections and Discussion’.

## **Methodology**

This section starts with an overview of the pilot training that was designed and implemented on the use of a technology tool called hypervideo/ interactive video for teachers. Next, the methods for this research are detailed.

## **Training Design**

The focus of the training was on hypervideo/ interactive video as a technology tool in teaching-learning and on an application that can be used to make such videos.

The training took the form of a series of five short-videos in a hypervideo format that were created using the H5P application and were hosted on a WordPress page. The videos were made based on recommendations and guidelines from research on using hypervideo in

education (Cattaneo et. al, 2019; Cattaneo & Sauli, 2017; Sauli et. al, 2018). These were reflected in how the different features of hypervideos were used in the training. Additional relevant information and readings on using hypervideos in teaching-learning were shared throughout the training.

The training consisted of the following five videos which guide teachers in a gradual approach from an introduction, to using hypervideos in education and ending with demonstration of an application to create hypervideos:

1. *What are hypervideos?* Understanding hypervideo and getting to know its key features.
2. *Hypervideos in education.* Understanding why one could consider using hypervideos and the added value they bring to the teaching-learning process.
3. *Creating a hypervideo.* Understanding the key steps in creating a hypervideo and some key pointers that can help in making them.

Followed by a set of two videos on getting to know the H5P application and step-by-step instructions in creating a hypervideo with it:

4. *Demonstration of an application for creating a hypervideo – Part I*
5. *Demonstration of an application for creating a hypervideo – Part II*

The ideas and thought-process that went into giving it this shape would be discussed in detail in the next section on dialogue with the TPACK-in-Practice Workshop Model.

### **Training Implementation**

This training was shared as a pilot with three teachers. They were asked to complete this video series and provide their reflections and feedback through a questionnaire, followed by individual interview conversations.

These teachers were invited primarily through my network as past colleagues. Teaching in a supplementary secondary school set-up across India, Australia and East Africa with a diverse group of students, I found this group to be a suitable audience to understand feedback for my pilot design. In response to the pandemic, I was aware about their transition to completely teaching online and thus, their interest in participating in this pilot training.

All teachers have academic backgrounds (masters level) in teaching and education with experiences ranging from two to eight years, teaching an international interdisciplinary humanities and religious studies curriculum.

Data was collected in two forms: the first as a feedback questionnaire after completing the video series, followed by an interview conversation. The interviews were held using Zoom and the conversations were audio recorded with the permission of the teachers.

The questionnaire was more generic and focussed on the tool covered in the training and how helpful the training was in learning about hypervideos.

The later interview was focused more on design decisions that shaped this training, rather than evaluating the training and their progress in using the technology tool in their teaching practice. More than the questionnaire, the interviews have thus been used as primary data from teachers and as part of my dialogue with the model.

### **Action Research**

The purpose of this research is to further understand a “central phenomenon” (Creswell, 2012, p.16), which in this case is the development of a training on technology tools for teachers. Qualitative inquiry is thus relevant for this research.

As a pilot training was planned and implemented, the methodology of action research guided this research process. Practitioners use action research to study issues, questions or problems that they face in their practice in order to improve it (Creswell, 2012).

Action research also known as a “self-reflective spiral” (Kemmins, McTaggart & Nixon, 2013, p.9) also suits well for the purpose of this research to improve my understanding when designing such a training course for teachers the next time.

In addition to improvement of practice, action research is also a way to research one’s own practice to generate “personal theories of practice” that are “... already located within the practitioner’s tacit forms of knowing, and which emerge in practice as personal forms of acting and knowing” (McNiff & Whitehead, 2002, p. 20, 22). Thus, such tacit knowledge is revealed in the actions and the doings of the practitioner. The purpose of this research is also to make the several decisions and choices made for this pilot training idea explicit in order to understand my practice better. To do this, I will engage in a reflective and reflexive dialogue with my practice.

Hibbert et. al (2010) state that reflection symbolizes a mirror image, allowing us to observe or examine our ways of doing and becoming “observers of our own practice” (ibid, p.48). For this research, the reflections serve as a way to describe what I did and the several decisions that I took in designing this training.

Further, the purpose of this research is also to engage in reflexivity, “a conscious cognitive process whereby knowledge and theory are applied to make sense of remembered reflective episodes” (Dallos & Stedmon, 2009, p. 4). This way the process of reflexivity can be seen as extending the process of reflection beyond the evaluation of my practice. In the case of this research, the TPACK-in-Practice Workshop Model will be used as a partner in dialogue to identify similarities and differences in the approach of the model and the training design to make sense of and articulate my own practice.

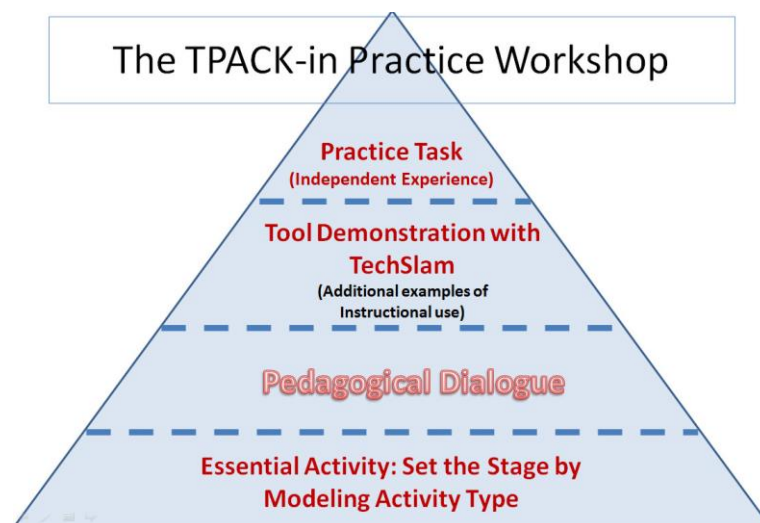
### Dialogue with the Model – Reflections and Discussion

This section is devoted to engaging in a dialogue with the TPACK-in-Practice Workshop Model with my training design. A background about this model has been described in the section on theoretical overview.

TPACK-in-Practice Workshop Model provides four distinct sequential experiences that supports teachers in transferring their knowledge from the workshop to their classroom practice as shown in Figure 1 (Figg & Jamani, 2013, p. 5041-5043):

- 1) Modelling a Tech-Enhanced Activity Type,
- 2) The Pedagogical Dialogue,
- 3) Tool Demonstration and the TECHSlam,
- 4) The Practice Task Using the Technology

**Figure 1**  
*TPACK-in-Practice Workshop Model*



These design elements will be used to engage in a reflective and reflexive dialogue with my training design to make sense of my current practice. This is also used to further

identify key ideas that can guide my future practice of developing such a training on technology tools for teachers. Feedback and reflections from teacher participants have also been used in this dialogue. All the design elements/ experiences of the model have been summarized from Figg and Jamani (2013).

In the following section, ‘training design’ refers to my work, and the ‘model’ refers to the TPACK-in-Practice Workshop Model.

### **Modelling a Tech-Enhanced Activity Type**

The model suggests setting the stage for the training with getting teachers to participate in a tech-enhanced activity type, learning with the technology tool to achieve a content learning goal.

Such a modelling experience by the workshop facilitator gives teachers a context of how the tool is useful in classroom instruction. It allows them to act as a learner and also visualize how learners would learn in a specific learning situation and content area with the tool. For example, a workshop called ‘Interactive Internet Research using QR Code Quests and iPads’, would involve teachers using iPads to conduct research using QR codes for an internet-based virtual scavenger hunt, after being provided brief instructions on how to use the QR Code Reader on the iPad.

Thus, key aspects include having the participants experience the use of the tool in a learning context as learner. The knowledge on technical skills is secondary at this starting point.

The training that was designed for teachers on the other hand was in the form of a series of videos. All the videos in the training were created in a hypervideo format using the H5P application. This way the tool and its different features were introduced and the teacher could experience these features as a learner.

For example, the first video, (*‘What are hypervideos?’*), was designed to take teachers on a gradual introduction to hypervideo as a technology tool by starting with brief information on videos and hypervideos. It then highlights the key differences between them and illustrates some of the key features of hypervideos. While introducing the features, examples of these supported by the H5P application were used in the video so that teachers could experience them right from the start. For example, when introducing the bookmark feature, teachers were directed to try out the bookmark feature in the video. Such an approach was intended to let teachers get to know the different possibilities that this tool has to offer while learning more about it and also experiencing it as a learner.

For example, in the other videos in the series, the different interactive features were also utilized to share further readings and links to multimedia content on hypervideo that teachers could refer to later or to bring their attention to an important point in the video. The link feature was used to share further readings on hypervideos that teachers could refer to while watching or in their own time. Additionally, the different quiz assessment options were utilized to assess teachers and also give them a sense about how learners could be assessed when using interactive videos.

The training experience (series of hypervideos) was also designed keeping in mind suggestions and guidelines shared by researchers on using hypervideos in education. For example, the length of the videos were kept short, also accounting the time needed to experience the several interactive features and work with the additional materials and multimedia content that were shared. Interactive features were carefully chosen and added at suitable points in the video, also keeping in mind how different interactive features may work together in enhancing the learning experience (e.g. quizzes, followed by hotspots helping learners navigate in order to revisit content of interest in the video).

These were some ways in which the tool was modelled for teachers while also informing them about it. As the tool may be new for (some) teachers, the idea was to present the tool, its features and possibilities and then set the stage for them to explore it further. Some illustrative feedback from teachers on this are quoted as follows:

“...You could see the examples through the video. So like, oh, that's cool... and I was imagining the student and the student's perspective as well... I was always putting myself in the shoes of my student and saying, okay, how can it help me to understand the content...” (Teacher 1)

“...With the way you modelled, I started imagining it as to how it would look like for my context.... I also thought if I created a hyper video what are some features that I would use? What are some YouTube videos or some content that I can use?...” (Teacher 3)

“... I was unaware about hypervideos or interactive videos and it would have been difficult for me to know about them, because of my busy schedules... you made it step by step, first starting with the theoretical knowledge. That gave me a background and a clarity on what exactly it is...” (Teacher 2)

The training was thus an invitation to learn about and explore this tool. This helped shape the overall design decisions to introduce and demonstrate the different features of the



tool and also provide teachers with background information about hypervideos and their use in the teaching-learning process.

While the training design adopts a similar ‘learning with the tool’ approach like the model, the training focuses on the tool. The model focuses on experiencing a tech-enhanced activity in a context. This activity plays a foundational role around which the overall workshop model is built.

### **The Pedagogical Dialogue**

In this part of the workshop, teachers engage in small group discussions to build their TPACK-in-Practice knowledge about how the tool can be seamlessly integrated and adapted into instruction. It accounts as the key step in which teachers are able to build the connections between pedagogy, content and technology and involves discussing the tech-enhanced activity modelled previously with the following guiding questions:

Technological Pedagogical Content Knowledge (TPCK): What is the structure of the activity? What tools are appropriate for this activity? In what types of lessons (e.g., Direct Instruction, Inquiry, Project-based, Problem-based, Collaborative Grouping Jigsaw) will this type of activity be most effective?

Technological Content Knowledge (TCK): How would this activity be adapted for content areas? What other tools could be used for this activity?

Technological Pedagogical Knowledge (TPK): What implementation strategies work most effectively for this activity? What does the teacher need to plan/ prepare ahead of time? What classroom management issues need to be addressed?. (Figg & Jamani, 2013, p.5042)

Thus, in the model the pedagogical dialogue is understood to be implemented through small group discussions with the above guided questions based on the teacher experiences of the tech-enhanced activity in the first step.

Such a form of pedagogical dialogue was not included explicitly in the pilot training design and rather took the form of sharing of information and demonstrating examples in the video series on using hypervideos in the teaching-learning process.

The second video, ‘*Hypervideos in Education*’ threw light on why one should consider using hypervideos and the added value they can bring to the teaching-learning process. The content outlined some of the key benefits of using hypervideo such as helping to engage learners actively when using video in instruction. This included the possibility to include multiple representations of the content (e.g. images, hyperlinks, audio, text), bring

attention of learners to critical information in the video (e.g. pausing the video at time-stamps, have labels to indicate or highlight key information) and enable self-assessment and self-regulation of learning by learners (e.g. through quizzes, navigation features like bookmarks, hotspots). Each of these was demonstrated with examples throughout the video so the teachers could get a sense of how the features could enable the outlined possibilities in their teaching.

The next video (*‘Creating a Hypervideo’*) focussed on strategies to plan and prepare when using the hypervideo tool in practice. The content focussed on the different steps in making a hypervideo along with key guidelines that can help teachers in creating them. It emphasized that teachers should keep in mind their learners, learning goals and the learning context when planning to use hypervideos in their teaching context. A roadmap of the different stages such as preparation, production and usage was presented that also included suggestions and guidelines for each stage. For example, in the preparation phase, the process of planning by using an existing video or creating a new video was described. In the production phase, the need to consider the purpose and suitability of using different interactive elements was explained. For the usage phase, some implementation strategies that the teachers could use were shared.

The contents presented in the videos were based on research and practice in using hypervideos in the teaching-learning process.

However, the process of connecting this information with their practice was left to the teachers.

In the interviews with the teacher participants, when asked about how they saw the use of this tool and could they connect it to their own practice, the following preliminary comments were received:

“ What interests me, you know, is the value of hypervideo, the engagement and the interaction. It’s different. You can pause and there are different features that are available...” (Teacher 1)

“While going through the videos, I could connect with certain things that I have used in my classroom, not hypervideos, but still some similar things which we use in our classroom, I could relate to that...there is an application called Nearpod, it has open ended and closed ended questions. But I think this has a lot of options... where we can have interactions, students can, you know, pause and reflect on certain (literature) pieces and work on... ” (Teacher 2)

“... And I also like the idea that more information was shared... And the video duration should be six minutes to retain students' attention... all these details made me aware that if I wanted to create hypervideos in future, I can keep all these parameters in my mind...” (Teacher 2)

“... I was thinking, how is it relevant to the topic that I'm teaching or, how is it relevant to the needs of my students? So that was something that I'm thinking about as well. So I started thinking, how can I leverage this hypervideo or links to create a self-paced tutorial for my students... but the challenge was at the back of my mind as well. How much time will it take?” (Teacher 3)

There were no explicit parallels on the pedagogical dialogue element as proposed by the TPACK-in-Practice Workshop Model in the training design, but it did ignite initial thoughts illustrated in the reflections of research participants that were shared in the interviews.

In the case of the model, the objective of the pedagogical dialogue is to help teachers build the connections between pedagogy, content and technology. This dialogue is in the form of discussions revolving around the modelled tech-enhanced activity, how and in what ways it can be adapted in different content areas and contexts. The frame of discussion is however, the tech-enhanced activity.

*How else could such a pedagogical dialogue look like?*

Now, if I have to think of an element of such a pedagogical dialogue for my training design, it points me to first further my understanding of the term dialogue. *What does dialogue even mean?*

As referred to earlier in the theoretical overview section, a dialogue does not necessarily need to be only between a group of people. A dialogue can also be between individuals and inanimate objects. Taking the case as the latter, a dialogue here can also take place between individuals and tools. Thus between teachers and technology tools.

*While considering it in the perspective of a training design, how can such a dialogue between teachers and tools look like?*

To explore this, I am drawn back to the work of Bohm (1996), where he presents the example of the work of an artist asking:

Can it properly be said that the artist is expressing himself, i.e., literally “pushing outward” something that is already formed inside of him? Such a description is not in fact generally accurate or adequate. Rather, what usually happens is that the first thing the artist does is only similar in certain ways to

what he may have in mind. As in a conversation between two people, he sees the similarity and the difference, and from this perception something further emerges in his next action. Thus, something new is continually created that is common to the artist and the material on which he is working. (p.3)

In trying to interpret this, we can relate it to a constant back and forth that can emerge when a teacher engages with a tool. In this, the teacher may observe similarities and differences in what he/ she may know and what he/ she observes. These differences can create opportunities for new ideas or understandings for the teacher, which can continue the dialogue further.

With this, one direction I find of particular interest is the work by Otchie et. al (in press). They propose that establishing a relationship and constant dialogue with the tool is key for deriving pedagogical meaning and understanding the affordances of the tool that are present but not directly visible to the teacher. They build on Gibson's (1955) concept of affordances and Polanyi's (1969) idea of 'indwelling'.

This view resonates with my own experience from learning about hypervideos to develop a training on it. My work with hypervideos started simply in one of my courses in which I was introduced to it. My engagement with it over time and for achieving different objectives led me to understanding its features and exploring the possibilities with them. In the process, it led me to discover possibilities that were not obvious to me initially for example organising a course or a study module utilizing its different features such as links, texts, quiz and so on. This was discovered only after having worked closely with the tool and its different features. I also realized some of the features that the application lacked and started looking for alternatives. Thus, what started as a simple account on H5P.com, took the shape of a training course on hypervideos in a hypervideo format.

### **Tool Demonstration and the TECHSlam**

This is the third step in the workshop model in which the teachers are introduced to the technical skills needed to effectively use the tech-enhanced activity in instruction.

The focus here is on developing the required technical skills needed to implement the tech-enhanced activity modelled earlier and is based on research that short and frequent training sessions continued over time help teachers to effectively integrate technology into their instruction.

This experience provides the specific technical instructions on the setup, creation and implementation of the tech-enhanced activity. Furthermore, tutorials and additional examples

of how the tech-enhanced activity and the tool could be used in different content areas and learning contexts are shared through an online web resource page (e.g. TECHSlam).

Thus, it addresses two aspects here: demonstrating the needed technical skills and providing further resources of how the tool could be used in instruction.

Such tool demonstration was a part of the training design to a large extent and was covered primarily in the last two videos of the series. In this series, the H5P application was introduced, and guided instructions to make interactive videos with it were demonstrated.

The first video (*Part 1*) in these was focussed on familiarizing teachers with the application, providing key information and directions to help them get started and try out the application. It gave a brief about the applications that can be used to make interactive videos and my choice and recommendation of using H5P. It was followed by a quick tour of its website. Teachers were also guided to examples of interactive videos that are shared on the website for future reference. The different options available to create and share interactive videos using H5P were introduced so teachers could choose a way that works best in their context. Progressing in the video, a relatively simpler approach was chosen to help teachers get started and the link to the website was shared. A brief overview of this website along with directions to sign-up were shared.

The next video (*Part 2*) focussed on demonstrating the process of making an interactive video in this application. It included step-by-step instructions from choosing a video, to inserting interactive features and sharing the video. It also covered key information relevant to choosing videos such as copyrights and format compatibility. With the help of an example video from the series, different interactive features that the application offers were highlighted and the process of inserting four interactive features was demonstrated. This included bookmark, text, link, and a quiz along with helpful information when trying out other features. Some of the advanced features were not covered so as to avoid information overload.

In this way, the aspect of tool demonstration was addressed in the training design.

A key difference also lies in the focus of tool demonstration in the two approaches. While the model focussed on specific technical skills needed to set up, create and implement the modelled tech-enhanced activity, the focus of the training was on the tool, with guided instructions to familiarize with and operate the tool.

Preliminary comments from the teacher participants provide feedback about the guided tool demonstration:

“...all details, I've got account login and from where you have to access and all minute details were given. It was good to know in detail...” (Teacher 2)

“I was very comfortable with the instructions you gave, so it would make my life very easy. So I really liked that process because it was crystal clear...

Having said that, I've been using other tools as well, that I learned on my own.

It took time. This saves me time because I had you, I could pause. I could replay, I could fast forward, I could do it along with your instruction...”

(Teacher 3)

This element of tool demonstration from the training design could form the first practical exploration of the tool by the teachers.

At this point, further examples of how teachers can use the tool in different content areas and learning contexts can serve as ready pointers to understand and learn from them.

“... It would have been nice if there was content in this, in the demo of application of part 1 and 2. I know you included your own content, but if you could have included like a curriculum content. Maybe I will be able to connect with it more... What does using a hypervideo look like when teaching with the example of the universe or galaxies?...” (Teacher 3)

### **The Practice Task Using the Technology**

In this last part, the workshop model involves giving participants time to practice using the technology and apply their newfound knowledge to design an independent task. The workshop facilitator may provide the same task similar to the modelled activity or allow participants to design a task using the tool that is more useful in their instruction. The workshop then concludes with a sharing session in small groups so that participants get an opportunity to see how other teachers plan to use the tool.

The model focussed throughout the workshop on using and adapting the tech-enhanced activity type in teachers' own context. This element was not covered explicitly in the training design. Owing to the pilot nature of the training, this activity was left to the independent choice and decision of the teachers. The element was however not ignored.

Throughout the training videos, the tool was modelled, giving teachers a sense of its use as well as guided step-by-step instructions to use the tool. In the last two demo videos, teachers were encouraged to try out the tool and its features. The idea of practicing using the tool was however kept open and not defined.

In making sense of my practice for the future and thinking about how practising with the tool could look like, it brings me to the question: *what does the ‘use’ of technology in education mean?*

The word ‘use’ in the use of technology in education could imply two aspects (Bardone, 2020). Using in one way operating a technology tool to learn the functionalities and technicalities of the tool. The other aspect could be referred to as contextual/ meaningful referring to the use of the tool in one’s own teaching practice and context. This use is not focussed only on the tool but on the use of the tool in a particular context. This thus depends upon several factors that could characterize the context such as teacher, teacher personality, students, curriculum, learning context, and so on. The use of the tool in this contextual form is not straightforward or clear as the operational use. This introduces an element of uncertainty of technology use in teaching as it does not follow a step-by-step guide but depends on the user/ teacher to create its meaningful use in their context.

This perspective points that the element of practice encouraging both these uses of technology tools will be important in the design of such a training. It can help teachers use a technology tool and eventually determine its meaningful use in their context.

Otchie et. al (in press) recommend training and workshops to focus on the following three phases to help teachers effectively contextualize the technology tool in their practice:

- Understanding phase: This involves understanding the tool and developing skills in the technical and operational use of the tool.
- Interaction phase: This involves a consistent dialogue with the tool by practicing or playing with it to establish a relationship with the tool. This way users (teachers) can identify the affordances of the tool that were previously not obvious/ visible.
- Contextualizing phase: In the third stage, users (teachers) can purposefully start using the tool in their own contexts and discover further affordances of the tool.

Although proposed for the use of social media, it can also be applied to technology tools in general.

For such training in the future, this could be a helpful framework which can guide the design of the practice tasks using the technology tool. The importance of practicing using the tool is also reflected in the feedback from teachers.

“... I want to explore more and make it a practice and feel comfortable, I want to take time and look more into it... I created the account and I logged in, I uploaded one video. And I tried but I think I got stuck somewhere and then I couldn't continue. I guess it really depends on how comfortable we are with the technology...” (Teacher 1)

“Modelling followed by application. So that is something important... if we create a space to say, here is what we're trying to introduce. Here are the benefits, let's try it together. I think that that makes a big difference. So you taught me, you've given me a tutorial, but now it's time for me to apply that tutorial into my own lesson, to see how I'm taking it... You as a teacher will know your focus, once you start engaging with the technology tool...”  
(Teacher 3)

### **Conclusion - Illuminating the Dialogue**

This section summarizes the overall reflections and discussions from this research work.

The thesis is a reflective and reflexive work in making sense of a pilot training that was designed to help teachers learn and explore a technology tool. The TPACK-in-Practice Workshop Model was used as a dialogue partner to make sense of my design and also derive understanding for how I can develop my practice for designing such training in the future. The outcomes are thus essentially in the form of a personal discussion that are aimed towards this objective.

The training in the pilot form, was shared with three teachers, with whom individual interviews were conducted on the training design. Keeping the objective of the thesis in mind, their responses are primarily used to understand the training design and not to evaluate the training.

The idea of having a dialogue with a model gave me a chance to develop my thinking about training teachers on technology tools. The model served as a ‘springboard’ from which I could start thinking about my training design and provided me with a frame to make sense of it. It also provided a structure to identify the similarities and differences with the model and further look at these differences with other perspectives that can guide my understanding in further developing this training.

The TPACK-in-Practice Workshop Model was identified as a dialogue partner. A key difference lies in the differing training objectives. While the model focuses on use of a



technology tool for one activity type, my training objectives were focussed on helping teachers get informed about the tool and be able to explore its use further.

While differing on the training objectives, this model was considered as an appropriate choice due to several common characteristics with my training idea. It focusses only on one technology tool in its workshop model. The model has been proposed for and used with K-12 to university teachers with varying teaching experiences (pre-service, in-service) and is also not dedicated to any particular subject/ content area. It also follows a short workshop-style approach.

In dialogue with the different phases of the model, similarities and differences with my training were identified. In both the approaches, having the teachers experience learning with the tool was common. The model focusses this on experiencing a tech-enhanced activity type with the tool, whereas my training design adopts an approach in which the teachers could experience the tool, its features and some examples of their use throughout the training. Another similarity was in how both the approaches provide a step-by-step demonstration of the tool. Key differences are identified in the elements of pedagogical dialogue and practice tasks using the tool. In the model, the pedagogical dialogue takes the form of small group discussions on the tech-enhanced activity and its integration and adaptation into their instruction. In the training, this element is not explicitly included in the design. Relevant information and guidelines related to the use of the tool in teaching and learning are shared throughout the training videos, also using the features of the tool as examples to demonstrate these. On the element of practice tasks using the tool, the model includes defined tasks for teachers to practice and adapt the tech-enhanced activity which could be used in their instruction. Such an element is not included in the training design and is left to the choice and decision of teachers. In the tool demonstration, the training however includes guided instructions on how teachers can get started in using the tool.

These differences triggered questions in first understanding them and then trying to make sense of what it could mean and how it could look for my practice. This led me to reach out for other perspectives that could provide some more light on these questions. Through this process, it helped me identify some key directions for these training elements to keep in mind for my work ahead. The scope of the current work has been to understand these. How these can be actualized, remains a continuing inquiry.

Having learnt about ideas of technology use in education in my coursework, using the model further provided the focus and additional lens to see this from the view of training teachers to use technology. The conversation brought forth the need to revisit and emphasize

what use of technology in education means and how this aspect is important for teachers to be able to contextualize a tool in their practice. Another key perspective that opened up for me was the interpretation of the word dialogue in relation with technology use. My training design would need to now recognize and enable regular engagement/ dialogue between the teacher and the technology tool so that they are able to progress from the functional to the contextual use of the tool.

In terms of limitations, the scope of work is also bound to the four step approach of the TPACK-in-Practice Workshop Model. Had the dialogue taken place with another model or framework for training teachers on technology tools, the outcomes could have looked different. Further, the current work is limited by the reflection and articulation of my own practice.

As this work is based on my reflective and reflexive experience, the scope to generalize may be limited. According to Thomas (2010, p. 579), generalization here would come from the “connections and insights it can offer to another’s experience” with mine. In this sense, someone else could enter into dialogue with my experience and practice of designing a training for teachers on technology tools and initiate a further process of thinking.

It has also been a first attempt in engaging with a dialogue on my training design. This is in no way final, evolving even as I write this thesis report. I have come to recognise and learn this idea of a dialogue, which I would like to continue in the future. Immediate next steps from this work could be to understand and develop the training design and the individual elements with the learnings from this dialogue, in particular the elements on pedagogical dialogue and practice using the technology tasks. With the training design also adopting an ‘experience as a learner’ approach, I would also like to see how it could shape with other technologies and also engage with more teachers. These could then serve as the training design for which I could again engage in a similar dialogue with suitable partners and continue making better sense of my practice in designing such training for teachers.

### **Acknowledgements**

To my thesis supervisor Dr. Emanuele Bardone for his supervision, guidance, support and the many conversations in this research journey.

To my teacher participants for their time and support in embracing my training and giving me valuable feedback.

To my family for all the love, care, encouragement and support as I embarked on this adventure in educational technology!

### **Author's Declaration**

I hereby declare that I have written this thesis independently and that all contributions of other authors and supporters have been referenced. The thesis has been written in accordance with the requirements for graduation theses of the Institute of Education of the University of Tartu and is in compliance with good academic practices.

Alisha Faridhussain Navodia

*Alisha Navodia*

---

05.06.2021

## List of References

- Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & education*, 52(1), 154-168. doi:10.1016/j.compedu.2008.07.006.
- Bardone, E. (2020, August 3). *Some terminological issues concerning technology use in education and educational technology* [Video file]. Retrieved from <https://www.youtube.com/watch?v=V26Kb6ieV6o>
- Bohm, D., & Nichol, L. (Ed.) (1996). *On dialogue*. Routledge.
- Cattaneo, A. & Sauli, F. (2017). Integrating interactive video in a learning scenario. Guidelines from IV4VET project. *Lugano: Swiss Federal Institute for Vocational Education and Training (SFIVET)*.
- Cattaneo, A. A., van der Meij, H., Aprea, C., Sauli, F., & Zahn, C. (2019). A model for designing hypervideo-based instructional scenarios. *Interactive learning environments*, 27(4), 508-529. doi: 10.1080/10494820.2018.1486860.
- Cherner, T., & Mitchell, C. (2021). Deconstructing EdTech frameworks based on their creators, features, and usefulness. *Learning, Media and Technology*, 46(1), 91-116. doi: 10.1080/17439884.2020.1773852.
- Creswell, J. W. (2012). *Educational research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*. Pearson.
- Dallos, R. and Stedman, J. (eds) (2009). *Reflective Practice in Psychotherapy and Counselling*. Maidenhead: Open University Press.
- Figg, C., & Jaipal, K. (2012, March). TPACK-in-Practice: Developing 21st century teacher knowledge. In *Society for Information Technology & Teacher Education International Conference*, 4683-4689. Association for the Advancement of Computing in Education (AACE).

- Figg, C., & Jaipal, K. (2013, March). Using TPACK-in-Practice Workshops to enable teacher candidates to create professional development workshops that develop tech-enhanced teaching. In *Society for Information Technology & Teacher Education International Conference*, 5040-5047. Association for the Advancement of Computing in Education (AACE).
- Figg, C., & Jamani, K. J. (2013). Transforming Classroom Practice: Technology Professional Development that Works!. *Teaching & Learning*, 8(1), 87-98.
- Graham, C. R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers & Education*, 57(3), 1953-1960. doi:10.1016/j.compedu.2011.04.010.
- Harris, J. (2016). Inservice teachers' TPACK development: Trends, models, and trajectories. In M. Herring, M. Koehler, & P. Mishra (Eds.), *Handbook of technological pedagogical content knowledge for educators* (2nd ed., pp. 191-205). New York, NY: Routledge.
- Hibbert, P. C., Coupland, C., & MacIntosh, R. (2010). Reflexivity: recursion and relationality in organizational research processes. *Qualitative Research in Organizations and Management*, 5(1), 47-62. doi: 10.1108/17465641011042026.
- Jaipal-Jamani, K., & Figg, C. (2015). The framework of TPACK-in-practice: Designing content-centric technology professional learning contexts to develop teacher knowledge of technology-enhanced teaching (TPACK). In *Technological pedagogical content knowledge*, 137-163. doi: 10.1007/978-1-4899-8080-9\_7.
- Jamani, K. J., & Figg, C. (2013, June). The TPACK-in-practice workshop approach: A shift from learning the tool to learning about technology-enhanced teaching. In *International Conference on e-Learning*, 215. Academic Conferences International Limited.
- Kemmis, S., McTaggart, R., & Nixon, R. (2013). *The action research planner: Doing critical participatory action research*. Springer Science & Business Media.

- Kimmons, R., Graham, C. R., & West, R. E. (2020). The PICRAT model for technology integration in teacher preparation. *Contemporary Issues in Technology and Teacher Education*, 20(1), 176-198.
- Kimmons, R., & Hall, C. (2016). Emerging technology integration models. *Emergence and innovation in digital learning: Foundations and applications*, 51-64.
- Kimmons, R., & Hall, C. (2018). How useful are our models? Pre-service and practicing teacher evaluations of technology integration models. *TechTrends*, 62(1), 29-36. doi: 10.1007/s11528-017-0227-8.
- Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)?. *Contemporary issues in technology and teacher education*, 9(1), 60-70.
- Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)?. *Journal of education*, 193(3), 13-19.
- Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., & Graham, C. R. (2014). The technological pedagogical content knowledge framework. In *Handbook of research on educational communications and technology* (pp. 101-111). Springer, New York, NY.
- McNiff, J., & Whitehead, J. (2002). *Action Research: Principles and practice*. RoutledgeFalmer.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, 108(6), 1017-1054.
- Mishra, P. (2019). Considering Contextual Knowledge: The TPACK Diagram Gets an Upgrade. *Journal of Digital Learning in Teacher Education*, 35(2), 76-78. doi: 10.1080/21532974.2019.1588611
- Otchie, W.O., Pedaste, M. & Bardone, E. (in press). Social media in education: Theorizing the concept of affordances and contextualizing technology tools. *Canadian Journal of Learning and Technology*.

- PuenteDura, R. (2010). SAMR and TPCK: Intro to advanced practice. Retrieved from:  
[http://hippasus.com/resources/sweden2010/SAMR\\_TPCK\\_IntroToAdvancedPractice.pdf](http://hippasus.com/resources/sweden2010/SAMR_TPCK_IntroToAdvancedPractice.pdf)
- Sauli, F., Cattaneo, A., & van der Meij, H. (2018). Hypervideo for educational purposes: A literature review on a multifaceted technological tool. *Technology, pedagogy and education*, 27(1), 115-134. doi: 10.1080/1475939X.2017.1407357.
- Thomas, G. (2010). Doing case study: Abduction not induction, phronesis not theory. *Qualitative inquiry*, 16(7), 575-582. doi: 10.1177/1077800410372601.

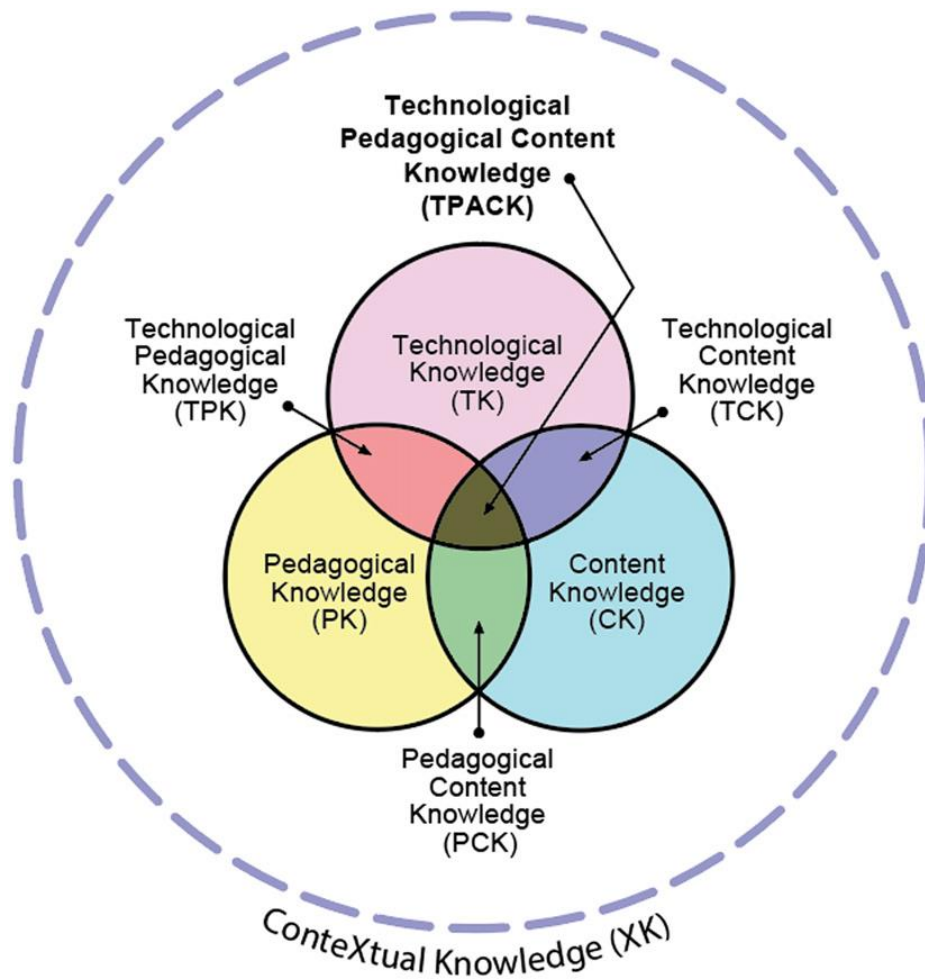


## Appendices

### Appendix 1. The TPACK Diagram

**Figure 1-1**

*Revised version of the TPACK image. (Punya Mishra, 2019)*

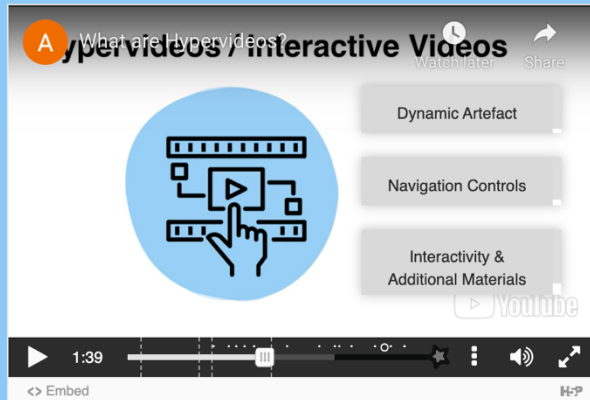


## Appendix 2. Knowledge Types in TPACK

**Table 2-1***Knowledge Types in TPACK (Mishra & Koehler, 2006, as cited in Graham, 2011)*

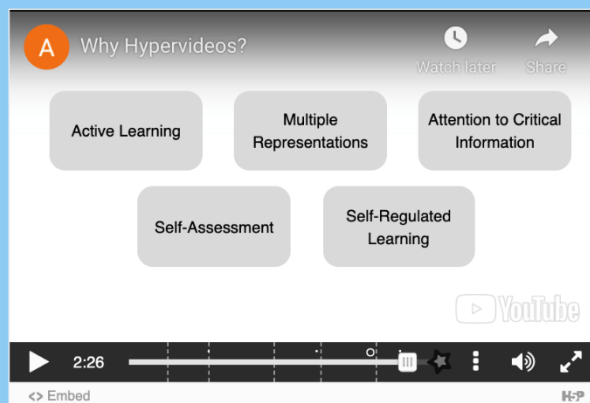
<b>Knowledge Type</b>	<b>Description</b>
PK	“Pedagogical knowledge (PK) is deep knowledge about the processes and practices or methods of teaching and learning and how it encompasses, among other things, overall educational purposes, values, and aims. This is a generic form of knowledge that is involved in all issues of student learning, classroom management, lesson plan development and implementation. It includes knowledge about techniques or methods to be used in the classroom; the nature of the target audience; and strategies for evaluating student understanding.” (p. 1026–1027)
CK	“Content knowledge (CK) is knowledge about the actual subject matter that is to be learned or taught.. including knowledge of central facts, concepts, theories, and procedures within a given field; knowledge of explanatory frameworks that organize and connect ideas; and knowledge of the rules of evidence and proof (Shulman, 1986).” (p. 1026)
TK	“In the case of digital technologies, this includes knowledge of operating systems and computer hardware, and the ability to use standard sets of software tools such as word processors, spreadsheets, browsers, and e-mail. TK includes knowledge of how to install and remove peripheral devices, install and remove software programs, and create and archive documents.” (p. 1027)
PCK	“PCK exists at the intersection of content and pedagogy. Thus, it goes beyond a simple consideration of content and pedagogy in isolation from one another. PCK represents the blending of content and pedagogy into an understanding of how particular aspects of subject matter are organized, adapted, and represented for instruction.” (p. 1021)
TPK	“TPK is knowledge of the existence, components, and capabilities of various technologies as they are used in teaching and learning settings, and conversely, knowing how teaching might change as the result of using particular technologies.” (p. 1028)
TCK	“TCK is knowledge about the manner in which technology and content are reciprocally related. Although technology constrains the kinds of representation possible, newer technologies often afford newer and more varied representation and greater flexibility in navigating across these representations.” (p. 1028)
TPACK	“TPCK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones.” (p. 1029)

### Appendix 3. Screenshots of Training Design



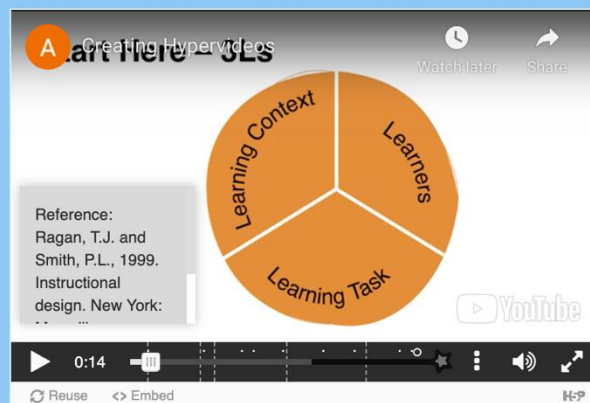
#### What are hypervideos?

Understand what hypervideos are and get to know their key features



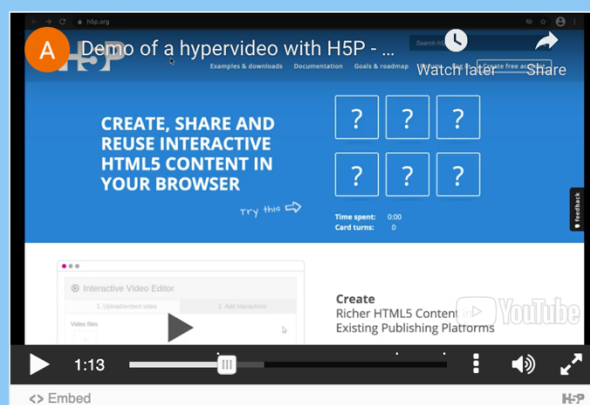
#### Hypervideos in education

Understand why one could consider using hypervideos and the added value they bring to the teaching-learning process



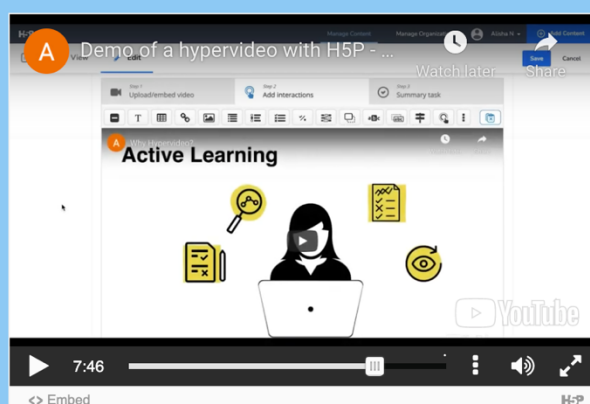
## Creating a hypervideo

Understand the different steps in creating a hypervideo and some key pointers that can help



## Demo of an application for creating a hypervideo - Part 1

Get to know H5P and creating a hypervideo with it



## Demo of an application for creating a hypervideo - Part 2

Get to know H5P and creating a hypervideo with it

#### Appendix 4. Interview Questions

The following set of example questions were a part of the interview with the teachers with whom the pilot training was shared:

1. What does the process of exploring a technology tool for your own teaching look like?
2. In this training, what aspects did you like the most in the sense that helped you know about/ explore the tool? Why?
3. Did the training help you reflect upon ways in which you can use this tool in your own practice?
4. What else could this training have included to help you explore the tool better? (e.g. format of training, further support...)
5. Have you had a chance to use this tool in your teaching?/ Do you plan to use this tool in your teaching? What were/ are some opportunities and challenges in doing so/ that you foresee?

## **Non-exclusive licence to reproduce thesis**

I, Alisha Faridhussain Navodia

1. herewith grant the University of Tartu a free permit (non-exclusive licence) to

reproduce, for the purpose of preservation, including for the purpose of preservation in the DSpace digital archives until the expiry of the term of copyright,

Designing Training on Technology Tools for Teachers – A Dialogue with a Model

supervised by Dr. Emanuele Bardone

Publication of the thesis is not allowed.

2. I am aware of the fact that the author retains the right specified in p. 1.

3. This is to certify that granting the non-exclusive licence does not infringe other persons' intellectual property rights or rights arising from the personal data protection legislation.

Alisha Faridhussain Navodia  
**05/06/2021**