UNIVERSITY OF TWENTE.

MASTER THESIS

THE DEVELOPMENT AND EVALUATION OF A PROFESSIONAL DEVELOPMENT PROGRAM FOR DEVELOPING TECHNOLOGY INTEGRATION COMPETENCIES OF EDUCATIONAL DESIGNERS: A STUDY IN INDONESIAN GOVERNMENT'S CENTER FOR EDUCATION AND TRAINING

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List of Abbreviations

CK	:	Content Knowledge
MOD	:	Managing Official Documents
PK	:	Pedagogical Knowledge
PCK	:	Pedagogical Content Knowledge
Pusdiklat	:	*Pusat Pendidikan dan Pelatihan* (Center for Education and Training)
Pusdiklat Setneg	:	*Pusat Pendidikan dan Pelatihan Sekretariat Negara* (Center for Education and Training of State Secretariat)
Setneg	:	*Sekretariat Negara* (State Secretariat)
TK	:	Technological Knowledge
TCK	:	Technological Content Knowledge
TPK	:	Technological Pedagogical Knowledge
TPACK	:	Technological Pedagogical and Content Knowledge

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Muhammad Farid Zeno

Abstract

State Secretariat of the Republic of Indonesia (*Setneg*) is responsible for managing official state documents effectively and efficiently by integrating computer office application, such as mail-merge system. *Setneg's* employees are required to attain sufficient skills and knowledge in using mail-merge system. In order to achieve that, Center for Training and Education of State Secretariat of the Republic of Indonesia (*Pusdiklat Setneg*) provides Management Official Documents (MOD) training. The MOD training should accommodate the regulation of managing official documents as training content and include mail-merge system as technological support. Besides, the training method has to be compatible with the real daily tasks of *Setneg's* employees. However, educational designers at *Pusdiklat Setneg* who are responsible to design MOD training curriculum do not have sufficient skills in integrating technology, neither with the training content nor the method on the training curriculum. They also do not have sufficient skills in presenting the curriculum to the instructor, who will deliver the training contents. To eliminate the gap, a professional development program for educational designers was conducted. On the professional program Technological, Pedagogical, and Content Knowledge (TPACK) framework by Mishra and Koehler (2006) was introduced to the educational designers in order to describe their knowledge with regards to technology integration in training curriculum. The study found that educational designers' TPACK in curriculum design and presentation changed after the professional development program. Educational designers' technological skills and knowledge also changed after joining the program. The educational designers appreciated the professional development program as useful effort in order to enhance their competencies. Design-based research was selected as the research method for this study. Twelve educational designers at *Pusdiklat Setneg* were participated in this study. TPACK questionnaires and TPACK rubric were used as research instruments for data collection. The non-parametric Wilcoxon Signed-rank statistical analysis was used to analyze the data. Moreover, qualitative analysis was used to interpret the feedback form, reflection report, and researcher log book.

Keywords: TPACK, technology integration, educational designers' competency

CHAPTER 1—BACKGROUND OF STUDY

This chapter presents background information that becomes the fundamental line of reasoning on this this study. It also provides current information about Pusdiklat Setneg as targeted institution with regards to its main tasks and responsibilities. This part also describes problem statement which becomes the central point of this study. Some research questions are presented in order to guide the researcher in solving the stated problem.

1.1. Introduction

Quality of government employees has been a critical issue in Indonesia since the reformation era in 1998. Government institutions have been encouraged to work on the improvement of their employees' quality in managing the state by establishing a center for education and training of state management. The main function of this center is to conduct professional development in order to improve their employees' skills and knowledge in managing the state. By the Regulation of Head of National Personnel Agency Number 43/KEP/2001 government officials must have information and communication technology (ICT) skills, such as utilizing computer office application that could help their administrative tasks in managing official documents. Therefore, government employees who have sufficient skills in ICT would have better performance in managing effective official documents than those without.

The State Secretariat of the Republic of Indonesia (known as *Setneg*), is a government institution that is responsible for managing official state documents to give administrative support to the President and Vice-president. In order to manage the official documents effectively and efficiently, technological support, such as computer office application for mail merging, tracking, and archiving system are needed. With the purpose of enhancing employees' skills and knowledge in managing official documents, *Setneg* through its Center for Education and Training (known as *Pusdiklat Setneg*) conducts a Management Official Documents (MOD) training for their employees. The curriculum of the training has to accommodate regulation of managing official documents as crucial content and integrate particular technology application as supporting factor. It is because *Setneg's* employees have to attain sufficient skills and knowledge in managing official state documents based on the regulation, and also have to implement specific technology for mailing system in computer application, such as mail-merge system to support the official state documents management. Besides, the training curriculum also has to adopt appropriate training method based on the real tasks of the educational designers. The tasks provided on the training should be based on the daily tasks of the educational designers in managing official documents.

In order to answer the challenge, the educational designers have to be able to design a MOD training curriculum by considering three aspects; content of the training, method of the training, and technological support for the training simultaneously. In detail, the educational designers should consider official documents regulation for the training content, task-based training for the training method, and a mail-merge application for the technological support. Based on their current formal job tasks, the educational designers do not have specific skills to integrate those aspects, especially with regard to integrate technological aspect into the MOD training curriculum. One of the learning objectives of the MOD training is to enhance skills of employees in implementing mail-merge system as technological support for official documents management. However, the current competencies of educational designers do not accommodate the attainment of training objectives. There is a gap when educational designers assigned to design the curriculum, and they do not fully understand the content and the learning objective of the training. Thus, professional development for educational designers should be implemented to eliminate the gap between the job tasks or required competencies with the limited current competency of the educational designers in integrating those three aspects, which is warranted to comply with the expected learning objectives of the MOD training. Table 1 shows the gap

between required and current competencies of educational designers relate with learning objectives of the MOD training.

Table 1. Educational Designers' Job Tasks and Required Competencies, Current Competencies Relate to MOD Training Objectives.

Job tasks and required competencies of educational designers at *Pusdiklat Setneg*	**Current competencies of educational designers**	**Curriculum objectives of Managing Official Documents (MOD) Training**
• Conducting training needs assessment (TNA) and planning training programs. • Formulating training curriculums based on training objectives. • Communicating training curriculums to users (i.e. leaders, instructors) • Preparing guidelines for training materials. • Scheduling training agenda for instructors and participants. • Selecting instructors and participants for training. • Organizing the implementation of training. • Conducting training evaluation. • Reporting implementation and evaluation results of training. • Supporting administrative matters concerning education and training.	• They are able to plan training programs and curriculums based on training needs assessment (TNA) that is matched with organization needs. It includes scheduling, selecting the instructors, and preparing training materials. • They have sufficient competencies in implementing training programs, doing evaluation, and reporting based on institution's regulation. • They have limited competency in integrating technology in training curriculums, especially for the training that is required technological support. • They have limited capacity in giving effective presentation about curriculum products.	Official documents training at *Pusdiklat Setneg* has intended to enhance *Setneg's* employees on these following skills: • Basic '*Bahasa Indonesia*' (Indonesian language) linguistic skills. • Formal-written language. • Official documents regulations. • Computer office application skills (mail-merge). • Mail tracking system. • Official documents security and archiving systems.

Concerning the integration of technology in learning process, previous findings reveal that computer technology is extensively used as an instructional in teaching and learning (Hogarty, Lang, & Kromrey, 2003 as cited by Al-Ruz & Khasawneh, 2011). The computer technology integration in the curriculum may result in the improvement of teaching instruction (Lipscomb & Doppen, 2002), and also gives beneficial impact in enhancing the learning process and participants understanding of subject matter (Bos, 2007; Graham & Thomas, 2000). It is because the computer technology enables instructor to establish interactive learning setting between the participants and the learning materials. Moreover, technology also supports the effectiveness of learning process in training, since the computer technology emphasizes on the direct participation and activities of the trainees that could enhance better performances and understandings to the training materials than the traditional training strategy that is only emphasized on theory-oriented text-books (Emad, 2010; Harun, 2001; Lim, Lee, & Nam, 2007).

In this context, the educational designers have to be able to design a training curriculum that is suitable to enhance the skills of *Setneg's* employees in MOD. Educational designers should be able to conduct technology integration for MOD training curriculum by considering official documents regulations as the main training content, and task-based learning as appropriate training strategy for the training. Besides, they also have to be able to present their curriculum product to instructors, who are responsible for implementing the curriculum in the classroom. The reason is that educational designers are not the persons, who are responsible to give the eventual instruction. Thus, in this context the competences of educational designers could be distinguished into two layers; designing training curriculum and presenting training curriculum. As mentioned before, a professional development program is needed here to enhance educational designers' competencies on those two layers. The framework of this study is presented in Figure 1. The figure indicates to what extend the professional development program contributes to enhance the competencies of the educational designers and it describes which issues should be studied before and after the professional development program.

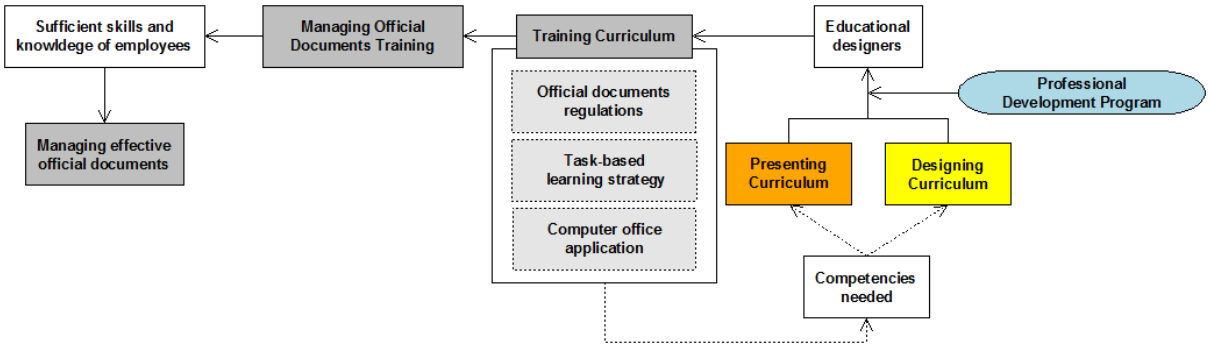

Figure 1. Chart of line of reasoning of the study

1.2. Institution background

Ministry of State Secretariat of the Republic of Indonesia, well known as *Setneg*, is a government institution that works under the control and has direct responsibilities to the President of Republic of Indonesia. On the Regulation of State Secretariat Minister Number 1 Year 2005, the main task of *Setneg* is to give technical and administrative support to the President and Vice-president of Republic of the Indonesia in order to maintain their power in managing the state. In administering its tasks, *Setneg* conducts five missions such as (1) giving excellence technical and administrative support to the President and Vice-president, (2) giving household and protocol service to the President and Vice-president, (3) giving technical and administrative support to the President as commander in chief of Indonesian Army Forces, (4) conducting effective and efficient supervision and institution relationship, and (5) improving quality of human resources and physical facilities.

Furthermore, in order to improve the quality of human resources that support the attainment of its main tasks, *Setneg* establish Center for Education and Training in 2005. Based on Ministry of State Secretariat Regulation Number 1 Year 2005 and Number 7 Year 2008, Center of Education and Training has the main task to plan, organize, and evaluate human resource development in *Setneg*. In implementing that main task, *Setneg* conducting ten following functions:

a. planning human resource development program;
b. implementing training cooperation with local and foreign educational institutions;
c. conducting structural education and training;
d. conducting functional education and training;
e. conducting technical education and training;
f. administering scholarship process;
g. monitoring and evaluating the implementation of education and training;
h. arranging administrative matters concerning education and training;
i. giving administrative service and coordinating training instructors;
j. administering yearly report.

Indeed, in conducting those functions, *Pusdiklat Setneg* hired educational designers who are assigned into four divisions. Those educational designers has main role to plan, organize, and evaluate education and training programs that are implemented in *Pusdiklat Setneg*. They are obliged to have skills in designing educational program and training. Besides, they are also required to mastery the content of training and its effective training method. Those skills are needed in designing precise training curriculum.

The educational designers at *Pusdiklat Setneg* have sufficient skills and knowledge in information and communication technology, especially in computer office application. They are also have sufficient skills in formulating curriculum for MOD training appropriately based on government regulations and employees' needs. However, they are still have limited skills in integrating computer office application with official documents regulations in MOD training with effective training method. Office application has strong benefit to support management of official documents, such as using mail merge database system. Current condition and situation at

Pusdiklat Setneg really has strong possibilities to support MOD training that is directly embedded with technology. It is because *Pusdiklat Setneg* has PC room facilities that are equipped with high-end specification computer that surely could support office application for mail-merge database system.

1.3. Problem statement

As aforementioned before, based on required competencies, the educational designers at *Pusdiklat Setneg* should be able to design training curriculum which is based on training objectives. Related with the MOD training, one of the learning objectives is to enhance the employees' skills in implementing mail-merge system as the technological support to establish effective official documents management. It means that the educational designers should be able to design MOD training curriculum which is integrated by the technology. Moreover, the educational designers have to integrate the technology into the content of MOD training and the method that is intended to be implemented for the training. However, a limited current competency of educational designers in integrating technology in training curriculum becomes a barrier to design intended MOD training curriculum. The educational designers also do not have specific skill to integrate mail-merge application as technology application to the content and to the training method of the MOD training curriculum. Besides, they also have limited capacity in presenting their curriculum product to the instructors who will use and implement the curriculum. It is important since educational designers are not assigned to give instructions in during the training.

Pusdiklat Setneg as an institution who is responsible to enhance the quality of human resources at *Setneg* should be able to establish an effective MOD training program. With this regards, *Pusdiklat Setneg* should enhance their internal performance, especially the capacity of their educational designers in formulating appropriate MOD training curriculum. A professional development program for educational designers should be conducted as an effort to enhance the capacity of the educational designers at *Pusdiklat Setneg*. Besides, the program is also determined to eliminate the gap between the required competency and the limited competencies of educational designers in integrating technology MOD training curriculum, relate with the expected learning objectives of the MOD training. This study is focused to investigate whether the professional development program that is provided to educational designers has good effect to enhance educational designers' competencies in designing technology-integrated training curriculum and in presenting the curriculum or not.

1.4. Research questions

From the problems discussed before, a general research question is formulated. This study attempts to answer *what are the characteristics of a professional development program that prepare educational designers to design and present a technology-integrated curriculum for Management Official Documents (MOD) training?* This main question is formulated into three sub-questions as follows:

a. Do educational designers' TPACK in designing training curriculum change after participating in the professional development program?
b. Do educational designers' TPACK in presenting training curriculum change after participating in the professional development program?
c. How do educational designers appreciate the professional development program?

CHAPTER 2—THEORETICAL FRAMEWORK

On the Chapter 2 some theoretical background from previous research reviewed and formulated as the framework for supporting this study. First review on this part is dealt with the advantages and considerations in integrating technology in training. Then, the review is followed by explaining required educational designers' competencies in integrating technology in training curriculum. In order to describe educational designers' knowledge with regards to technology integration explanation about TPACK framework and its relation with educational designers' competencies are provide. Then, model characteristic of professional development arrangement to enhance educational designers' competencies is explained. The chapter is closed with a formulation of design guideline for conducting effective professional development program for educational designers in designing technology-integrated curriculum.

2.1. Technology integration in training: The advantages and its considerations

The advantages

Training and development in an organization has become a serious concern to enhance productivity of the employees. Most of organization attempt to provide effective training that could enhance performances of the employees that lead to visions or goals of the organization. Several types of training and development methods are available to be implemented, but the organization through its human resource department has to decide which training methods are the most suitable for their employees (Ertemsir & Bal, 2012). In general, training methods could be distinguished into two types; traditional training method and technology-supported training method (Betrus, 2008; Andreu and Jauregui, 2005 as cited on Ertemsir & Bal, 2012). Traditional training here could be as instructor-led, case study, behavior modeling, business games, in-basket training, on-the-job training, internships, etc. (Mondy, 2010; Dessler, 2005 on Ertemsir & Bal, 2012). Then, technology-supported training is the consequence of the rapid development of information and communication technology that penetrates its training process and instructional functions through technology innovation (Ertemsir & Bal, 2012). The traditional training method has become insufficient to be implemented on training setting without considering technology changes (Ertemsir & Bal, 2012). Han and Wang (2010) affirm that training contents that are well integrated with technology are more effective than traditional theory-oriented textbooks that are used in traditional training method.

With regards to information and communication technology development, the use of computer technology in educational setting has attained global acceptance (Al-Ruz & Khasawneh, 2011). In education sector, computer technology is widely utilized as instructional tools in teaching and learning settings (Hogarty, Lang, & Kromrey, 2003). There is an acceptance that integration of technology in curriculum may results in improvement on instructional process in education (Lipscomb & Doppen, 2002). In addition, Payne et al. (2009) state that training for employees that integrate technology on it, significantly improved the skills of inexperienced employees. Based on that intention, technology integration on the training setting nowadays is a must, in order to provide effective training method. Indeed, technology integration on training gives more advantages that are discussed on this part. Tables 2 presents the summary of the advantages of technology integration in training which are used as part of guidelines in providing effective training for this study.

Table 2. The Advantages of Technology Integration on Training

The Advantages of Technology Integration on Training	Authors
Provide flexibility	Bell and Kozlowski (2002); Harun (2001); Lim et al. (2007); Macdonald and Chiu (2011); McKay and Vilela (2011); Munro and Peacock (2005); Payne et al. (2009)
Enhance practicality	Al-Ruz and Khasawneh (2011); Bell and Kozlowski (2002); Ertemsir and Bal (2012); Payne et al. (2009)
Enables interactivity	Ertemsir and Bal (2012); Han and Wang (2010); Klieger, Ben-Hur, and Bar-Yossef (2010); Munro and Peacock (2005); Payne et al. (2009)

- **Provide flexibility**

  From point of view of flexibility, technology integration in training also could enhance flexibility and convenience of participants in following the training, since technology offers flexible features and amenities to support it (Macdonald & Chiu, 2011). In addition, McKay and Vilela (2011) affirmed that creating a learner-centered, flexible and adaptive training program that integrates the power of ICT multimedia tools will improve the delivery of training program in institutions. Harun (2001) argue that by implementing technology, learning activities could be integrated into working activities that determined for maximum improvement of employees performance in minimum time. Furthermore, Lim et al. (2007) also affirm that a training environment that is supported by technology could be customized based on the participants needs. It means that the technology could be adapted based on training content that is needed by the participants. For example, if the participants need to attain specific skills in managing effective mailing system in their office, the training setting could be arranged in the PC room or in their own PC work-station by using computer application of mail-merge system to make it computerize, instead of provide a conventional classroom training. Payne et al. (2009), on their study about technology-integrated training on industrial sector found that employee attain better training setting if it is supported by technology rather than the conventional training, since technology-integrated training allows the employees to customize their demands and time in comfort.

  Furthermore, Munro and Peacock (2005) also affirm that integration of technology on the training enhances the flexibility of the training process. They provide nice example about the flexibility on the training setting for nurses training to use syringe driver for injection. They found that technology-supported training makes possible to customize the training to adapt the needs of different levels of learners by providing different series of training materials on soft-copy format (i.e. published on computer compact disk). Besides, Munro and Peacock (2005) also reveal that integration of technology on the training provide flexibility to the learner to access the training materials at their work, at home, or on a formal training setting. Indeed, learner like much more flexibility on their education or training activities (Monteith and Smith, 2001 on Munro & Peacock, 2005). Likewise, Bell and Kozlowski (2002) argue that integrating computer-based technology on the training allows employee to occur the training course almost anytime and anywhere depends on their needs. It also enables learners to control their different training content, sequence, and learning pace on the training activities (Bell & Kozlowski, 2002)

- **Enhance practicality**

  From the practicality perspective, Al-Ruz and Khasawneh (2011) on their study attempt to find out how technology integration in training influence the effort of participant in integrating technology in their professional activities. In their study the training was intended for pre-service teachers that were prepared to integrate technology in their classroom. The study revealed that technology integration in the training give positive influence for teachers to integrate technology in their real working environment (i.e. teacher in classroom setting). Besides, Payne et al. (2009) confirm that technology-integrated training enhances complex skills of employees to take over

complex practical tasks in an organization, since it could provide real working environment during training by employed technological support during the training. Moreover, from point of view of practicality, technology-integrated training could represent the real training environment if it too risky to be implemented on the real setting. The integrated-technology could utilize many types of training tools such as web-based training or computer-based simulation that could create a safe training environment that avoid serious injury for the employees or extensive damage to equipment in industry setting if the training participants do a mistake (Bell & Kozlowski, 2002)

Furthermore, Ertemsir and Bal (2012) affirm that technology integration on training could enhance training practicality. They provide example how technology-integrated training support the implementation of managerial training. On that training the technology that they used was computer simulation software that allows employees to experience real setting of management activities through its software. By the support of its technology, the software makes possible to represent dynamic situation of management activity that reflects reality on the organization. Indeed, it provides learning experience to become more practical for the employees rather than conventional classroom instruction.

- **Enhance interactivity**
  From the interactivity perspective technology integration on training surely give promising advantages to the training process and its end results. Han and Wang (2010) affirm that technology integration on a training curriculum gives advantage to enhance the effectiveness of the training, since technology supports the training process that encourages interactivity of the participants to acquire better understanding of training materials. The point of interest on the interactivity here that through technology-integrated training, employees as the training participants could interactive directly to the training course and materials (Ertemsir & Bal, 2012; Payne et al., 2009). Indeed, it could shift the paradigm from instructor-centered to learner-centered which is more valuable for training settings (Klieger et al., 2010) Furthermore, the interactivity that arouse between training participants to the training course and materials improves motivation of leaners (Hughes and Daykin, 2002 on Munro & Peacock, 2005). Likewise, Ertemsir and Bal (2012) argue that interactivity to the training materials is one of the advantages of technology integration on the training, beside of cost benefit advantage.

From the explanation above one could be inferred that technology integration on training reveals some advantages for the training process. At least there are three advantages from technology integration on training that could be concluded from previous findings. First, the technology that is well-integrated into training provides flexibility to the learners or training participants in order to access the training or course materials based on their personal needs and learning pace. Second, technology integration on the training settings enables training to be more practical by makes possible to provide real setting of working environment of the employees as training participant on the training activities. Third, well technology-integrated training enables the training participants to be more interactive with the training course and materials by implementing particular computer software.

Consideration for integrating technology in training curriculum

Those advantages only could be attained if the technology is integrated into training setting appropriately. The availability of technology might become a salient infrastructure of training in integrating technology on the training curriculum. Al-Ruz and Khasawneh (2011) affirm that the availability of technology plays important role and influences the integration process of technology integration in classroom for education and training setting. It is because the higher support of technology availability leads to higher technology integration efforts by teachers or instructors on integrating technology in their classroom.

Availability of technology is not enough to establish effective integration of technology on training settings. Technology just become a tool if the instructors and educational designers could not have skills and motivation to apply it on training settings (Zisow, 2000). Likewise, Keengwe and Georgina (2011) affirm that technology could not stand alone to enhance pedagogy. It is for the reason that successful technology integration "is all about the ways in which technology tools are used and integrated into the teaching and learning process to enhance meaningful learning" (Keengwe & Georgina, 2011, p. 4). In consequence, technology has to be well-integrated into training curriculum to establish appropriate technology-integrated training. Indeed adapting existing curriculum that already used for traditional training into technology-integrated training curriculum is challenging and time consuming (Munro & Peacock, 2005). Keengwe and Onchwari (2008) as cited by Keengwe and Georgina (2011) state that integrating technology into curriculum has to be focused on best practices could integrate that technology appropriately. They also affirm that appropriate technology into training curriculum have to consider pedagogical practices on the training process.

Capacity of human resource that implement technology integration into training curriculum also plays important role i.e. instructors, educational administrator, educational designer. It is imperative for them to learn how to integrate technology into the traditional training curriculum before they implement the actual technology-integrated curriculum into real training settings (Keengwe & Georgina, 2011). In order to facilitate that, a training program or professional development should be conducted in order to enhance their skills in integrating technology into training curriculum, and also to support the transition process from tradition training curriculum into technology-integrated curriculum (Hewett & Powers, 2007). Indeed, the professional development program for them should be conducted gradually and continuously, not just in a day training or incidental program, since basic skill of technology is not enough for adapting technology innovation on training that develop rapidly (Brandt, 2001).

Furthermore, Perencevich, Seidel, and Kett (2007) notice at least five issues that have to be considered in integrating technology into training settings. First, educational practitioner should explicitly explain the purpose of the used technology on the training curriculum. Second, appropriate training evaluation should be conducted through examining the purpose of the used technology with the appropriate methods and measurements. Third, educational practitioners should manage the implementation process by incorporating empirically tested principles for successful integration of technology. Fourth, they also need to distinguish the difference between developing instruction with technology and delivering instruction with technology. It is important because technology integration is generally assumed to the use of technology as the tool to deliver instructional process. Fifth, educational designers should apply the technology appropriately into to the learning phase that leads to support training process.

In addition, Seidel & Cox (2003) and Seidel & Perez (1994) as cited by Perencevich et al. (2007, p. 189) state that "successful implementation of innovations of instructional technology in educational/training systems and minimizing uncertainty requires partnerships among all stakeholders; and building and maintaining such a partnership demands such integration expertise in the leadership of the implementation team." Likewise Senteni (2006) affirm that social condition and organizational intervention give potential influence to the integration of technology into training curriculum.

From this part one could be concluded even though technology-integrated on the training provide some promising advantages; its implementation should consider particular aspects. Availability of technology as fundamental infrastructure on technology-integrated training becomes a salient factor. Indeed, technology stands alone is not enough, it has to be well integrated into existing training curriculum appropriately. Besides, the quality of education practitioners should be considered by providing professional development in order to improve their skills in integrating technology in the training curriculum. In addition, others aspects such as clarity of technology

that would be used, stakeholder and organization support, should be considered if educational practitioners would integrate technology into training curriculum appropriately and effectively.

2.2. Educational designers' competencies for integrating technology in training curriculum

This part is focused on discussing capacity of educational designers as person in charge in integrating technology into training curriculum. Most of designers called themselves as educational psychologist, or media specialists, or training specialists (Dick, 1987 as cited by Richey, Fields, & Foxon, 2001). However, to make it consistent the term educational designers would be used on this discussion. This part discusses a set of competencies that are needed by educational designers in order to support their task in integrating technology on training curriculum.

As discussed before, in order to design appropriate technology-integrated training program that meets participants' needs and organization's goals, the educational designers should have particular competencies that could support their tasks. Before the competencies of educational designers are discussed, the definition of competency itself should be discussed earlier. The International Board of Standards for Trainings, Performances, and Instruction (IBSTPI) defines competency as "a knowledge, skills, or attitude that enables one to effectively perform the activities of the given occupation or a function to the standards expected in employment" (Richey et al., 2001, p. 31). McLagan (1997) on Richey et al. (2001) affirms that competencies have been perceived from six different approaches as job tasks, as results of work efforts, as knowledge, skills and attitudes, as qualities that describe higher performers , and finally, as bundles attributes. Furthermore, Richey et al. (2001) state that a set competencies relates to a job role which is the role definition is typically an initial step to define competency. Thus, competencies that totally unrelated with actual job task are impossible to be implemented effectively.

IBSTPI distinguishes educational designers into four clusters as major competencies; (1) professional foundation, (2) planning and analysis, (3) design and development, and (4) implementation and management (Richey et al., 2001). Then, in detail IBSTPI describe twenty-three competencies for educational designers from those major competencies which are presented on Table 3. From the twenty-three competencies that are presented on the table, Richey et al. (2001) also breakdown them into one-hundred-twenty-two performance statements. However, this literature study would not discuss all of them. Some selected educational designers' competencies from Table 3 are used as guidelines to formulate effective professional development program on this study. From the Table 3, only performance statements that support the study about required competencies for educational designers to integrate training curriculum at *Pusdiklat Setneg* are used as guidelines. Especially are the competencies in integrating technology into training curriculum and how to present it effectively to training instructors as the person who deliver the curriculum.

Table 3. Educational Designers' Competencies Based on the International Board of Standards for Trainings, Performances, and Instruction (IBSTPI) (Richey et al., 2001)

Clusters	Competencies
Professional Foundation	• Communicate effectively in visual, oral and written form. • Apply current research and theory to the practice of instructional design. • Update and improve one's knowledge, skills and attitudes pertaining to instructional design and related fields. • Apply fundamental research skills to instructional design projects. • Identify and resolve ethical and legal implications of design in the work place.

Clusters	Competencies
Planning and Analysis	• Conduct a needs assessment. • Design a curriculum or program. • Select and use a variety of techniques for determining instructional content. • Identify and describe target population characteristics. • Analyze the characteristics of the environment. • Analyze the characteristics of existing and emerging technologies and their use in an instructional environment. • Reflect upon the elements of a situation before finalizing design solutions and strategies.
Design and development	• Select, modify, or create a design and development model appropriate for a given project. • Select and use a variety of techniques to define and sequence the instructional content and strategies. • Select or modify existing instructional materials. • Develop instructional materials. • Design instruction that reflects an understanding of the diversity of learners and groups of learners. • Evaluate and assess instruction and its impact.
Implementation and management	• Plan and manage instructional design projects. • Promote collaboration, partnerships and relationships among the participants in a design project. • Apply business skills to managing instructional design. • Design instructional management systems. • Provide for the effective implementation of instructional products and programs.

Regarding competencies of educational designers in integrating technology into training curriculum Richey et al. (2001) describe some competencies for them. On the planning and analysis cluster reveals that educational designers should has competency in designing a curriculum or program (Richey et al., 2001). They also state that educational designers should be able to determine the scope of the curriculum and specify its courses based upon needs assessment outcomes. Besides, educational designers should conduct analysis and modification of existing curriculum to insure adequate contents are covered. Furthermore, regarding technology integration, Richey et al. (2001) mention that educational designers should have competency in modifying the existing curriculum in order to adjust the changes of society, knowledge, technology, and organization. It means that educational designers should be able to adapt and to accommodate the changes that happened in surroundings, especially technological skills that require more sophisticates skills to integrate it.

Moreover, Richey et al. (2001) that educational designers should attain capability in analyzing the characteristics of existing and emerging technologies and their use for instructional process. They should know the uses and benefits of technology in instructional situations. Indeed, educational designers should select those technologies on training curriculum that would enhance the instructional process. Richey et al. (2001) also confirm that educational designers should know the limitations of technology and when it is not a cost-effective delivery solution. Furthermore, Miller (2007) confirm that the educational designers should have properties of several instructional media with their appropriate use and technical skills in designing learning object by using the media. It is intended to integrate technology into curriculum that makes content materials more learnable for the participants. Likewise, on the professional foundation cluster, educational designers have to acquire and apply new technological skills into instructional design practice (Richey et al., 2001).

Relating with determining instructional content, educational designers have to consider and select a variety of techniques for determining instructional content (Richey et al., 2001). They have to determine type of subject matter and make connection with the needs of the learners and the organization. They also have to be able to develop existing instructional materials by select and modify it in order to support the appropriate content, delivery methods, instructional strategies and intended educational technology (Richey et al., 2001). As consequence, Richey et al. (2001, p. 78) affirm that development would result in "an instructional product that integrates the content, the technology, the delivery methods and the instructional strategies that have been selected." Likewise, Sonwalkar (2001) as cited by Miller (2007) assert that educational designers need to comprehend the most effective method of sequencing and presenting the content so that learning runs effectively.

Regarding educational designers' job task at Indonesian governments' education and training center, that they have to present curriculum product to instructors who are responsible to deliver it in classroom, educational designers should mastery some competencies. Based on IBSTPI, at professional foundation cluster, Richey et al. (2001) state that educational designers should communicate effectively in visual, oral and written form. Furthermore, they have deliver presentation that effectively engage and communicate information in a way that is appropriate for the norms and tasks of team work. It is because designing training curriculum is not a solitary activity, thus educational designers have to work effectively in group settings (Richey et al., 2001). Typically, instructional designers organize presentation time to explain various aspects of a curriculum product in particular project (Richey et al., 2001).

Other alternative explanation about educational designers' competencies comes from Miller (2007). He confirms at least five aspects that have to be comprehended by educational designers in order to integrate technology into training curriculum. Educational designers have to be acquainted with (1) systems of classifying educational content that make salient factors that affect learnability, (2) principles of organizing content to make knowledge more learnable for target users, (3) properties of various instructional media and their appropriate use, (4) technical skills in designing learning objects, and (5) an understanding of cost/benefit factors to maximize impact while minimizing cost (Miller, 2007). In addition, Rothwell & Kazanas (2008) on Boyle (2011) states that educational designer not only develops curriculum or instruction, but also may prepare job aids or redesign communication methods.

From this part could be concluded in order to formulate effective technology-integrated training curriculum educational designers have to comprehend the existing training content and training method. Then, educational designers should be able to modify and fit the content and method into selected the technological supports. They also need to fully understand about the selected technology whether it could support the process of delivering training content in appropriately or not. In the other words, educational designers should be able to elaborate three main aspects—technologies, contents, and methods or pedagogical approaches—in designing and integrating technology in training curriculum. Indeed, that account connects with a framework called TPACK (Technological, Pedagogical, and Content Knowledge) that provides integrated structure of technological, pedagogical, and content aspects of teaching and learning. Thus, it could be assumed that educational designers should have sufficient understanding about TPACK in order to define their knowledge base in order to integrate technology into training curriculum appropriately. Based on that reason, the next part of this review explains about TPACK framework which is introduced by Mishra and Koehler (2006).

2.3. TPACK Framework

As discussed before that integrating technology could not only consider about technology as tool to deliver instruction process only. Integrating technology into training curriculum would not be effective if technology stands alone (Keengwe & Georgina, 2011) in order to improve the effectiveness of training process. Harris, Mishra, and Koehler (2009) affirm that integrating technology into learning process is more than applying tools, it has implication to the learning

contents and pedagogical approaches that should be employed. In designing technology-integrated training curriculum, the educational designers also have to consider the training contents and appropriate instructional or training method to deliver those contents. Shulman (1986) on his research confirm that pedagogical aspect and content on educational process have to be considered appropriately. Hence, Shulman (1986) introduce the concept of pedagogical content knowledge (PCK). Thus, technological aspect should be well-integrated with pedagogical and content aspects on the training curriculum. Regarding that concern, there is a framework that is formulated as integration of those three aspects, called TPACK. TPACK frameworks is the abbreviation of Technological, Pedagogical, and Content Knowledge which is introduced by Mishra and Koehler (2006) from their longitudinal study about this framework. Mishra and Koehler (2006) affirm that TPACK framework is an extended concept from study of Shulman (1986) about PCK. They attempt to integrate technology as an imperative aspect in order to establish effective educational process.

Originally TPACK is the conceptual framework to describe the knowledge base for teachers who eager to teach with technology effectively. However, based on the discussion about educational designers' competencies, educational designers also need TPACK for describing their knowledge in order to integrate technology into training curriculum appropriately. It is because the educational designers at *Pusdiklat Setneg* are encouraged to have sufficient knowledge in integrating technology, training contents, and its training method into training curriculum documents for MOD training. Indeed, by understanding their knowledge in TPACK, educational designers have underpinnings to enhance their knowledge in integrating technology into training curriculum by considering those three aspects effectively.

Based on Mishra and Koehler (2006) discussion, TPACK framework has six crucial sub-components that have to be understood carefully by educational designers. Those components are (1) content knowledge (CK); (2) pedagogical knowledge (PK), (3) technological knowledge (TK), (4) pedagogical content knowledge (PCK), (5) technological content knowledge (TCK), and (6) technological pedagogical knowledge. This part would discuss those components and how it contributes to TPACK framework at the end discussion.

(1) Content Knowledge (CK)

Content knowledge is clearly about the subject or the content that have to delivered on the educational process (Mishra & Koehler, 2006). At school settings Shulman, 1986 on Mishra and Koehler (2006), states that "teachers must know and understand the subjects that they teach, 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". It also important to be noticed for educators that contents that have to be delivered on every level of education have differences (Mishra & Koehler, 2006). For example, the content of computer subject on word processing by using Microsoft Word for secondary school is different for employees in a company that participate computer training. One have to be concerned that in different subject matters, the ways discussing the content structure of knowledge differ (Shulman, 1986). For instance is discussing how computer logic operation is different with discussing linguistic or literature explanation. Furthermore, Shulman (1986) notices that educators (i.e. teachers) have to attain deep understanding on content, about why it is so, on what grounds it is could be affirmed, and under what circumstances our acceptance in its justification can be weakened and even denied.

(2) Pedagogical Knowledge (PK)

Pedagogical knowledge is the second sub-components of TPACK framework that have to be understood carefully by educators in integrating technology-integrated curriculum. Mishra and Koehler (2006) assert that PK is a deep knowledge understanding about teaching and learning process and practices and how it incorporates with other aspects such as purpose of education, values, and educational aims. They also state that PK includes all knowledge

about students learning, classroom management, lesson plan development and its implementation, and evaluation process. Furthermore, Mishra and Koehler (2006) also confirm that in order to enhance PK, educators require a comprehension about cognitive, social, and learning developmental theories, and how to apply it into educational settings.

(3) Technological Knowledge (TK)

Technological knowledge is the third sub-components of TPACK framework that is focused on how educators utilize technology on education settings. Mishra and Koehler (2006) differ two kinds of technology here; (1) standard technologies such as books, chalk and blackboard; and (2) advanced technologies, such as the Internet, computer, and digital video. This skill includes how to operate those technologies. Moreover, Mishra and Koehler (2006) also mention that in the issue of digital technologies, educators are also require to have knowledge in operating computer hardware and its systems, and the ability to use software tools such as word processors, spreadsheets, internet browsers, and e-mail.

(4) Pedagogical Content Knowledge (PCK)

Pedagogical content knowledge is the fourth sub-components of TPACK framework which intersection of CK and PK. Mishra and Koehler (2006) assert that the main idea PCK is in the line and mostly similar with the PCK framework from Shulman (1986). The main idea is about how to employ knowledge of pedagogy in order to deliver particular content. Shulman (1986) argues that PCK includes a deep comprehension of what makes the learning process of specific topic in particular contents becomes easy or difficult. Furthermore, it also includes understanding appropriate pedagogical approaches that fit the content, and also how the content could be arranged for better pedagogical approaches (Mishra & Koehler, 2006). Besides, Mishra and Koehler (2006) also affirm that PCK is also an imperative knowledge for educators to formulate learning strategies that integrate suitable conceptual representation as an effort to aid learning difficulties or misconceptions, and foster them to attain meaningful learning.

(5) Technological Content Knowledge (TCK)

Technological content knowledge is the intersection of TK and CK on the TPACK framework. TCK is knowledge about the manner in which technology and content are reciprocally related (Mishra & Koehler, 2006). TCK is about how educators attain deep understanding of the influence of technology in particular subject materials, and how the subject materials fit to the technology. Educators need to know not only the subject matter that they deliver but also the way in which subject matter could be changed by the application of technology (Mishra & Koehler, 2006). For instance, if educators need to explain about microorganism in Biology subject, it is better to use digital microscope, instead of analog microscope. Surely digital microscope could provide better description about microorganism, rather than the analog one. Thus, educators have to know how change of technology could support subject matter in an appropriate way.

(6) Technological Pedagogical Knowledge (TPK)

Technological pedagogical knowledge is the last sub-component of TPACK framework which is the intersection of TK and PK. Mishra and Koehler (2006) explain that TPK is knowledge of the existence, components, and capabilities of various technologies as they are used in educational settings, and on the other hand, knowing how pedagogical approaches might change as the result of implementing particular technologies. TPK also could be perceived as knowledge about how pedagogical approaches could be adapted by implementing technology. Moreover, it includes a comprehension that a range of technological tools exists for a particular task, the ability to select the technology based on its appropriateness, strategies for using the technology's affordances, and knowledge of pedagogical approaches and the ability how to apply those approaches by using the technologies (Mishra & Koehler, 2006).

From the sixth component above, Mishra & Koehler (2006) framed technological pedagogical content knowledge (TPCK) as an emergent form of knowledge that goes beyond all three components (content, pedagogy, and technology). In detail, they argue that "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" (Mishra & Koehler, 2006, p. 1029). Likewise, Engelien et al. (2009) state that TPCK represents a type of knowledge is applied by educators in the their practical use of information communication and technology. They also affirm that TPACK framework eligible since there is no straightforward technological solution that is applicable to all learning situations. TPACK as a theoretical framework proposes a structured way to approach the complexity of information communication technology and learning settings (AACTE, 2008). The visualization of TPACK framework could be seen on Figure 2.

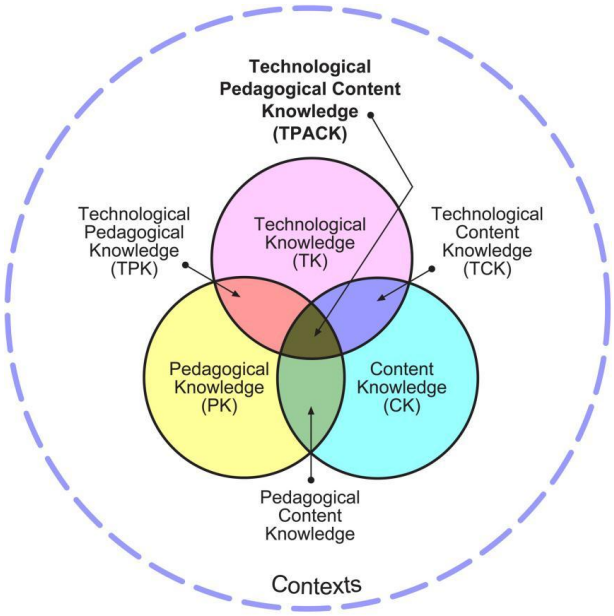

Figure 2. TPACK Framework (Mishra & Koehler, 2008)

2.4. Educational designers' TPACK

Explicitly there is no research article that specifically discussed about how educational designers implement the TPACK framework in training. It is because TPACK framework is originally intended to enhance teachers' capability at school settings. However, from competencies of educational designers that are discussed before, it was revealed that educational designers not only have to organize training content that is appropriate for the learner, they also have to consider effective methods for transferring that content by using particular instructional media or technology. This part of the literature study more to provide elaboration about TPACK framework and required competencies of educational designers in integrating technology into training curriculum.

Chou and Tsai (2002) and Hamam and Loucif (2009) affirm that technology provides alternatives for educational designers in designing, developing, storing and distributing of, as well as accessing to, learning materials. However, the process of integrating technology in training curriculum is a complicated and time consuming process, and requires a teamwork, and educational designers should rethink and adapt traditional curriculum development models (Chou & Tsai, 2002). It is because the educational designers still have to adapt technology integration into common existing curriculum development models, which starts from identifying

learner needs, specifying learning objective, determining learning contents and methods, until assessing performances of the participants. Likewise, Hamam and Loucif (2009) confirm that the success of training program for an organization relies on how well its program curriculum is designed. Hence, great attention should be paid to the development of the program curriculum.

As mentioned on the previous part that educational designers are required to obtain to comprehend particular contents of the training curriculum that would be formulated. Educational designers also need to consider and determine techniques or method that would be used to deliver the contents (Richey et al., 2001). Educational designers have to be able to select and modify training curriculum in order to support the appropriate content, delivery methods, instructional strategies and intended educational technology that would result in curriculum that integrates the content, the technology, the delivery methods or strategies that have been selected (Richey et al., 2001). Indeed, it substantially relates with TPACK framework. From the Table 4 could be seen how components of TPACK framework are related with educational designer competencies. The competencies of educational designers are classified based on TPACK components. Thus, it would provide a description what educational designers' TPACK is.

Table 4. Educational Designers' TPACK: Elaboration of TPACK Framework and Educational Designers' Competencies

TPACK Component	Educational Designers' Competencies
Content Knowledge (CK)	Educational designers have to obtain deep understanding about the content of the training that would be designed on training curriculum. They also could reach the understanding of the content by having some experts that have that comprehensive understanding. They also have to consider that content of the training curriculum should be differed depends on the levels of training participants.
Pedagogical Knowledge (PK)	Educational designers have to comprehend about how to select various pedagogical approaches on the training curriculum. Likewise, educational designers also should be able to understand the selected pedagogical approach with its advantages or disadvantages in order to reach the training objectives.
Technological Knowledge (TK)	Educational designers should have sufficient skills in using particular technological tools that relates to training process. Thus, educational designers should fully understand the most appropriate technological tools that fit to training settings.
Pedagogical Content Knowledge (PCK)	Educational designers have to attain sufficient skill in choosing appropriate pedagogical approach for particular content and also fit particular content to pedagogical approach on training curriculum in order to reach the effectiveness of the training.
Technological Content Knowledge (TCK)	Educational designers must have adequate comprehension about how new technological innovation influences the training content, and also how the training content should be fit with technology. Thus, on the training curriculum educational designers should be able to select suitable technology and content that reciprocally related.
Technological Pedagogical Knowledge (TPK)	Educational designers should have sufficient competencies to select technological tools that support pedagogical approaches. Besides, they also have to understand the changes of pedagogical approaches if they implemented particular technological tools on the training curriculum.

TPACK Component	Educational Designers' Competencies
Technological Pedagogical Content Knowledge (TPACK)	Educational designers have to be able to design training curriculum in order to support the appropriate content, delivery methods, instructional strategies and intended educational technology that would result in curriculum that integrates the content, the technology, the delivery methods or strategies.

In this study, the educational designers' competencies are distinguished into two layers. First, they need competency in relation to design a training curriculum based on the TPACK framework incorporating MOD contents, task-based learning, and mail-merge. Secondly they need competency in presenting their curriculum product to the instructors. Indeed, educational designers' TPACK are also distinguished into two layers' as well; i.e. educational designers' TPACK in designing curriculum and educational designers' TPACK in presenting the curriculum. The relationship of the main variables of this study is drawn in Figure 3 and 4.

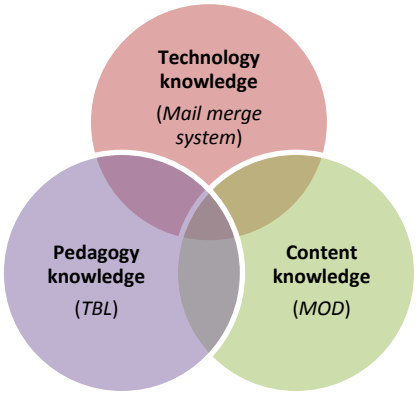

Figure 3. Framework of educational designers' TPACK in designing curriculum

Content knowledge (CK_{MOD}):	Knowledge about Managing Official Documents (MOD)
Pedagogical Knowledge (PK_{TBL})	Knowledge and skills about applying Task-based Learning (TBL)
Technological Knowledge ($TK_{Mail\text{-}merge}$)	Knowledge and skills about use of Mail-merge application
Pedagogical content knowledge (PCK)	*In this first layer concept of PCK is not applied since educational designers do not give instruction/teaching*
Technological content knowledge ($TCK_{Mail\text{-}merge\text{-}MOD}$)	Knowledge and skills of applying mail-merge application for MOD
Technological Pedagogical Knowledge ($TPK_{Mail\text{-}merge\text{-}TBL}$)	Knowledge and skills of how to use mail merge in TBL
Technological pedagogical content knowledge ($TPACK_{Mail\text{-}merge\text{-}TBL\text{-}MOD}$)	Knowledge and skills of designing MOD curriculum by applying TBL with mail-merge system

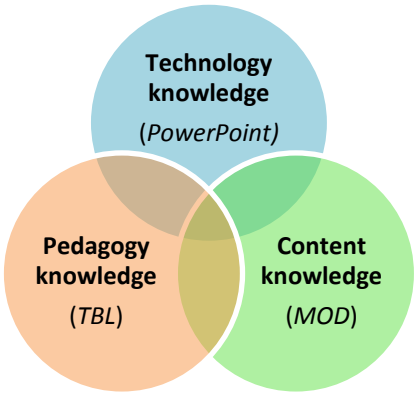

Figure 4. Framework of educational designers' TPACK in presenting curriculum

Content knowledge (CK_{MOD}):	Knowledge about Managing Official Documents (MOD)
Pedagogical Knowledge (PK_{TBL})	Knowledge and skills about applying Task-based Learning (TBL)
Technological Knowledge ($TK_{PowerPoint}$)	Knowledge and skills about use of PowerPoint application
Pedagogical content knowledge ($PCK_{TBL-MOD}$)	Knowledge and skills of how to apply TBL in presenting MOD curriculum
Technological content knowledge ($TCK_{PowerPoint-MOD}$)	Knowledge and skills of presenting MOD curriculum with PowerPoint
Technological Pedagogical Knowledge ($TPK_{PowerPoint-TBL}$)	Knowledge and skills of how to use PowerPoint in TBL
Technological pedagogical content knowledge ($TPACK_{PowerPoint-TBL-MOD}$)	Knowledge and skills of presenting MOD curriculum by applying TBL with PowerPoint

Consequently, in order to enhance the skills and the knowledge of educational designers' TPACK, a specific professional development would be promising to be implemented. It is in the line with Richey et al. (2001) who affirm that the competencies of educational designer could be improved by conducting an appropriate professional development program for educational designers.

2.5. Professional development program for educational designers

As aforementioned, in order to enhance educational designers' competency in integrating technology in training curriculum, an appropriate and effective professional development program is required to be implemented (Brandt, 2001; Hewett & Powers, 2007; Richey et al., 2001). Most of the previous studies only focused on how to provide effective professional development program for teachers in integrating technology in classroom at schools. There is no finding that reveals explicitly about an effective professional development for enhancing educational designers' competency in designing technology-integrated training curriculum. Nevertheless, concept of professional development for teacher is eligible to be implemented for educational designer with some modification on content and activities. A fundamental principle that has to be noticed that the professional development program should be viewed as adult learning perspective that not only viewing them as learner on the program, but also involve them directly in every process of the program (King, 2002).

Furthermore, an appropriate professional development program for the educational designers should provide real experiences for educational designers. The professional development program that gives real professional experience could establish environments contributing toward substantial adult learning (King, 2002). King (2002) affirms that considering professional development as adult learning that is concerned in giving real experience could aid them as adult to attain new understanding by integrating the experiences and their prior beliefs and assumptions. Professional development that is focused solely on a training activity without

providing authentic experiences could not accommodate the effectiveness of the program. In specific, professional development for enhancing technology integration in education that only provides common workshop or courses are failed to establish deep understanding of technology integration for the educators as the participants of the program (Brand, 1997; Milken Exchange on Education Technology, 1999; US Department of Education, 1999; as cited by Koehler & Mishra, 2005).

Koehler and Mishra (2005) on their study about professional development for teacher in integrating technology for teaching, offers innovative professional development program that does not only provide single training for how to use technological tools or how to conduct effective teaching, but also establish interactive activities that involves the participants directly during the program. The professional development program promotes learning by design approach. Koehler and Mishra (2005) implemented learning by design approach to deliver TPACK framework to teachers. Thus, it could be perceived that the approach with particular adjustment could be implemented on this study in order to address TPACK framework for educational designers in designing technology-integrated training curriculum. They affirm that learning by design approach could create environment in which the participants naturally confront with three main issues of TPACK—technology, content of learning, and pedagogy or method (Koehler & Mishra, 2005). It is because, by implementing learning by design approach, the participants are not only encouraged to getting aware with technological issue only, but also with the subject matter and specific instructional goals in which the designing process always intertwines together the three main components; technology, content, and pedagogy (Koehler & Mishra, 2005)

Furthermore, by adapting learning by design approach, educational designers as the participants are cultivated to work collaboratively in establish technological solution for training curriculum problems (Koehler & Mishra, 2005). Besides, learning by design approach as effective professional development program encourages the participants to engage with authentic problems of educational issues, focus on it, and attempt to find out the solution by utilize technology to solve it (Koehler & Mishra, 2005). Indeed, the participants are encouraged to actively working to solve the problems in collaborative group working (Koehler & Mishra, 2005). Thus, by providing the real problems that have to be solved in order to design technology-integrated training curriculum, educational designers could experience the factual environment of professional development program which is beneficial to reach the effectiveness of the program.

Moreover, by implementing learning by design approach, one thing that has to be considered is about the main idea of design itself. Koehler and Mishra (2005) explain that design is an iterative processes that continually cycling back to first principles and re-thinking decision. The model of professional development program for educational designers that adapt learning by design approach should accommodate the iterative processes or activities in designing training curriculum. Jang (2010) on her study about developing teachers' TPACK integrating technology in classroom, introduces a model of professional development called TPACK-COIR (TPACK Comprehension, Observation, Instruction and Reflection). The model with some modification on the activities is eligible to be implemented on this study in order to provide effective professional development for educational designers in designing technology. Furthermore, this model also eligible to be engaged with learning by design approach since the model give space or possibility to do iterative process in conducting designing process during the program. Originally, Jang (2010) implemented four main activities on the model (1) Comprehension of TPACK, (2) Observation of peer instruction, (3) Instruction of a real class, and (4) Reflection of TPACK. However, since the educational designers do not give instruction on this study those activities are modifies into four main activities (1) TPACK training program, (2) curriculum design, (3) curriculum presentation, and (4) reflection meeting. The modified model of professional development program from Jang (2010) that is adapted for this study, is presented on Figure 5.

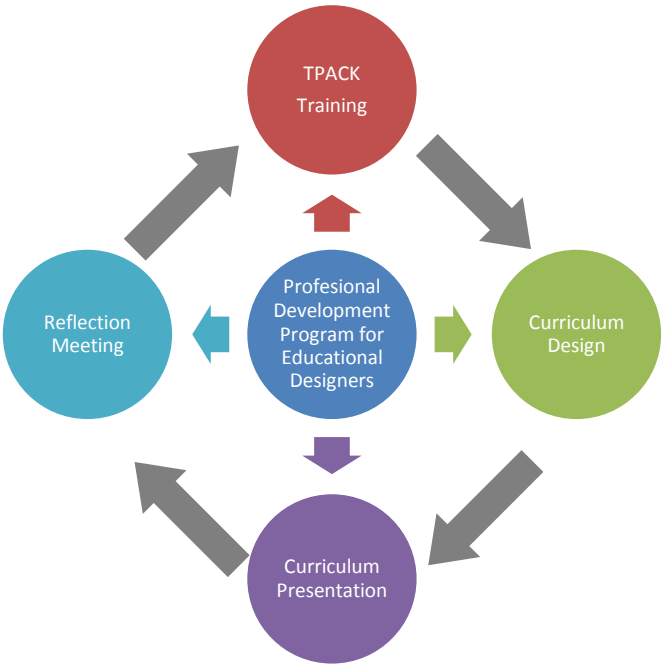

Figure 5. Model of Professional Development Program to Enhance Educational Designers' Competencies (adpated and modified from Jang, 2010)

Those four activities on the professional development model are supported from the previous findings that contribute constructive effort to enhance the effectiveness of the program. Training activities of the professional development program is important to give fundamental comprehension of TPACK framework of educational designers. Keengwe, Kidd, and Kyei-Blankson (2009) affirm that technology in education could not be integrated appropriately if there is a lack of fundamental skill about technology integration framework in which a well-training as critical factor is needed here for the adoption process. The training that is implemented has to be aligned and relevant with the main goal of professional development, in this case have to accommodate the attainment of technology integration in curriculum (Keengwe et al., 2009; Keengwe & Onchwari, 2009). Keengwe et al. (2009) that training program should be implemented earlier as the adoption phase which is not only give the training about technology itself, but also substantive material about educational content or method.

Furthermore, the curriculum design phase is also imperative on the professional developments since the designing activity is the core of learning by design approach for this study. Koehler and Mishra (2005) affirm that design is a process that is best learned by experiencing it. By involving educational designers as the participants in curriculum design process, they experience the authentic problems in integrating technology in curriculum (Koehler & Mishra, 2005). Besides, on the design phase the participants are also encouraged to conduct re-design process which is important to force the participants to think deeply about evaluating the needs of curriculum and to modify their design to meet the needs (Koehler & Mishra, 2005). Koehler and Mishra (2005) also state that the re-designing process could be supported by providing continual feedback from instructors or peers that could force them to think about their work from users' perspectives.

Presenting the work of educational designers during the professional development program is also prominent sequence. By presenting their work in designing training curriculum, educational designers could share their idea and knowledge with their fellows which is important for them to attain new insight (Taylor & Walls, 2005). Finally, the last important phase on the professional development is the reflection meeting. By conducting reflective process, the participants could identify consciously what they learned during the program and what they should improve after the program. Taylor (1998) as cited on King (2002) argues that "learning as a process of critical

reflection and self-examination of one's worldview in light of new knowledge and a fundamental reorganization of one's perspective or frame of reference". Indeed, by reflecting their experience on the professional development program, the educational designers are expected to attain new insight or knowledge, especially about technology integration in training curriculum.

2.6. Design Guidelines

From the explanations and the discussions of previous findings about technology integration in education and training, the educational designers' TPACK, and the professional development arrangement, some guidelines should be formulated in order to provide an appropriate professional development program for enhancing educational designers' TPACK in designing and presenting training curriculum at *Pusdiklat Setneg*. At least four guidelines should be considered properly as an effort to develop effective professional development program for educational designers at *Pusdiklat Setneg* in integrating technology into training curriculum. Those guidelines are:

1) ***Providing effective technological support***. As already discussed on sub-chapter 2.1 that technology integration in training curriculum contributes some advantages to support the effectiveness of the program. Based on that reason the professional development program for educational designers should apply effective technological support. The technological support should provide a flexibility, enhance a practicality, and enables interactivity of the professional development program. Computer technology with mail-merge application is chosen as appropriate technological support which is in the line with main objective of the program in integrating technology in MOD training curriculum at *Pusdiklat Setneg*.
2) ***Engaging the TPACK framework***. In enhancing educational designers' competency in integrating technology in training curriculum, a framework should be applied in order to explain their knowledge in obtaining that competency. The TPACK framework from Mishra and Koehler (2006, 2008), is expected to describe educational designers' knowledge that are required in integrating technology in training curriculum. Though TPACK framework originally is intended for describing teachers' knowledge with regard to technology integration in classroom, the framework is also appropriate for this study since educational designers are also required to have sufficient knowledge about training content, training method, and technological support in designing training curriculum.
3) ***Considering the intended educational designers' competencies***. Professional development program for educational designers should take account in enhancing competencies of educational designers. A set competency of educational designers which is presented before on sub-chapter 2.4 should be considered exactly. With regards to this study, the professional development program should be able to enhance educational designers' competencies in designing and presenting technology-integrated training curriculum at *Pusdiklat Setneg*.
4) ***Implementing learning by design approach***. In participating professional development educational designers should be provided with real experience during the program. The professional development program should implement an approach that makes possible to establish authentic learning environment that leads to the effectiveness of the program. Learning by design approach which is introduced by Koehler and Mishra (2005), is an appropriate approach to be implemented for the program. By implementing learning by design approach, the program is expected to provide real experience for educational designers in designing integrated-training curriculum. The program also should provide reliable problems in integrating technology in training curriculum that have to be solved by educational designers during the program through individual and collaborative working,
5) ***Adapting effective a professional development model***. Since learning by design is consisting of iterative process, the professional development program should adapt professional development model that could accommodate those process. In this study, an iterative professional model from Jang (2010) is expected to accommodate the iterative process in learning by design. With some modification from the original one, the professional model consists of four main activities; (1) training program, (2) curriculum design, (3) curriculum presentation, and (4) reflection meeting.

CHAPTER 3—INTERVENTIONS

Chapter 3 provides detail description about the interventions that are used on this study. The interventions consist of four main activities. TPACK training program is choses as the first activity from those 4 main activities. Second part explains about designing technology-integrated training curriculum as the intervention. Then, presenting technology-integrated training curriculum is selected as the third activity of the intervention. The last activity of the interventions relate with reflection meeting of educational designers.

In this study, learning by design approach from Koehler and Mishra (2005) with integration of the professional development program model from Jang (2010) was conducted as intervention for enhancing educational designers' competency in designing and presenting technology-integrated curriculum at *Pusdiklat Setneg*. In the line with Richey et al. (2001) who affirm that in order to enhance the competencies of educational designers, a professional development program should be conducted. The professional development program includes training program or workshop that formally delivers new skills and knowledge concerning the enhancement of educational designers' competencies. In this research the professional development program was intended to improve educational designers' competencies in designing and integrating technology into training curriculum. Specifically the professional development program on this study was aimed at improving educational designers' TPACK in designing and presenting technology-integrated curriculum. Likewise, the professional development program was intended to enhance technological skills and knowledge of educational designers.

As mentioned before on the Chapter 2, the professional development program has four main activities; (1) training program, (2) curriculum design, (3) curriculum presentation, and (4) reflection meeting. The curriculum design and curriculum presentation activities were conducted two times in order to produce two prototypes of curriculum product. It was intended to promote educational designers to learn about how to integrate technology into training curriculum by participating on the designing process directly. At the beginning, a pre-training meeting was conducted to introduce the program to the educational designers, instructors, officials or leaders at *Pusdiklat Setneg*. The researcher gave the overview of the program and explained roles of every party who were participated in the program. Furthermore, on the pre-training meeting some agreements were submitted such as timing allocation, language of instructions, training materials, and training facilities. Then, at the end of the program, a wrap-up meeting was conducted to conclude the whole process of the professional development program. The details of main activities are presented on Table 5 and described as follow.

3.1. TPACK training

TPACK training was conducted in two working days at *Pusdiklat Setneg*. A PC-room with 15 computers was used to support the training program. Twelve educational designers who were participated on the training program received privilege for not doing routine activities concerning their job tasks. It was really good, since educational designer paid more attention to the training program. In total four instructors were employed on the training.

Mainly the TPACK training was aimed at introducing TPACK framework to educational designers, with regard to enhance their competencies in integrating technology into training curriculum. The researchers took role as training instructor who presented TPACK framework explanation to educational designers. The researcher gave opportunity to the educational designers to involve in interactive discussion about particular topic during the training session. Educational designers were given a challenge to make snapshot analysis and connection between the current situations in designing training curriculum at *Pusdikat Setneg* with ideal process by implementing TPACK framework in training curriculum.

Furthermore, the TPACK training was also intended to give sufficient information about designing an effective and interactive training strategy. Two instructors were assigned to deliver this topic. The instructors provided explanation about TBL as effective and appropriate training method for *Pusdiklat Setneg*. Moreover, the educational designers were also trained to utilize computer office application. It was intended to enhance technological skills of educational designers. A technical instructor was assigned to coach educational designers how to use mail-merge application and designing interactive presentation. Since the training was conducted in a PC-room, so the educational designers could directly practice what they learned about mail-merge application and interactive presentation-slides. Lastly, educational designers were trained how to design technology-integrated training curriculum. Educational designers were trained how to use TPACK framework in elaborating training content of MOD training with task-based learning as pedagogical approach, supported by mail-merge application, into MOD training curriculum.

3.2. Designing technology-integrated training curriculum

After following TPACK training educational designers were assigned to design a new MOD training curriculum. Educational designers designed the curriculum based on TPACK framework that has been introduced on the training program. The process of designing technology-integrated training curriculum was intended to give practical experiences for educational designers during the professional development program. At the first, educational designers had to consider about technology-integrated MOD training curriculum individually based on existing MOD training curriculum at *Pusdiklat Setneg*. They provided individual concept of technology-integrated MOD training curriculum based on TPACK framework. A set of MOD training materials was also provided to support the designing process. For the next step, educational designers worked in group of 4. So, there were 3 discussion groups in this designing process. They discussed their own curriculum product in group whether their concept already represent TPACK framework. Educational designers should pay their concern in integrating mail-merge application as selected-technological support with task-based learning as pedagogical approach, and how it fit with MOD training contents. On this phase, three training instructors had roles to assess their first curriculum product. Instructional designers gave appraisal based on individual curriculum concept by considering group curriculum product. The training instructors also provided feedback as consideration to revise the curriculum product.

3.3. Presenting technology-integrated training curriculum

After designing technology-integrated MOD training curriculum, educational designers were assigned to give group presentation about their product. Each group was entitled to divide the roles of each educational designer in giving presentation. Before giving presentation, educational designers prepared interactive presentation-slides. They applied the skill about designing interactive presentation-slides that have given during the training program. Each group was given fifteen minutes to give presentation in front of other groups. After giving presentation, they received feedback from other group about their presentation in MOD training curriculum product. The feedback was about whether educational designers already employed interactive presentation while present their curriculum product. Besides, the other groups also gave feedback whether educational designers already integrated TPACK framework on their MOD-training curriculum. Educational designers used the feedback from other groups as considerations to revise their slide-presentations and also the curriculum product.

3.4. Re-designing technology-integrated training curriculum

As aforementioned, after receiving the feedbacks and comments from other groups, educational designers were assigned to revise their curriculum product. They were given 5 days to revise the curriculum. It was no direct meeting during the revision time. The researcher and training instructors provided consultation opportunities by using electronic mail, online chatting, and telephone. Most of them only interested to use chat session for consulting their MOD training curriculum. On this phase, educational designers mostly already comprehended about TPACK framework and how to integrate it in MOD training curriculum. They only used the consultation

session for make sure whether they are working on the right track or not. Two supervisors were asked to appraise their second curriculum products. The supervisors come from Technical Training Division which has responsibility to conduct MOD training at *Pusdiklat Setneg*.

3.5. Re-presenting technology-integrated training curriculum

After revising the first training curriculum product, educational designers were assigned to re-present it again. At this time, the educational designers presented their second training curriculum product in front of the training instructors. It is intended to provide practicality of the professional development program since in the real working settings educational designers should present the MOD training curriculum in front of the instructors at *Pusdiklat Setneg*. After presenting the training curriculum, educational designers received feedback and comments from the instructors. The feedback was used by the researcher to analyze whether there is an improvement of presentation skills of educational designers on the second presentation.

3.6. Reflection meeting

The last phase of the intervention for the professional development program was reflection meeting. During reflection meeting educational designers were assigned to make reflection paper. However, only 5 out of 12 educational designers agreed to make paper-based reflection. The rest of educational designers preferred to give their personal reflection on the discussion during the meeting. Educational designers were assigned to reflect what they have learnt during the professional development program. They were also encouraged to give reflection about the possibilities to implement TPACK framework in designing technology-integrated training curriculum at *Pusdiklat Setneg*.

Table 5. Detail of Intervention

Skills	Day	General Activities	Researcher activities	Educational designers activities
Designing Skills	1	Pre-training	• Researcher introduced to educational designers and their leaders about general overview, schedule and aims of the study. • Research distributed pre-TPACK and TAC questionnaires.	Educational designers followed project orientation meeting.
	2	TPACK training program (Day 1)	Researcher organized the training with following themes: • TPACK Framework • Interactive and effective training methods • Applying mail-merge application • Interactive Ms. Power Point • Designing training curriculum	• They followed the development program • They worked in group of three in designing MOD training curriculum
Presenting skills	3	TPACK training program (Day 2)— Presentation (1)	Researcher organized time to conduct presentation and group discussion.	• They presented their curriculum product to other educational designers/ • They gave/received feedback or comments to/from other groups.

Skills	Day	General Activities	Researcher activities	Educational designers activities
Designing Skills	4-8	Re-designing training curriculum	Researcher and instructors provides opportunity to make consultation.	They re-design the MOD training curriculum based on the feedback and comments from other groups
Presenting Skills	9	Presentation (2)	• Researcher organized time to conduct presentation and group discussion.	• They presented the training curriculum to the instructors. • Educational designers received feedback from the training instructors
	10	Reflection meeting	Researcher organized reflection meeting with educational designers and supervisors	Educational designers gave their reflection about their experience after following the program.
	17	Wrap-up Session	• Researcher wraped-up the study and conclude the activities • Research distributed post-TPACK and TAC questionnaires.	Educational designers followed wrap-up session

CHAPTER 4—RESEARCH METHODOLOGY

On this chapter the methodology of conducting the research is presented. The explanation is started with describing the design of research that is applied in order to answer the research questions. Then, the background of participants of this study is provided. Some instruments that are used as the tools to collecting the data are explained here by connecting with the research questions. Indeed, the procedures how the data are collected are important to be designated here. Last part of this chapter explains how the collected-data are analyzed.

4.1. Research design

This study applied design-based research as research method in order to answer a main research question *"what are the characteristics of a professional development program that prepare educational designers to design and present a technology-integrated curriculum for Management Official Documents (MOD) training"* and three sub-questions; (1) *do educational designers' TPACK in designing training curriculum change after participating in the professional development program?* (2) *do educational designers' TPACK in presenting training curriculum change after participating in the professional development program?* and (3) *how do educational designers appreciate the professional development program?".* This method has potential to develop more effective educational interventions and to provide opportunities for learning during the research process (McKenney, Nieven, & van den Akker, 2006). It is match with the objective of this research to understand the ways to enhance designing curriculum skills for training settings.

Furthermore, on this design-based research educational designers were intended to follow every step and cycle of designing technology-integrated MOD training curriculum. Educational designers were assigned to design two prototypes of technology-integrated MOD training curriculum and conduct formative evaluation for that curriculum. From that evaluation, educational designers were encouraged to make development of the prototypes. Thus, educational designers were promoted to learn how to design effective technology-integrated training curriculum by participating directly on this research. It is important since design is not something that could be taught by formal lectures, however it is be learner by experiencing the processes (Koehler & Mishra, 2005). Thus, by implementing design-based research on this-study, the educational designers are expected to conduct development of technology-integrated MOD training curriculum for *Pusdiklat Setneg*. Likewise, the researcher also studied the skill improvement of educational designers during the designing processes on the professional development program. Then, another important thing is the researcher also studied the characteristic of the program with regards to the improvement. The prototypes development and formative evaluation processes are shown in Figure 6.

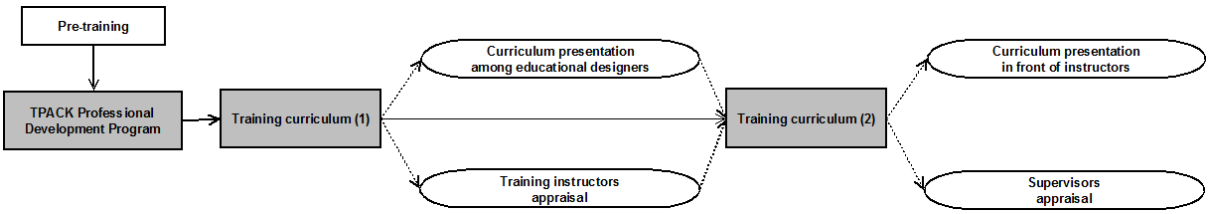

Figure 6. Research design

Outputs of this research are proposed to be in line with McKenney, et al. (2006) explanation about design-based research. This research is aimed to attain three main outputs. First, this research was intended to result design principles as generated knowledge for further study about the ways educational designers integrate technology within TPACK framework. Second, this study was also planned to create MOD training technology-based curriculum product that contributes to technology-training integration in *Pusdiklat Setneg*. Third, this research provided

learning settings for educational designers through the professional development program. In this context, educational designers learned how design-based research works as research method that gives direct impact to the practice through iterative approach. It is important since design is iterative process as a cycle that never really ends and continually cycling back to first principles and re-thinking decision (Koehler & Mishra, 2005). In addition, by implementing design-based research, the design guidelines about effective characteristic of professional development program could be formulated during the process of development.

4.2. Participants

At the beginning 15 educational designers were proposed to be participated on the professional development programs. However, due to high working load at Pusdiklat Setneg only 12 educational designers were selected as the participants. This study used purposive sampling, since it is directly targeted to educational designers who work at *Pusdiklat Setneg*. The participants were selected based on their job tasks and job descriptions (well known as *Analisis Jabatan* or *Anjab*). Those, who have job tasks in planning, organizing, and evaluating educational and training program in *Pusdiklat Setneg* were categorized as educational designers. Then, 1 head-subdivision, and 1 head division were selected as supervisors in this research. Herewith the demographics of the participants which are categorized by age, gender, level of education, and educational background.

Table 6. Participants Demography by Range Age and Gender

Age Range	Gender	
	Male	Female
22-26	1	3
27-31	5	2
31<	1	-
Total	**7**	**5**

Table 7. Participants Demography by Level of Education and Gender

Level of Education	Gender	
	Male	Female
Diploma	3	3
Bachelor	4	2
Master	-	-
Doctorate	-	-
Total	**7**	**5**

Table 8. Participants Demography by Educational Background and Gender

Educational Background	Gender	
	Male	Female
Law	2	-
Public Administration	2	-
Management/Accounting	1	2
Information Technology	-	2
Others	2	1
Total	**7**	**5**

4.3. Instruments

In this study four instruments were adapted to support data collection in order to answer three research questions. The first two main instruments are TPACK questionnaire (Schmidt et al., 2009) and TPACK rubric (Harris, Grandgenett, & Hofer, 2010). Besides, feedback-form was used by educational designers to provide feedbacks and comments to other group's presentations. Reflection paper was also used as instrument in order to know what they learned

after following the program by conducting reflection. Furthermore, in order to support those four instruments in collecting the data, researcher' log book was also be used for taking notes during the study.

Table 9. Connection between Research Questions and Research Instruments

Research Questions	Focus of studies	Instruments			
		TPACK questionnaire	***TPACK rubric***	***Feedback Form***	***Reflection Paper***
a. Do educational designers' TPACK in curriculum design change after participating in the professional development program?	Improved educational designers' TPACK (Layer 1)	√ (*Layer 1*)	√	-	-
b. Do educational designers' TPACK in presentation change after participating in the professional development program?	Improved educational designers' TPACK (Layer 2)	√ (*Layer 2*)	-	√	-
c. How educational designers appreciate the professional development program?	Educational designers' appreciation	-	-	-	√

4.3.1. TPACK questionnaire

TPACK questionnaire by Schmidt et al. (2009) is the main instrument for this research. The TPACK survey was intended to measure educational designers' TPACK in designing and presenting integrated-training curriculum (Layer 1 and Layer 2). The TPACK questionnaire employed 5 scales of rating; 1 for *Strongly Disagree*; 2 for *Disagree*; 3 for *Neither Disagree or Agree*; 4 for *Agree*; and 5 *for Strongly Disagree*. Score of 2.5 is used as average scores of the questionnaire. On this study 33 questions were applied for the TPACK questionnaire. Those questionnaires were divided into 7 sections based on each elements of TPACK framework; CK, PK, TK, PCK, TPK, TCK, and TPACK. Educational designers were assigned to fill in the questionnaire based on their self-report. In order to analyze the questionnaire, the scores were calculated for each element. So the comparisons of educational designers' performances before and after the professional development program were based on each element of TPACK framework. TPACK questionnaire is presented on Appendix 1.

Furthermore, a reliability analysis of TPACK questionnaire was conducted by implementing a pilot test. Ten educational designers and academic staffs of *Pusdiklat Setneg* who were not participated on the professional development program were assigned to fill-in the questionnaire. Based on the pilot-test, found that the Cronbach's α for the TPACK questionnaire is 0.95. George and Mallery (2003) as cited by Gliem and Gliem (2003) presented rules of thumb for interpreting the Cronbach's α values. They affirm that the value of $\alpha > 0.9$ is *Excellent*, $\alpha > 0.8$ is *Good*, $\alpha > 0.7$ is *Acceptable*, $\alpha > 0.6$ is *Questionable*, $\alpha > 0.5$ – *Poor*, and $\alpha < 0.5$ is *Unacceptable*. Thus, the reliability of TPACK questionnaire for this study is excellent. Beside, reliability analysis was also applied for each element of TPACK questionnaire which is presented on Table 10. From the table could be seen that the reliability for PK and TCK element are only around 0.7, but it is still acceptable for the study. The rest elements have good reliability with α more than 0.8.

Table 10. Reliability Analysis for Each Element of TPACK Questionnaire

Reliability	Cronbach's α (N = 10)
Content knowledge (CK)	0.84
Pedagogical knowledge (PK)	0.74
Technological knowledge (TK)	0.85
Pedagogical content knowledge (PCK)	0.81
Technological content knowledge (TCK)	0.77
Technological pedagogical knowledge (TPK)	0.84
Technological pedagogical content knowledge (TPACK)	0.86

In addition, the results of pre- and post- self-reporting TPACK questionnaire were calculated to attain the effect size value. The effect size values were calculated in order to infer whether the professional development program contributed any effect to enhance educational designers' competency in every component of TPACK. The values of effect size were resulted by calculating the mean (M) and standard deviation (SD) of the pre- and post- self-reporting TPACK questionnaire. Cohen (1988) provide the benchmarks to interpret the effect size values which are the effect size value of 0.2 to 0.4 have "small" effect, around 0.5 to 0.7 have "medium" effect and 0.8 to infinity have "large" effect.

4.3.2. TPACK rubric

TPACK rubric as one of the research instruments was used in order to measure educational designers' TPACK in designing technology-integrated MOD training curriculum before and after the professional development. The rubric was adapted from Harris et al. (2010) with some modification to fit the study. TPACK rubric was filled in by training instructors and supervisors at *Pusdiklat Setneg* in order to assess the first and second prototypes of training curriculum products that were designed by educational designers. The rubric has 7 items that come from elements of TPACK framework. Same as TPACK questionnaire, the results comparisons on the TPACK Rubric was based on each item. The rubric used three scale ratings; 3 for *Strong*; 2 for *Minimum*; and 1 for *Not at all*. Thus, the average score here is 2 for "Minimum". The TPACK rubric is presented on Appendix 2. Likewise, the effect size calculation was employed for TPACK rubric.

Table 11. Intraclass Coefficient Correlation Analysis for Each Element of TPACK Rubric

Reliability	Cronbach's α (N = 10)
Content knowledge (CK)	0.96
Pedagogical knowledge (PK)	0.77
Technological knowledge (TK)	0.77
Pedagogical content knowledge (PCK)	0.90
Technological content knowledge (TCK)	0.87
Technological pedagogical knowledge (TPK)	0.75
Technological pedagogical content knowledge (TPACK)	0.78

Since TPACK rubric was filled in by more than one instructor and supervisor, the inter-rater reliability testing was conducted. The interrater reliability was conducted by calculating assessment result from three instructors for the first prototypes of curriculum product. Intraclass coefficient correlation was employed to assess interrater reliability since the raters are more than two. Same as the reliability analysis of TPACK questionnaire, the results of the Interclass Coefficient Correlation were also interpreted with Cronbach's α. From the Table 11 could be seen that interrater reliability for TPACK element of TPACK rubric is 0.78 which is acceptable. It means that the raters' agreement in assessing TPACK element is quite good and could be accepted. Strong agreement of

the raters could be seen from the CK and PCK with Cronbach's α for interrater reliability is above 0.90. The raters' agreements for the rest elements are acceptable with Cronbach's α above 0.70.

4.3.3. Feedback form

Feedback form is kind of open-question form that was used by training instructors and educational designers to give feedback and comments to other educational designers after presenting their training curriculum. The educational designers used the feedbacks as consideration to make improvement from the first prototype to the second prototype of training curriculum. The researcher used the feedback form as supporting data from qualitative aspect. From the feedback form, the researcher attempted to analyze whether educational designers skills in presenting training curriculum has improvement or not. Detail of open questions on the feedback form is attached on Appendix 3.

4.3.4. Reflection paper

Reflection paper on this study was used in order to know how educational designers appreciate the professional development program that they followed. Educational designers were encouraged to write about their experience during the program. They were also asked about their opinion for TPACK framework and the possibilities of implementation at *Pusdiklat Setneg*. One of the important things that educational designers were encouraged to write what they have learnt after experiencing the program. It is important since by experiencing the program and doing a reflection, educational designers were encouraged to learn something about TPACK and its integration into training curriculum. It is in the line with Dewey (1916, p.44) as cited by Bringle and Hatcher (1999) who said that "an ounce of experience is better than a ton of theory, simply because it is only in experience that any theory has viral and verifiable significance."

4.3.5. Researcher log book

Researcher log book was used by researcher in order to note the activities of professional development program from the pre-training meeting until wrap-up meeting. It was also used to note important input from educational designers during discussions on the TPACK training. Besides, the researcher log book was also used by the researcher to note many opinions from educational designers during the reflection meeting. It was because not all of educational designers feel disposed to write down their experience on the reflection paper. Most of them prefer to do the reflection by discussing it in a group.

4.4. Data collection procedures

In order to attain data for answering the research questions of this study, data collection procedures are implemented from the beginning until the end process of this design-based research. The data collection procedures are aligned with the main four activities of professional development program; training, designing, presenting, and reflecting. Nevertheless, before entering the main four activities, a pilot testing is conducted at the beginning to know the reliability of the instruments. A validation is also conducted to validate the program and training materials. Besides, after the main activities of the professional development program, a meeting is conducted to wrap-up the program. Detail of data collection procedures on the main activities and whole activities of this study is presented on Table 12 below:

Table 12. Data Collection Procedures

Activities	Aims of the activities	Instruments
Pilot testing	Pilot testing is conducted in order to acquire data about the reliability of TPACK questionnaire as the research instrument.	TPACK questionnaire
Validation of TPACK training program	Validation of TPACK training program is required in order to gain the validity of the program, especially about the training materials that are proposed by the researcher.	*Head of the training center and a senior supervisor check whether the professional development program meets the center needs.*
Pre-testing	Pre-testing is intended to attain the data about prior educational designers' TPACK. The pre-testing is conducted during the first day of TPACK Training on the first day.	TPACK questionnaire
Designing and presenting training curriculum (first round)	Designing and presenting training curriculum are aimed at assessing prior educational designers' competency in integrating technology in training curriculum by describing their TPACK. In order to obtain the data, instructors give assessment to their curriculum product. Then, their fellows give feedback on their curriculum presentations.	• TPACK Rubric • Feedback form
Designing and presenting training curriculum (second round)	On the second round designing and presenting training curriculum are intended to assess the improvement of educational designers' TPACK in integrating technology in training curriculum. Supervisors are assigned to assess their curriculum product, and the instructors are assigned to give feedback on their presentations.	• TPACK Rubric • Feedback form
Reflection meeting	The reflection meeting is conducted in order to obtain the data about educational designers' appreciation after following the professional development program.	• Reflection paper • Researcher's log-book
Wrap-up Session	The meeting is conducted to wrap-up the activities and also assess the educational designers' TPACK after following the whole cycle of the program.	TPACK questionnaire

4.5. Data analysis

In order to analyze data that already collected from TPACK instruments, statistical analysis by using SPSS as applied. As mentioned before on the instruments part, Cronbach's α was used to measure reliability of TPACK questionnaire. Then, Wilcoxon Signed Rank test was used as appropriate statistical method to analyses those data since this study employed limited respondents—12 respondents—that influenced the normality distribution of the data. Then, qualitative data that came from feedback form and reflection paper were analyzed by making summary of the data. From the summary, the qualitative data was categorized or cluster based on the similarities of each statement. Then, the researcher could draw interpretation analysis form the categorization of the qualitative data.

CHAPTER 5—FINDINGS

Chapter 5 presents the findings that are attained from the research processes. The findings here are provided align with the sub-research questions. It is because the main idea of the findings is to answer the (sub-) research questions. Since there are three sub-research questions, thus this part is also divided into three parts. First part tells about educational designers' TPACK in designing training curriculum. Then, the second part of the findings concerns about educational designers' TPACK in presenting training curriculum. Lastly, the finding about educational designers' appreciation in following the professional development program is presented.

5.1. Educational designers' TPACK in designing training curriculum

In order to reveal whether there is a change of educational designers' TPACK in designing training curriculum TPACK questionnaire and TPACK rubric were used to investigate it. From those questionnaires, the data that already collected were affirm as research findings and analyzed as presented below.

5.1.1. TPACK questionnaire (First Layer)

The data from TPACK questionnaire on this part is focused on the first layer of educational designers' competency which is about educational designers' TPACK in designing training curriculum. As mentioned on Chapter 4 that the researcher distributed TPACK questionnaire in the pre-training meeting. It was intended to investigate the initial competencies of educational designers before the professional development program. On this first layer PCK component is not calculated since educational designers did not give instruction or presentation on this layer investigation.

From the Table 13 could be seen that the mean of all components are above 2.5. It means that educational designers already have prior knowledge about those elements in designing training curriculum. Nevertheless, the standard deviation for TCK and TPK are quite high SD = 1.04 and SD = 0.93. The high value of those standard deviation means that there are various level of understanding of TCK and TPK by educational designers. There are might be some educational designers who have sufficient knowledge on TCK and TPK, and also some of them know nothing. Besides, important findings revealed here that educational designers' TPACK score is the lowest one, which is M = 2.83 and SD = 0.87. So, on this pre-test investigated that though educational designers have enough understanding about CK, PK, TK, TCK and TPK, they are still have limited knowledge about how to integrate it together as TPACK framework in designing training curriculum.

Table 13. Pre-TPACK Questionnaire (First Layer: Mail-merge system)

Pre-TPACK Questionnaire (Layer 1)	Mean (N=12)	Standard Deviation
Content knowledge (CK_{MOD}):	3.39	0.64
Pedagogical knowledge (PK_{TBL})	3.27	0.68
Technological knowledge ($TK_{Mail\text{-}merge}$)	3.33	0.78
Pedagogical content knowledge (PCK)*	-	-
Technological content knowledge ($TCK_{Mail\text{-}merge\text{-}MOD}$)	3.04	1.04
Technological pedagogical knowledge ($TPK_{Mail\text{-}merge\text{-}TBL}$)	3.30	0.93
Technological pedagogical content knowledge ($TPACK_{Mail\text{-}merge\text{-}TBL\text{-}MOD}$)	2.83	0.87

1=Strongly Disagree; *2*=Disagree; *3*=Neither Disagree or Agree; *4*=Agree; *5*=Strongly Disagree

*) *In this first layer PK is not calculated.*

Afterward, the post TPACK questionnaire was administered by the researcher after educational designers following the program. In order to know the significance impact of the intervention, the Wilcoxon Signed-rank test was applied to the data. One-tailed

analysis on 0.95 confidence level (α = 0.05) was used to determine whether there is significance different of the score before and after the program. Moreover, to measure the effect of intervention the size effect calculation Cohen's d was employed here.

Table 14. Wilcoxon Signed-rank Test and Cohen's d Size Effect for TPACK Questionnaire (First Layer: Mail-merge system)

Variables	Pre-test		Post-test		Z	p	Cohen's d
	Mean (N=12)	SD	Mean (N=12)	SD			
CK_{MOD}	3.39	0.64	4.00	0.34	-2.585	0.004	1.19
PK_{TBL}	3.27	0.68	3.70	0.53	-2.451	0.006	0.74
$TK_{Mail-merge}$	3.33	0.78	3.89	0.52	-2.938	0.000	0.88
PCK*	-	-	-	-	-	-	-
$TCK_{Mail-merge-MOD}$	3.04	1.04	4.00	0.51	-2.536	0.004	1.22
$TPK_{Mail-merge-TBL}$	3.30	0.93	4.17	0.41	-2.949	0.000	1.26
$TPACK_{Mail-merge-TBL-MOD}$	2.83	0.87	3.88	0.54	-2.963	0.000	1.51

1=Strongly Disagree; 2=Disagree; 3=Neither Disagree or Agree; 4=Agree; 5=Strongly Disagree

*) *In this first layer PK is not calculated.*

From the Table 14 could be inferred that mean of all components on the TPACK have been increased. The mean scores of PK and TK on this post-test are above 3. Besides, CK, TCK, and TPK reached mean scores above 4 on this post. The standard deviation scores on this post-test are smaller than pre-test. It means that the comprehension of educational designers on those elements getting prevalent. Furthermore, it could be seen that score for educational designers' TPACK has been increased with mean M = 3.88 and standard deviation SD = 0.54.

Moreover, score of all components on the post-test after interventions are significantly higher than before the interventions. It is because all p-value of the components is below α = 0.05 on one-tailed analysis. Another important finding is about the size effect. Most of components on the TPACK questionnaires show large effect of the intervention with Cohen's d value above 0.8. From the Table could be seen that intervention gave medium effect to PK element with d = 0.74. Then, from the score for educational designers' TPACK in designing training curriculum could be seen that the intervention contributed a large effect with d = 1.51, z = -2.9 and p-value 0.000 which is absolutely significant.

5.1.2. TPACK rubric

From the Table 15 could be previewed that their first prototypes have sufficient scores which are above 2 in all components. The standard deviation also not too high, it means there is prevalent comprehension of those elements in designing first prototype. TPACK's mean score on this first curriculum product is the smallest score compares with other component with M = 2.22 and standard deviation SD = 0.64.

Table 15. TPACK Rubric First Curriculum Product

TPACK Rubric of First Curriculum Product	Mean (N=12)	Standard Deviation
Content knowledge (CK_{MOD}):	2.31	0.47
Pedagogical knowledge (PK_{TBL})	2.39	0.69
Technological knowledge ($TK_{Mail-merge}$)	2.47	0.51
Pedagogical content knowledge ($PCK_{TBL-MOD}$)	2.33	0.48
Technological content knowledge ($TCK_{Mail-merge-MOD}$)	2.33	0.68
Technological pedagogical knowledge ($TPK_{Mail-merge-TBL}$)	2.56	0.50
Technological pedagogical content knowledge ($TPACK_{Mail-merge-TBL-MOD}$)	2.28	0.66

3 = Strong; 2=Minimum; and 1=Not at all

It reveals though their mean scores on this first prototype are quite good, their knowledge in bring it all components together on training curriculum still not in maximum performance. Furthermore, PCK component here is not about educational designers competency in giving instruction, but how educational designers' knowledge in elaborating pedagogical aspect and content into training curriculum.

After revising the first curriculum product, educational designers provided their second prototypes of training curriculum to be assessed. Table 16 presents the assessment results of their second prototypes compare with the first one. Same as the first prototype, on the second prototype the mean score of all components are above the average score. Mean scores of TK, TCK, TPK reached the maximum score, 3. Wilcoxon signed-rank test and Cohen's d were also applied here to know the significance change after the interventions. All components of TPACK rubric have p-value below $\alpha = 0.05$ on one-tailed analysis. It means that there is significance change from the first and the second curriculum product.

Table 16. Wilcoxon Signed-rank Test and Cohen's d Size Effect for TPACK Rubric

Variables	Pre-test		Post-test		Z	p	Cohen's d
	Mean (N=12)	SD	Mean (N=12)	SD			
CK_{MOD}	2.31	0.47	2.67	0.48	-2.121	0.031	0.79
PK_{TBL}	2.39	0.69	2.67	0.48	-1.867	0.043	0.49
$TK_{Mail\text{-}merge}$	2.47	0.51	3.00	0.00	-2.598	0.004	1.54
$PCK_{TBL\text{-}Mail\text{-}merge\text{-}MOD}$	2.33	0.48	2.67	0.48	-1.847	0.042	0.74
$TCK_{Mail\text{-}merge\text{-}MOD}$	2.33	0.68	3.00	0.00	-2.585	0.004	1.46
$TPK_{Mail\text{-}merge\text{-}TBL}$	2.56	0.50	3.00	0.00	-2.828	0.004	1.30
$TPACK_{Mail\text{-}merge\text{-}TBL\text{-}MOD}$	2.28	0.66	2.83	0.38	-2.969	0.000	1.07

3 = Strong; 2=Minimum; and 1=Not at all

Nevertheless, not all components have sufficient size effect from the intervention that is given during the revision time. For the PK component, the size effect is quite low with d = 0.49. It means that the intervention (i.e. consultation session) during revision time did not give potential effect to the PK of educational designers. Then, medium effect size is shown by CK and PCK, with d= 0.79 and d = 0.74. Furthermore, the intervention has large effect on the TK, TCK, and TPK of educational designers with d value above 1.00. The result shows that giving consultation session during revision time of the first curriculum product to the second curriculum product contribute large effect for educational designers TPACK in designing training curriculum. It was proven by the calculations that show TPACK's d = 1.07 and p-value is absolutely significant on 0.000.

5.2. Educational designers' TPACK in presenting training curriculum

With the intention of investigating presentation skill of educational designers before and after the professional development program, TPACK questionnaire and feedback form were employed. The findings that were collected from those questionnaires are presented below.

5.2.1. TPACK questionnaire (Second Layer)

The findings from TPACK questionnaire are focused on the second layer which is about how educational designers present their training curriculum. On the second layer, the data analysis was only focused on three components that relate with conducting interactive presentation of training curriculum by using Power Point as technological support. Those three aspects are TK, PCK, and TCK. From the Table 17 one could be seen that the mean scores from the pre-test of those components are above 3. However, the standard deviations scores for those components are also high; for TK, SD = 0.75, PCK = 0.99, and TCK = 0.88. It means that the skills and knowledge of educational designers in conducting interactive presentation by using Power Point are still not prevalent. There are

some educational designers who have scores of those components far away from the mean scores.

Table 17. Pre-TPACK Questionnaire (Second Layer: Presentation)

Pre-TPACK Questionnaire (Layer 2)	Mean (N=12)	Standard Deviation
Technological knowledge ($TK_{PowerPoint}$)**	3.45	0.75
Pedagogical content knowledge ($PCK_{TBL-MOD}$)**	3.00	0.99
Technological content knowledge ($TCK_{PowerPoint-MOD}$)**	3.42	0.88

1=Strongly Disagree; 2=Disagree; 3=Neither Disagree or Agree; 4=Agree; 5=Strongly Disagree
***) The differences questionnaire items of first and second layer are on these variables*

Next, the post-test results were compared with the pre-test results in order to investigate the change of educational designers' TPACK in presenting training curriculum. Wilcoxon signed-rank analysis and size effect from Cohen were also applied as seen on the Table 18. From the table could be seen that post-test scores of TK, PCK, and TCK are significant larger than the pre-test scores with the p-value of those components are below the significance level $\alpha = 0.05$. Furthermore, the score of standard deviation of those three components are smaller than the pre-test. It means that most of educational designers' knowledge on TK, PCK, and TCK relatively prevalent and close to the mean score. Then, relates with educational designers' knowledge about Ms. Power Point application as technological support, the intervention contributed large effect to the post-test with $d = 0.81$ for TK. Furthermore, the change of educational designers' skill and knowledge in giving effective presentation of training curriculum could be seen from the PCK score which the intervention contributed large effect with $d = 1.07$. Moreover, the intervention also gave large effect to the change of educational designers' skills and knowledge in using interactive Power Point application to present MOD training curriculum that is shown by TCK's value of $d = 0.96$.

Table 18. Wilcoxon Signed-rank Test and Cohen's d Size Effect for TPACK Questionnaire (Second Layer: Presentation)

Variables	Pre-test		Post-test		Z	p	Cohen's d
	Mean (N=12)	SD	Mean (N=12)	SD			
$TK_{PowerPoint}$**	3.45	0.75	3.94	0.49	-2.674	0.002	0.81
$PCK_{TBL-MOD}$**	3.00	0.99	3.78	0.42	-2.623	0.004	1.07
$TCK_{PowerPoint-MOD}$**	3.42	0.88	4.08	0.50	-2.558	0.004	0.96

1=Strongly Disagree; 2=Disagree; 3=Neither Disagree or Agree; 4=Agree; 5=Strongly Disagree
***) The differences questionnaire items of first and second layer are on these variables*

5.2.2. Feedback form

Feedback form was used in order to gather the qualitative data that support the findings about educational designers' skill and knowledge in presenting training curriculum. As mentioned on the Chapter 4 that feedback form was filled by educational designers and instructors in order to give feedback to other educational designers after giving presentation of training curriculum. The analysis of the feedback form is conducted by comparing the summary of feedback on the first group presentation with the second group presentation of training curriculum. Summary of the feedbacks for the first presentation are presented on Table 19.

Table 19. The Summary of Feedbacks of First Group Presentation

Presenter / Evaluator	Group 1	Group 2	Group 3
Group1		*"The group two on their presentation already described the MOD training content and the TBL as training method. However, they did not provide clear presentation how mail-merge application has strong relation to support the training content and its pedagogical approach."*	*"The presentation already explained the technological support that is used on the training curriculum. But the training content that they were presented still in general and not fit with the technological support. They have to elaborate more in presenting the training content aspects."*
Group 2	*"They have to give clearer presentation about mail-merge application and its relation with MOD training content and TBL approach."*		*"They gave well presentation about training curriculum. They just need to give clearer presentation about how mail-merge application as technological support fit with the training content."*
Group 3	*"They presented that mail merge application as technological support. Nevertheless, they did not give clear presentation how the mail-merge application fit with MOD training content. Their next presentation should be focused on how mail-merge application really supports the training content by using TBL as training approach. "*	*"They did not present the compatibility on training content with mail-merge application. On their presentation seems that mail-merge application and MOD training are standalone without any relation. They have to present it more obvious how those aspects fit each other."*	

From the summary on the Table 20, one could be drawn that educational designers attempted to present training curriculum from every aspect; training content, training method, and technological support. Nevertheless, educational designers' did not give further explanation about how each aspect interrelate each other. For instance, educational designers on their presentation said that mail-merge application would be implemented as technological support in MOD training curriculum, but they did not explain clearly how mail-merge application fit the training content. Thus, the information that they presented on the first group presentation was still not appropriate.

Table 20. The Summary of Feedbacks of Second Group Presentation

Presenter / Evaluator	Group 1	Group 2	Group 3
Instructor 1	*"They gave well presentation. They explained how MOD training content, mail-merge application and TBL approach are integrates together in training curriculum. For the next improvement, they have to pay more attention to the verbal language that they used to become more formal."*	*"They presented the training curriculum appropriately. They just need to give more information while giving presentation about training curriculum. They also have to do more practice to give presentation in good language."*	*"They gave presentation more structured than other groups. It was really good to provide comprehension understanding about training curriculum. For the improvement that they just have to pay attention in using interactive and communicative presentation styles."*

Presenter / Evaluator	Group 1	Group 2	Group 3
Instructor 2	*"The presentation was good and understandable. For the next improvement they need to design their presentation slides to be more interactive and interesting."*	*"They have good presentation skills. The main idea of training curriculum was delivered. They also presented how to conduct evaluation on their training curriculum."*	*"They presented appropriate information about the training curriculum. It was good. They just need to improve their communication skills."*
Instructor 3	*"They need to add more information on their presentation. They also need to use more interactive slides in giving presentation."*	*"The information about training curriculum was well presented. They explained in informative way how mail-merge supports the training content and TBL as training approach. They also used interactive and interesting slide presentation."*	*"The training curriculum was well presented. They just need put their attention on the presentation slides that they were used to be more interactive and communicative."*

After giving the first group presentation, educational designers received the feedback as considerations to revise and improve their presentation at the second time. The preparation time of the second presentation is equivalent with the time of revising their first curriculum product. Educational designers still received the feedback after giving the second presentation. At the second presentation, educational designers received feedback from instructors. The summary of the feedbacks were used by educational designers in order to analyze qualitatively whether there is a change of educational designers presentations skills after receiving the feedback. From the Table 19 could be read that most of groups already gave appropriate presentation about training curriculum. They gave clear presentation how every component in training curriculum interrelates each other. Educational designers provided sufficient information on their presentation. Nonetheless, the instructors gave important notice that for further improvement educational designers should pay more attention on their presentation styles and the formal language that they used.

5.3. Educational designers' appreciation to the professional development program

At the end of professional development program, educational designers were asked to write a reflection paper that describes their experiences and their appreciation to the program. Not all of educational designers provided paper-based reflections. Most of them preferred to discuss it during the reflection meeting. Thus, the researcher used the researcher log book to note educational designers' reflection during the meeting. The important findings from reflection papers and discussions on the meeting are presented below:

Educational designers gave good appreciation to the professional development program since the program enhanced their technological skills and knowledge:

> *"I think I inferred new insight that could enhance my skills and knowledge in technology, especially how technology supports training process. From this professional development program I experienced that technology really give advantages to provide the effectiveness of the training."*

> *"Another important thing that I acquired from this program is about presentation skills. I learned how to make interactive presentation by using simple PowerPoint. It was so useful."*

> *"I learned about how to integrate technology into training curriculum, especially how to use mail-merge application for management official documents training. And also it is really useful for me to learn how to make interactive PowerPoint presentation. It is really important for me as educational designers since sometime I have to present the curriculum product to instructors in my institution."*

"I got new skills on technology, especially about implementing mail-merge application into management of official documents training. Mail-merge application is really appropriate technological support to do effective management official documents. I also got new insight in making interactive PowerPoint presentation. It is really useful to enhance my competency as educational designers in presenting training curriculum to others, such as instructors and officials."

Furthermore, educational designers also gave their arguments about TPACK framework as core of the professional development program. Most of educational designers asserted that they already knew the basic concept of TPACK; they just did not label it and did not know how to integrate it in the training curriculum:

"I also have noticed that actually we already attempted to integrate technology, content, and method in our training curriculum. We just did not know that the concept is named as TPACK framework. I agree TPACK is appropriate concept for enhancing technology integration."

"From the professional development program I have been introduced the new concept of TPACK framework. Actually, it is not 'really new' for us. We are already noticed that in designing curriculum program we have to consider the content, training method, and the technological support that we will be used in training curriculum. However, our weakness is not document it into a formal framework like TPACK's founder did. Indeed, TPACK concept is really appropriate to be integrated into training curriculum. I assume that the TPACK framework could enhance the effectiveness of the training program in our institution. So, Pusdiklat Setneg should develop it seriously and should integrate in into our existing curriculum."

"I agree that TPACK is a good theoretical foundation about integrating technology in training curriculum. I recommend Pusdiklat Setneg do further development of this concept. I also argue that not only educational designers need this professional development program, but also the instructors and the officials of Pusdiklat Setneg. Thus, the capability of human resources in Pusdiklat Setneg could support the integration process."

"As a formal framework TPACK is a new concept for me. However, in practically I already knew the concept of integrating technology, content, and training method."

Another opinion about technology integration that could enhance training effectiveness:

"During the training program I found that technology gave large contribution in the training process. I think technology integration at Pusdiklat Setneg is not optimal. Our institution has quite good technological facilities, though the integration of it into training activities is still limited."

"…the mail-merge application that was introduced in the program really helps us re-thinking about management official document training curriculum. I think mail-merge application is really helpful to be implemented on the management official document training since it could help the process of mailing more effective. Then, interactive PowerPoint presentation is really useful for our presentation skills as educational designers."

Educational designers also noticed that in order to implement TPACK framework at *Pusdiklat Setneg*, many aspects have to be considered:

"…However, in the practical implementation we have to consider crucial factor such as the availability of technological facilities, quality of human resources, leadership and policy support. Indeed, policy support is really important aspect for us in government institution. A good concept would not be implemented if there is no policy support."

"I thought that lack of capacity of human resource in using technology at our institution could be an obstacle to do that integration. Besides, the quality of technological facilities such as internet connection also contributes to the successfulness of technology integration into training curriculum."

"I assume that quality of human resource that responsible to implement it is still insufficient. Besides, leadership and policy support also important to be considered in this integrating process."

"Besides, I agree that TPACK framework is a nice concept for integrating technology into training curriculum. However, in the process of integrating TPACK framework we have to consider about the availability of technology at Pusdiklat Setneg."

Based on the reflections that are presented above one could be inferred that educational designers gave positive appreciation on the professional development program. They appreciated that TPACK framework is good concept to be implemented at *Pusdiklat Setneg* by considering some important aspects.

CHAPTER 6—CONCLUSION, DISCUSSION, AND RECOMMENDATION

This chapter attempts to wrap-up the report of this study by concluding the most prominent aspect, especially about answering the research questions based on the findings part. Then, with regards to answer the questions and solve the problems, the findings are discussed with the review literature from others studies. Lastly, some recommendations are drawn in order to give input for further research on the same area of study, and for Pusdiklat Setneg in developing effective professional development program for educational designers in designing technology-integrated training curriculum.

6.1. Conclusion

The study was intended to find out educational designers' competency in integrating technology in training curriculum at *Pusdiklat Setneg* as Indonesian government's center for education and training. It was focused on how educational designers' competency in designing the curriculum and present it to the instructors. The professional development program was organized as intervention of the study. Measurements about educational designers' competency in designing and presenting training curriculum were conducted before and after the interventions in order to investigate whether the professional development program contributed changes to their competencies. Furthermore, the study also revealed educational designers' appreciation to the program. The study is started with the question *what are the characteristics of a professional development program that prepare educational designers to design and present a technology-integrated curriculum for Management Official Documents (MOD) training?* This main question is formulated into three sub-questions as follows:

a. Do educational designers' TPACK in designing training curriculum change after participating in the professional development program?
b. Do educational designers' TPACK in presenting training curriculum change after participating in the professional development program?
c. How do educational designers appreciate the professional development program?

Concerning the first research question "*Do educational designers' TPACK in designing training curriculum change after participating in the professional development program*?" the findings showed that the professional development program contributes change to educational designers' TPACK in designing training curriculum. The findings were revealed from two ways of data collection; self-reporting by filling up questionnaire and assessment of their curriculum product. From the questionnaire, the results show that educational designers have already had prior knowledge about TPACK components; CK, PK, TK, TPK, and TCK, however they did not have good competency to integrate those components of knowledge into a framework in training curriculum. On the first layer of TPACK questionnaire, PCK was not measured since educational designers did not give instruction. The TPACK's training as intervention contributed large effect to enhance educational designers' TPACK in designing training curriculum. It could be seen from their post-test of self-report questionnaire that TPACK score is significantly higher than the pre-test. Wilcoxon Signed-rank test was used to analyze the significance of change, and Cohen's d analysis was used to determine the effect size. Furthermore, based on the assessment of first curriculum product that they were made, educational designers attained sufficient knowledge for all TPACK components. It might be because the first curriculum product was designed directly after the TPACK training. The results of assessment for the second curriculum product shows that the interventions by giving consultation time during the re-designing phase contributed the large effect to change educational designers' TPACK in designing training curriculum. However, not all components of the TPACK have large effects from the interventions. The interventions only contribute medium effect to change the educational designers CK and PCK, and small effect for PK. PCK here is not about the educational designers competency in giving instruction, but how the educational designers' knowledge in elaborating pedagogical aspect and content into training curriculum.

Moreover, with regards to the second question "*Do educational designers' TPACK in presenting training curriculum change after participating in the professional development program*?" the findings show that the professional development program changed educational designers' competency in presenting training curriculum. First finding was drawn from self-report TPACK questionnaire of second layer. On the second layer only three components—TK, PCK, and TPK—that relate with educational designers skills in presenting training curriculum by using interactive presentation-slides tools were investigated. The findings show that the educational designers have sufficient prior knowledge in giving presentation and using its presentation tools. However, their skills are still not prevalent. There are educational designers who have good skills about presentation and its application, and there are educational designers who have not. Moreover, the professional development program contributed large effect in order to improve their presentation skills. The scores of post-test are significantly higher than pre-test. Those findings were also supported by qualitative data analysis from feedback form that was filled in by educational designers and instructors after presentation session. The summary of feedback form affirms that educational designers' presentation's skill changed on the second presentation. At the second round, educational designers presented clearly how technological support, training content, and training method are integrated in training curriculum.

Afterwards, relating the third question *"How do educational designers appreciate the professional development program?"* the findings show that at the end of the program educational designers gave positive appreciation to the professional development program. They appreciated TPACK framework as suitable concept for integrating technology in training curriculum at *Pusdiklat Setneg*. The educational designers impressed that the development program was really beneficial to enhance their competencies in designing and presenting technology-integrated training curriculum. They also noticed important aspects that have to be considered in order to implement TPACK framework, such as quality of human resources, technological facilities, leaderships and policy support.

6.2. Discussion

From the findings that are discussed on the Chapter 5, one could be inferred that the professional development program as the main interventions gave potential influence to improve educational designers' TPACK, both in designing and presenting technology-integrated MOD training curriculum. The findings support that the characteristics of professional development program on this study really appropriate to enhance educational designers' competency in designing and presenting training curriculum. The professional development program is like a bridge to connect the gap between limited competency of educational designers' and the objectives of MOD training curriculum. The program gave opportunity for educational designers to conduct direct practice in designing MOD training curriculum. It could be asserted that the practicality of the professional development program contributed to the enhancement of educational designers' competency in designing and presenting training curriculum. The practicality of the professional development program was reached by providing technological support during the program, such PC and computer application that supports educational designers in designing and presenting the training curriculum during the program. Al-Ruz and Khasawneh (2011); Bell and Kozlowski (2002); Ertemsir and Bal (2012); Payne et al. (2009) confirm that technology integration in training settings could provide the practicality of training that enhances the training effectiveness.

From the specific competency in designing MOD training curriculum, the findings prove that the professional development program as the intervention significantly changed educational designers' TPACK. It is proven from the results of Wilcoxon Signed-rank analysis of self-report questionnaire of first layer and assessment of their curriculum product with both $p = 0.000$, which is absolutely below the significance level $\alpha = 0.05$. An interesting finding reveals on the study that there are differences of size effect on CK and PK components from self-report questionnaire and the assessments of curriculum prototypes. From the self-report questionnaire found that the interventions contributed large effect to change educational designers' knowledge

of those components. Yet, from the curriculum assessments that were conducted by instructors and supervisors found that the interventions did not contribute large effect for each component. The interventions only gave medium effect to educational designers' CK, and even small effect to educational designers' PK. Actually, the PCK component also have medium effect from the intervention, but it could not be compared since PCK component was not considered on the first layer of TPACK questionnaire. The phenomena could be explained that educational designers designed the first training prototype directly after the TPACK's training, so they already have sufficient knowledge about TPACK's components. That was why the consultation session during the re-designing phase did not contribute large effect to enhance educational designers. Besides, on the re-designing phase, educational designers only focused on improving technological aspect in order to integrate it into training curriculum.

Besides, other explanation also could be drawn concerning the differences results of self-report and curriculum assessment on CK and PK components for first layer of TPACK questionnaire. On the self-report report questionnaire the educational designers attempt to perform as best as they can by filling in the questionnaire. It could be influenced by the culture of them that they perform better while they are aware that they are being researched. Furthermore, concerning with the cultural issue, the proximity between the participants and the researcher probably influence the questionnaire results. All of the educational designers involved in this study are the researcher's colleagues at *Pusdiklat Setneg*. Thus, they may attempt to provide the intended results expected by the researcher. This phenomenon is affirmed by Rosenberg (1969) as cited by Dooley (2008), who says that respondents are obtrusively being researched try to look good, intelligent, normal, and well. Dooley (2008) also endorse that the participants of researcher may believe that they can achieve best by performing in a way that supports the researcher' theory as guessed from demand characteristic of the study. Indeed, this issue makes the results of self-report questionnaire less objective. For that reason the curriculum assessment was conducted by instructors and supervisors to maintain the objectivity of the results on the same aspects of measurements.

Despite there are differences on CK and PK components, the findings proved that the interventions contributed large effect to change educational designers' TPACK, whether from self-report questionnaire or curriculum assessment in which effect size score for TPACK questionnaire $d = 1.51$, and effect size score for TPACK rubric assessment $d = 1.07$. It means that the educational designers have more sufficient knowledge in integrating technological aspect (i.e. mail-merge application), MOD training contents, and TBL as appropriate training approach into MOD training curriculum. It is so important since the core of TPACK framework is how technology is integrated and fit with content and pedagogical approach appropriately in educational process (Mishra & Koehler, 2006). It also confirms what Richey et al. (2001) say that the educational designers have to be able to select and modify training curriculum with the purpose of supporting the content, delivery methods, instructional strategies and technological supports that would result in appropriate-technology-integration.

Furthermore, the findings also confirm that the professional development program changed educational designers' TPACK in presenting training curriculum. On this second layer investigation, the same self-report questionnaire as first layer also used. The difference is only some items for three components (i.e. TK, PCK, and TCK) that relate with skills in presenting and designing interactive presentation-slides. Although from the findings show that the interventions contributed large effect to change educational designers' TK, PCK, TCK, it could not directly assume that educational designers' TPACK in presenting training curriculum has been changed. It is because the self-report questionnaire on the second layer only measured partially—TK, PCK, and TCK—of educational designers' skills in giving presentation. Indeed, it becomes the limitation of the measurement on this aspect. In order to cover that limitation, qualitative data analysis from feedback from is provided. The findings from the summary of feedback form confirm that educational designers' TPACK in presenting training curriculum changed positively on the second presentation. On the second presentation educational designers

presented clearly and interactively how technological support, training content, and training method are integrated on technology-integrated MOD training curriculum. Interactive and communicative presentation skills are important for educational designers in order to communicate their training curriculum to instructors and other stakeholders effectively Richey et al. (2001).

Furthermore, the findings from the reflection meeting of educational designers affirm that the professional development program was really useful to enhance their technological skills and knowledge, especially with regard to design the technology-integrated training curriculum. Educational designers gave positive appreciation to the professional development program in order to enhance limited technological competency of educational designers at *Pusdiklat Setneg*. Besides, it reveals that TPACK framework is eligible to be implemented at *Pusdiklat Setneg* with some arrangement for further development. TPACK framework is a gate way to integrate technology in training curriculum effectively.

Likewise, the reflection meeting revealed that some factors should be considered in order to employ TPACK framework at *Pusdiklat Setneg*. *Pusdiklat Setneg* should guarantee the availability of technological support for the training. Al-Ruz and Khasawneh (2011) affirm that the availability of technology is really important to support technology integration in training. Besides, the leaderships at *Pusdiklat Setneg* should give policy support concerning TPACK implementation. It could be a regulation from the Minstry or Head of *Pusdiklat Setneg*. Leadership and policy support in organization has potential influence to support technology integration in training (Seidel & Cox, 2003; and Seidel & Perez, 1994 as cited by Keengwe et al., 2009; Perencevich et al., 2007; Senteni, 2006) Furthermore, the most important thing is *Pusdiklat Seteng* should facilitate the educational designers and the academic staff to enhance their capacity through professional development program.

Moreover, it could be inferred that the professional development program is really important to enhance the educational designers' competency in designing and presenting training curriculum. The professional development program has been proved as the interventions that changed educational designers' competency. It is in the line with Hewett and Powers (2007) and Brandt (2001) who affirm that professional development should be conducted continuously in order to enhance educational designers' competency integrating technology into training curriculum, and also to support the transition process from traditional into technology-integrated curriculum. By the same token, Richey et al. (2001) confirm that the competencies of educational designer could be improved by conducting an appropriate professional development program. Thus, *Pusdiklat Setneg* should pay attention to the professional development program in order to establish technology-integrated MOD training curriculum. The characteristic of professional development program on this study could be used as consideration to make improvement of a further program.

Towards the end, from the discussion above it could be reflected that the study has some limitations. The first prominent limitation that has to be concerned is about the previous research or findings that are match with this study. It was difficult to find the research findings that perfectly meet the criteria for this study. Most of literature only discussed about the professional development program for teachers in integrating technology at classroom. There was no finding that explains explicitly about the professional development program for educational designers, especially on training settings. Another important thing that has to be considered as a limitation of this study is about the cycle of the program. Since the limitation of the time, the study only accommodates two times of designing and presenting training curriculum. Designing process need more cycles in order to give opportunity of formative evaluation for the further development of the product.

Additionally, another limitation that could be reflected from this study is about the assessment of educational designers' curriculum product. The first assessment is conducted after the TPACK training, and the second one is conducted for the final product after a-five day consultation and

revision time. The first assessment is not really describing the prior knowledge of educational designers' TPACK since they already given information about TPACK framework during the training. The assessment for obtaining information about prior knowledge is better to be conducted at the beginning of the program. Lastly, the researcher on the study plays to two roles; as researcher and as instructor of the training. The researcher could eliminate his role as the training instructor; by let somebody who has sufficient knowledge about TPACK for giving explanation. The roles as researcher is really obviously recognize by the participants, since the researcher also educational designer at *Pusdiklat Setneg*. Indeed, like explain before that it makes some personal assessment less objective since they were fully aware that they are being researched.

6.3. Recommendation

From the study some recommendation could be delivered to *Pusdiklat Setneg* as Indonesian Government's Center for Education and Training that intends to provide technology-integrated training. TPACK framework is a good solution to be implemented at *Pusdiklat Setneg* in order to integrate technology in training curriculum. To achieve that, *Pusdiklat Setneg* should concern in improving the capability of human resources, especially the quality of the educational designers. *Pusdiklat Setneg* should provide sustainable professional development program for educational designers and also training instructors in order to enhance their competency in integrating technology in training curriculum. It is suggested that the professional development program, which involves the educational designers should be made more interactive. It should be more than just one day training about technology integration. Furthermore, it is also recommended to establish institution regulation that controls formally the integration of technology in training curriculum. It is important since in government institution every step and innovation should be based on formal regulation. Thus, the integration of technology in training curriculum would be supported by legal-formal.

Furthermore, the recommendation is also given to other researchers who want to conduct a research with same concerns. In investigating educational designers' TPACK in designing training curriculum, it is recommended to assign educational designers to design a training curriculum before the TPACK's training program in order to measure their prior knowledge in designing training curriculum, not only based on the self-report questionnaire. It relates with the issue of on this study that the intervention did not give large effect to CK, PK, and PCK of educational designers, based on the assessment of their curriculum product. Then, educational designers are also still assigned to design the second curriculum product after the training, and produce the third product after re-designing it. Thus, researcher and training instructors could make comparison of 3 training curriculum products. By considering this recommendation, it is expected that the researcher could see obviously whether the interventions contribute large, medium, or small effect to change educational designers' competency in every component of TPACK framework.

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Appendices

Appendix 1: TPACK questionnaire

Thank you for taking time to complete this questionnaire. Please answer each question to the best of your knowledge. Your thoughtfulness and candid responses will be greatly appreciated. Your individual name or identification number will not at any time be associated with your responses. Your responses will be kept completely confidential and will not influence your job performance assessment.

Demographic Information

1. Your working division: ……
2. Years of your working experience: …….
3. Gender
   a. Female
   b. Male
4. Age range
   a. 23-26
   b. 27-32
   c. 32+
5. Educational Degree
   a. Diploma
   b. Bachelor
   c. Master
   d. Doctoral
6. Educational Background
   a. Law
   b. Public Administration
   c. Management
   d. Information Technology
   e. Others, please specify…….

Technology is a broad concept that can mean a lot of different things. For the purpose of this questionnaire, technology is referring to digital technology/technologies. That is, the digital tools we use such as computers, laptops, iPods, handhelds, interactive whiteboards, software programs, etc. Please answer all of the questions and if you are uncertain of or neutral about your response you may always select "Neither Agree nor Disagree"

No.	Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	TK (Technology Knowledge)					
1.	I know how to solve my own technical problems.					
2.	I can learn technology easily.					
3.	I keep up with important new technologies.					
4.	I frequently play around the technology.					
5.	I know about a lot of different technologies.					
6.	I have the technical skills I need to use technology.					
7.	I know how to use mail merge application.					
8.	I know how to use PowerPoint application.					
	CK (Content Knowledge)					
	Official Documents Management					
9.	I have sufficient knowledge about managing official documents					

10.	I can use a management official state documents way of thinking.					
11.	I have various ways and strategies of developing my understanding of managing official documents.					
	PK (Pedagogical Knowledge)					
12.	I know how to assess employees' performance in training.					
13.	I can adapt my instruction based-upon what employees' currently understand or do not understand.					
14.	I can adapt my instruction style to different learners.					
15.	I can assess employees' learning in multiple ways.					
16.	I can use a wide range of instruction approaches in training settings.					
17.	I am familiar with common employees' understandings and misconceptions.					
18.	I know how to organize and maintain training management.					
	PCK (Pedagogical Content Knowledge)					
19.	I can select effective instruction approaches to present management official documents curriculum to instructors and other educational designers					
20.	I can adapt management official documents curriculum in my instruction approaches while presenting its curriculum.					
21.	I am thinking critically how to make instructors and educational designers understand about management official documents curriculum.					
	TCK (Technological Content Knowledge)					
22.	I know about technologies that I can use for understanding and doing official documents management.					
23.	I know how to use mail merge application and embed it in management official documents training curriculum					
24.	I know how to use PowerPoint application to present management official documents training curriculum.					
	TPK (Technological Pedagogical Knowledge)					
25.	I can choose technologies that enhance the instruction approaches for a training curriculum					
26.	I can choose technologies that enhance employees' learning for training.					
27.	I am thinking critically about how to use technology in training settings.					
28.	I can adapt the use of the technologies that I am learning about to different training activities.					
29.	I can use strategies that combine content, technologies and instruction approaches that I learned about in my curriculum in my training.					
30.	I can provide leadership in helping others to coordinate the use of content, technologies and instruction approaches at my training center.					
31.	I can choose technologies that enhance the content for training.					
	TPACK (Technology Pedagogy and Content Knowledge)					

32.	I can design training curriculum that appropriately combine content of official documents management, technologies and effective instruction approaches.					
33.	I can present training curriculum to training instructors and other educational designers that appropriately combine content of official documents management, technologies and effective instruction approaches.					

Appendix 2: TPACK rubric

Criteria	3	2	1
Appropriately spelt out subject matter of managing official documents (*CK*)			
Task-based Learning (TBL) support to managing official documents training (*PK*)			
Clearly designed mail-merge application technique that can use to support the transfer of knowledge in the training (*TK*)			
Support of TBL approach to managing official documents materials content. (*PCK*)			
Alignment of mail-merge application to MOD goals (*TCK*)			
Support of mail merge application TBL approach (*TPK*)			
Fit of MOD content, TBL approach, and mail-merge application together within training curriculum/lesson plan. (*TPACK*)			

Criteria	4	3	2	1
Curriculum Goals & Technologies (Curriculum-based technology use)	Technologies selected for use in the instructional plan are strongly aligned with one or more curriculum goals	Technologies selected for use in the instructional plan are aligned with one or more curriculum goals	Technologies selected for use in the instructional plan are partially aligned with one or more curriculum goals	Technologies selected for use in the instructional plan are not aligned with any curriculum goals
Instructional Strategies & Technologies (Using technology in teaching/ learning	Technology use optimally supports instructional strategies	Technology use supports instructional strategies	Technology use minimally supports instructional strategies	Technology use does not support instructional strategies
Technology Selection(s) (Compatibility with curriculum goals & instructional strategies)	Technology selection(s) are exemplary, given curriculum goal(s) and instructional strategies	Technology selection(s) are appropriate, but not exemplary, given curriculum goal(s) and instructional strategies	Technology selection(s) are marginally appropriate, given curriculum goal(s) and instructional strategies	Technology selection(s) are inappropriate, given curriculum goal(s) and instructional strategies
"Fit" (Content, pedagogy and technology together)	Content, instructional strategies and technology fit together strongly within the instructional plan	Content, instructional strategies and technology fit together within the instructional plan	Content, instructional strategies and technology fit together somewhat within the instructional plan	Content, instructional strategies and technology do not fit together within the instructional plan

Appendix 3: Feedback form

Presenter Group: ……

Evaluator Group: ……

Please give feedback to presenter group by considering these following questions:

1. What topic was presented by the presenter group? Was it relevant with official documents management?
2. What kind of instruction strategy that was used by the presenter group? Was it relevant with task-based training method?
3. What kind of technology that was used by the presenter group? Was it relevant with computer office application?
4. Would give general comments to the presenter group and what should they improve for better presentation skills?