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Case Studies on the Use of Technology in TPD (Teacher Professional Development)

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In this paper, the progress of a three-year cooperative project investigating the current state of TPD (teacher professional development) in Sweden and China in the area of TPD and ICT (information and communication technologies) is summarized. A brief introduction to the field of TPD is given, and thereafter, ICT is related to what in the project is referred to as TETPD (Technology Enhanced Teacher Professional Development). Thereafter, the project as such is given a short presentation, followed by findings[1] regarding policies and initiatives related to TETPD in Sweden and China for investigating the current state of TETPD in each country respectively. The framework for investigating TETPD is presented, and four Chinese and four Swedish cases are compared to some facets showing differences in models for TETPD in the two countries.

Keywords: TPD (teacher professional development), TETPD (technology enhanced teacher professional development), multiple case studies, Sweden, China

Introduction

Constant change in the working conditions of teachers and an increased impact of ICT (information and communication technologies) in education both lead to a need for teachers to engage in professional development activities. TPD (teacher professional development) is, therefore, a dynamic area of constant change, and teachers' knowledge and skills are in a constant need of improvement. One might say that teachers are in need of TPD. In this context, this paper summarizes the progress of a three-year cooperative project investigating the current state of TPD in Sweden and China in the area of TPD and ICT. It starts by giving a brief introduction to the field of TPD and thereby relates ICT to what in the project is referred to as TETPD (technology enhanced teacher professional development). Thereafter, the project is given a short presentation, followed by findings regarding policies and initiatives related to TETPD in Sweden and China for investigating

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[1] The content of this paper builds on four papers presented at the International Conference on ICT in Education 2009, Corfu, Greece.

the current state of TETPD in each country respectively (Gu & Lindberg, 2009; Jiao, Wang, & Jia, 2009; Jiao, Wang, & Qin, 2009; Lindberg & Gu, 2009). The paper then gives a short description of the project research designed as a multiple case study, as well as the cases selected and a comparison of four cases per nation.

Background

The quality and performance of teachers have for a long time been considered as determining factors for the success of educational changes (K. O. Aluko & R. A. Aluko, 2008). TPD is a crucial component in nearly every modern proposal for educational improvement. But sometimes, it is claimed that TPD is constricted by barriers (Diaz-Maggioli, 2004). Barriers can be top-down decision-making, lack of ownership of the professional development process, inaccessibility of professional development opportunities, providing little or no support in transferring professional development ideas to the classroom. Further barriers can, for instance, be when TPD is arranged and carried out in single or short sessions in which the teachers are attending in person (McRae, Ainsworth, Groves, Rowland, & Zbar, 2001). TPD in Sweden seems often to be initiated at a central governmental level, e.g., with directives concerning financing and organisation of content and implementation (Ordinance, 1982, p. 608; Ordinance, 2007, p. 223). Lately, the use of ICT for TPD has been trend and hot topic in teacher education development.

In China, TPD is “mainly carried on by the way of pre-service education that is normal education in early years. It has gradually developed into in-service teachers’ education till 1980s” (Wang, 2007, p. 26). From the 1980s, teachers’ education has been advocated, and related policies have been issued. Governmentally initiated TPD has been studied in Sweden as well as internationally. In Sweden, Strömberg (1994) and Englund (1992) held that state controlled TPD is a means for the state to secure those teachers who are loyal to the curriculum rather than the traditions of the profession. Internationally, Diaz-Maggioli (2004) held steering limits ownership over TPD and Husby (2005) argued that it could lead to teachers learning not being meaningful. Hargreaves (2006) and Goodson and Hargreaves (2003) held that instead of teachers giving in to demands for change from above, teachers searching for continuous learning should be encouraged. But teachers often find themselves in a political, economic and social dilemma regarding their TPD (Blase, 2005).

Today, there are more than 10 million teachers and 200 million students in China. In the past 20 years, teacher education institutes in China have made great progress in TETPD (Gu, 2005). Many explorations and practices in China provided typical cases, lessons and experiences for the academic community in teacher education to draw upon when conducting research on TETPD (Jin & Xiong, 2006). Success in using ICT in education depends largely on teachers and their levels of skills in integrating ICT into their professional developments and utilizing ICT to provide learner-centered and interactive education. All institutions of teacher education are faced with the challenge of preparing a new generation of teachers to effectively use the new learning resources in their life-long learning and teaching practices. This is one of the reasons why TETPD has aroused an increasing interest from both practitioners and researchers, in China as well as in other countries (Carlson & Gadio, 2002; Schlager & Fusco, 2004; Zhang, 2007).

The TETPD Project

The TETPD project has a broad approach to the study of ICT in TPD. In the project, both China and Sweden are described as countries that for the past decades have been developing a strong technological infrastructure for teaching and learning (Jedeskog, 2005; Sang, 2004; Watters, Leung, & Ginns, 2006). What is

highlighted is the fact that yet few studies have examined the effects on TPD (Snyder & Acker-Hocevar, 2004). The purpose of the project was described in terms of exploring and analyzing TETPD in Sweden and China. The specific objectives of the project related to this are:

(1) To compare the systems, programs, curriculum, resources, methods, evaluation of teacher education and professional development on both in-service and pre-service levels in Sweden and China;

(2) To identify and analyze the similarities and/or differences in the definitions, foci, models, policies and perspectives on TETPD in teacher education and professional development in Sweden and China;

(3) To investigate, analyze and understand teachers, teacher trainees and respective teacher trainers' attitudes, experiences and understanding of their own learning and professional development in relation to the integration of ICT and teaching and learning in Sweden and China;

(4) To investigate and examine TETPD models and cases in Sweden and China, and identify the common factors that contribute to successful TETPD.

Policies and Research on TETPD in Sweden and China

According to Jiao et al. (2009), the following four points can be highlighted from the backgrounds and policies of TPD and TETPD since the 1980s. Teacher education in China has tremendously changed in the past 20 years, and issues related to teachers, such as TPD and TETPD, were gradually highlighted. There have been three great transformations on teachers' education in China in the past 20 years: The first concerns a shift from only stressing normal education (pre-service teacher education) to the combination of normal education and in-service teacher training; The second concerns a gradual shift from focusing on teacher training and teacher's continuing education to TPD; The third concerns a shift from the over-emphasis on face-to-face teacher's training to a combination of face-to-face training and distance teacher education and other strategies and approaches. During the past 20 years, neither technologies nor technological factors were appreciated in TPD. The amount of literature regarding TETPD has gradually increased.

Regarding the research and practices on TPD and TETPD in China, Jiao et al. (2009) concluded the following aspects after having reviewed the Chinese literature. TPD was highlighted for special attention, and researches and practices on TETPD in China are at their preliminary stage. TPD and TETPD have increasingly attracted policy-makers of departments of education in China. Training is one of the significant approaches and strategies of TPD and TETPD in China. Some other approaches, strategies and methods of TETPD have appeared recently and are being adopted slowly. Practices on TPD and TETPD have gone ahead of research. There are few studies on TETPD reported in Chinese literature, but practices on TETPD are spreading.

Teacher training practices in China have been dominated by top-down organization and face-to-face trainings are the overwhelming majority of teacher training activities in China. In recent years, other practices on TETPD begin to come to prominence in China. Mangy researches and practices on TPD and TETPD in China seem to be anchored in approaches from abroad. Most of them focused on phases of TPD. There are few reports on phases, processes and models of TETPD. It seems that there is a long way for Chinese researchers to go before having developed an approach of their own. There is a lack of research on teachers' learning and learning through the use of technologies in China. The difference between knowledge learning and technology learning has been neglected by designers and practitioners in the practices of teacher training. Training techniques and methods should be improved and new strategies and approaches should be introduced. Some trainings lack proper instructional design. Complex and advanced technologies used to be selected as content of

teacher training. But these technologies seem seldom to be brought into play in teaching and learning of teachers who accepted this kind of training. Therefore, new strategies and approaches, such as participatory training, task-driven training, action research, cases study and problem-based training, could be adopted in teacher training. Traditional pedagogical skills have not been given proper importance, and technologies and teachers professional skills in Networked environments are highly thought of by training designers and teacher-trainers. For example, oral expression, classroom management, questioning, homework design and mark, peer-coaching and mentoring, skills of lesson plan, etc., were overlooked in training. The enthusiasm of teachers of TPD should be encouraged; especially the desire of teachers for autonomous development should be stirred up. Training, based on a model of one size fits all, cannot meet the individual teacher's needs. Teachers, being busy with great pressure for raising the rate of their students enrolled into colleges and universities, have not enough time to update their own knowledge and pedagogy. The links between normal universities or teacher training institutes and K-12 schools should be strengthened. Researchers who work in normal universities or teacher training institutes should be encouraged to do their own researches in classrooms or K-12 school settings.

According to Gu and Lindberg (2009) and Gu (2011), the Swedish government has had sustainable commitment and substantial investment in promoting ICT in schools and encouraging teachers to use ICT for a period of more than 10 years. Both strategic and operational policies are provided at the national level. The strategic policies provide common visions of significant expenditures requited for employing ICT in education; while operational policies, which usually frame as action plans, programs or projects, offer the opportunities to enable theses visions to be reached (Kozma, 2003). Some positive outcomes of this national effort have been the development of ICT infrastructure in Swedish schools, cooperation between schools, municipalities, industry and teacher education, and providing teacher training, especially in-service training that emphasizes on teachers' knowledge and skills needed in using ICT in classroom. In this respect, the effectiveness of a degree of top-down initiatives and companions in putting ICT-related change into the large context of educational innovation and school reforms, especially at the beginning, have been proved.

In Sweden, it seems that ICT has shifted the focus from policies and programs on providing infrastructure and promoting use to effectively use by teachers in classroom to enhance their teaching and thereby the learning of their pupils, which puts new demands on teacher education and TPD. It was stated in Government Directive (2007, p. 103) by the committee for a renewed teacher education in Sweden that the new teacher education should ensure teachers the skills needed for choosing ICT and media for learning. In 2008, the government issued an additional directive (Government Directive, 2008, p. 43) relating teacher education to the eight key competencies for lifelong learning stated by the European Union (2006), and giving especially importance to the responsibility of teacher education, teachers and schools for developing a digital competence for the future Europe. In autumn, 2008, the committee presented its inquiry for a new teacher education program (SOU (Official Government Reports), 2008, p. 109), in which it was stated that ICT should involve in all teacher education programs, and ICT should be used as an educational resource.

Gu and Lindberg (2009) and Gu (2011) also claimed that the lesson Sweden has learnt is that a successful and effective integration of ICT into education needs not only commitment and intervention of the central government, but also full support and initiative participation of the locals and individuals, in which teachers' knowledge and skills on ICT and their attitudes, beliefs as well as abilities of ICT use in teaching and learning play a crucial role. ICT competence should be a central part of the teacher's profession. ICT should not only be

a content of TPD that teachers should learn as their knowledge and skill basis, but also a means of promoting an effective TPD. The power of a bottom-up, long-term, reflective, differential, contextualized, collaborative and pedagogical approach related models of TPD has been stressed recently (Hargreaves, 2006; Villegas-Reimers, 2003), in which a TETPD model could be one of them.

There are a lot of researches and practices, as well as successful cases on TPD and TETPD in China (Jiao et al., 2009) and Sweden (Lindberg & Gu, 2009). An important question to address is how to select cases that would represent TETPD in Sweden and China. The next section will lay out the research design of the project and provide a framework for selecting cases in China and Sweden for further investigating TPD and ICT.

Project Design and Methodology

The project builds on a framework designed to select cases for a multiple case-study (Yin, 1993), and analyzes and compares the similarities and differences among the cases selected in Sweden and China respectively. The framework combines two dimensions: One is the stakeholders of TETPD, such as government driven TETPD, individual teachers, schools and local departments; and The other is the approaches, strategies and methodologies of TETPD used, such as traditional face-to-face dominated, technology supported, virtual communities, etc.. Together these two dimensions form a space for selecting cases. Within this framework, different cases of TPD and TETPD may be designated to one of the four quadrants shown in Figure 1.

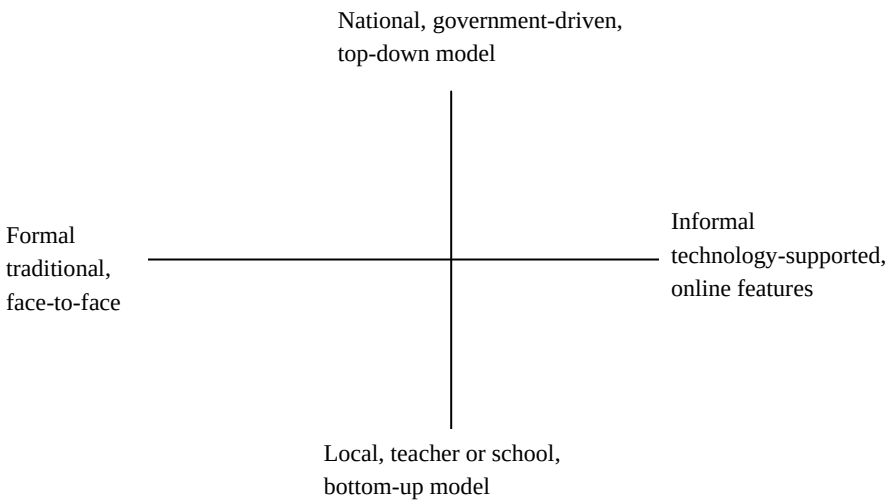

Figure 1. Two dimensions of TPD used for selecting cases.

Firstly, it is the distinction between top-down models and programs and bottom-up models and programs. On the upper part of horizontal axis, TPD is initiated and driven by national or governmental initiatives, and on the lower part, TPD is spontaneous or controlled by individual teachers, specific schools or local educational departments.

Secondly, it concerns the issue of formal-informal models or programs. On the left side of the vertical axis, technologies, such as computer technology, multimedia, Internet, etc., are considered in a traditional sense as content and subject matter of TPD. These are what teachers should learn. On the right side, technologies are used as approaches, methods, environments and strategies to improve TPD. This side represents technology that teachers use to learn in different ways.

In accordance with the framework, four cases of TETPD in Sweden and China are selected. By relating

the cases back to some facets that may be identified in the background and policies regarding TPD and ICT, the paper will end in a discussion of the possibilities for TETPD within each of these four different cases. The cases will be described in the following.

Brief Presentation of Four Chinese Cases, Following Jiao et al. (2009)

Case 1: NPBKTCET (national plan for building-up K-12 teachers' competence of educational technology). In April of 2005, The MOE (Ministry of Education) issued the Notice of Launch of NPBKTCET, with the purpose of applying ICT to teaching and learning in K-12 schools. Its aim is to markedly improve K-12 teachers' competences of educational technology, promote the effectively use of ICT in teaching, help teachers change their pedagogies and teaching methods, improve the quality of teaching and learning and thereby develop basic education in China (MOE, 2005).

In July of 2005, the MOE launched a pilot project of new curriculum reform in nine provinces including Liaoning, Jiangsu, Henan, Guangxi, Hainan, Chongqing, Sichuan, Yunnan and Ningxia. From July of 2006, new curriculum reform has been carried out in all-round in the whole nation.

NPBKTCET can be divided into two parts: train and examination. The examination of CETS (competence of educational technology) was organized and implemented by the National Test Center under the MOE. In August of 2006, the NPBKTCET's official Website (Retrieved from http//www.teta.com.cn) was launched, and its office was established by MOE in September (MOE, 2005). Training activities were organized and the first national test was held in November. From then on, this kind of test is held twice a year.

The NPBKTCET is a top-down project. The stakeholders of NPBKTCET are the central government and local educational authorities. All K-12 teachers are required to participate in its training activities including face-to-face sessions and online sessions, and pass its national test. Its supporting Websites both at the national level and the provincial level have been designed and developed. It is a one-fits-all model for TPD.

Case 2: NANTE (national associates for networked teachers' education). In order to push forward the innovation of teacher education and improve the quality of teachers and staff, the MOE launched the Plan of NANTE in September of 2004. The NANTE is a joint enterprise of institutes of distance education, a confederation of 13 organizations and institutes which are involved in Networked education for teacher education (MOE, 2003).

Eight normal universities are included: Beijing Normal University, East China Normal University, North Eastern Normal University, Central China Normal University, Southwestern University, Shanxi Normal University, Fujian Normal University and South China Normal University; A mega-university focused on distance education, Central Radio and TV University, an National Educational TV Station, China Educational TV and two publishing houses—Higher Education Press and Peoples' Education Press.

On the official Website of NANTE (Retrieved from http//www.jswl.cn), there are different modules, such as teachers training, head teachers training, resources centre, TPD, rural education, educational news, trends of K-12 curriculum reform, international educational review, policies and regulations, ICT skills training, etc.. It has been a professional portal and hub for TPD.

NANTE is a loose organization associated with the department of teacher education under the MOE (MOE, 2003). Its approach is a top-down way to help teachers with professional development. Its effects and impacts on TPD are under observation in the future.

Case 3: Tianhe blogosphere. Tianhe Blogosphere in Chinese (Retrieved from http//www.thjy.edu.cn) is

one of the top four regional platforms for teachers to communicate and share experiences concerning teaching in China. It has been known as one of the four teachers blogospheres (the others being Zibo blog for teaching research, Suzhou Educational Blogosphere and Haiyan Teachers' Blogosphere), named as the Tianhe Blogosphere Phenomenon. The Blog was originally used by teachers in the Tianhe District of Guangzhou City. At present, it has attracted more than 10,000 of teachers from other areas in China.

The Tianhe Blogosphere is an important channel and approach for TPD. By April 7th, 2009, there has been 14,026 K-12 teachers exchanging their professional experiences, affective interaction, ideas and thoughts, showing their own talents and competence on the Tianhe Blogosphere all over the country. A lot of bloggers tell their own stories and life in schools, post their own lesson plans and syllabus to collect suggestions and advice from others online, accumulate successful cases and improve their own tacit knowledge and wisdom. The total posts' numbers in the blogosphere added up to 229,019, since it was built in February, 2005. Today, more and more students in K-12 schools, undergraduates from teachers' colleges and normal universities, and in-service teachers from all over the country, are attracted to it.

As such, blogs are important part of the rapidly developing Web 2.0 phenomenon that revolutionizes the current World Wide Web. As a founder of Tianhe Blogosphere, Mr. Zhang Weichun said that Tianhe Blogosphere is not only a technological system, but also a communicative mechanism and management system, as well as a culture of TPD (Ruan, 2007). Not only teachers are active on the Tianhe Blogosphere, more and more students join in it too.

Tianhe Blogosphere changed the model of TPD from a top-down, centralized model of TETPD to a bottom-up, autonomous and spontaneous model. It combined teaching and research, teacher resources development, teachers' practical reflection, school-based training as well as quality monitoring of teaching and learning in one system. It strengthens communications among teachers, students and parents. The blogosphere is unique in that it is a place where everyone can share his/her thoughts and spread his/her views. This personalized aspect seems very important for teachers.

Case 4: John Wu (Bingjian Wu). John is a former English teacher at Zhixin Primary School in Shaoguan City of Guangdong Province with a special Website (Retrieved from http//www.teacherweb.com/CH/Zhixin/JohnWu) for teachers. He has taught English to students from grade four to six for more than 10 years. In those years, John linked his class to classes from 26 different countries via different technologies, from air mail to e-mail, Website, etc.. His students benefited from his exploration, while he progressed in his own professional development. Later, he was transferred to the teaching and research division under Shaoguan Department of Education. He is in charge of guiding English teachers at primary schools in Shaoguan City.

In the summer of 1994, Bingjian Wu (John), a 22-year-old English teacher at the Zhixin Primary School of Shaoguan, participated in an English seminar sponsored by Shaoguan University. At the seminar, he met Rhonda Rolf, an elementary school teacher from Temple City. Both were enthusiastic about their work, and they had much experience to share. Later, Wu and Rolf worked out a feasible pen pal program. John Wu put much extra effort into the program, because his students had difficulty in writing in English. In 1997, Rolf introduced John to her former teaching colleague, Mrs. Jackson. Jackson introduced a colleague of her who worked at another school, Mrs. Fikac… This process went on and more and more teachers from different countries and their classes were involved.

Mostly, the children's letters have been about their school life, birthday parties, pets, family members, hobbies, festivals, favorite pop stars, religion and current events they had seen on news broadcasts. Sometimes

with their letters, the children enclose small gifts, such as photographs of themselves and their families, postcards, maps, paintings created by them, handicrafts and reading materials that depict life in their countries (Xiang, 1999). Through pen pal communication, John created a natural and real environment of English language learning for his classes, fulfilled language interactions and made his students experience a fancy English learning.

At that time, computers were really expensive for people there and the Internet was not available. John and his students wrote air mails to their pen pals. Later, John bought a computer and developed Websites to improve cross-cultural communication. John is a self-regulated teacher with high achievement motivation. He continuously strives to develop professionally and change his teaching and learning.

These four cases are not intended to be representatives of all cases of TETPD or present a comprehensive overview of all possible cases to select in China in this fast changing field. But within each case, both special and typical characteristics are included, and they display variation in the two dimensions of the framework used for selecting cases.

Brief Description of Four Swedish Cases, Following Lindberg and Gu (2009)

Case 1: ITiS (National programme for ICT in schools). The ITiS was initiated in 1999 by the government and the program ran from 1999 to 2002 (Jedeskog, 2005). The program was building on prior programs of TPD using ICT, and people involved in the program were recruited as facilitators in the ITiS program from prior programs. Actually, all Swedish schools were involved in the ITiS program. The program consisted of seven components to improve teachers' ICT literacy: in-service training; a multimedia computer for each participant; state grants to improve Internet accessibility for the schools; state grants to ensure all teachers and pupils having e-mail addresses; support for developing the Swedish Schoolnet and the European Schoolnet; special measures for pupils with special needs; and awards for excellent pedagogical contributions. Teachers and school managers were offered an ICT course to acquaint them with the potential use of ICT as an educational tool. All 289 Swedish municipalities chose to participate. Training was to be arranged flexibly, in form of intensive courses, study circles or seminars. Training was to be held regionally, adapted to regional conditions. A management group, representing teacher training institutions, regional educational development centers and local municipalities, coordinated a regional network. Training was offered for facilitators, principals, administrative heads and politicians. Facilitators were trained to gain insights into how to chair seminars and to support teams of teachers in developing their learning. Training for principals was intended to give them insights into their roles in implementation of development work in schools. The training consisted of both theoretical and practical parts. Practical parts were development projects carried out in teacher teams and with pupils. Theoretical parts were centered in three areas: ICT in the world; ICT and learning; and ICT in practice. The in-service training was aligned with the pedagogical approaches set out in the national curriculum, such as a shift from teaching to learning, giving pupils more responsibility, interdisciplinary approaches to teaching in teams and a problem based pupils-oriented pedagogy. Every teacher team summarized their work in a final report, in order to reflect personal learning and development during the in-service training. Focus was on the team and not the individual teacher. Finding good models for in-service training was time consuming. Benefits from the ITiS model were time for reflection and cooperation with colleagues in seminars. The basic requirements were team work, problem-based learning and lifelong learning.

Case 2: The National TPD program "Lifting the Teachers" (Lärarlyftet). In 2007, the government

took the initiative to form the National TPD program “Lifting the Teachers” (Retrieved from http://www.skolverket.se). The program was set to run between year 2007 and 2010 and included teachers working in almost all aspects of the Swedish K-12 school system. Improving schools is one of the major motives for the program. In the national evaluations conducted by the Swedish National Agency for Education, the outcome of the students’ performance in several subject areas has decreased in 2003 compared to the result from 1995 and 1992 evaluations. Research that is claimed by the government has shown that the competence of the teacher is one of the most important factors for the performance of the students. Therefore, the teachers are in need of TPD. The focus of the program should be on the teachers’ subject knowledge and their didactical competence, as well as other relevant TPD that might benefit the students’ performance. The TPD will be held by the universities appointed the task by the Swedish National Agency for Education. The TPD-courses, which are to be held, are not all given at all universities, the Agency will select those universities and colleges who have the best conditions. This means that the courses to be held must be given in an open and flexible mode, allowing participants from many different regions of the country who are in need of specific courses. Many courses will be given as distance courses using ICT as educational support. Teachers apply for the courses at the universities, but they need approval from their principals and municipalities before entering the program. This also means that there is a rather large individual influence from the teachers themselves to search for appropriate courses, but at the same time the municipality will have the final words before the teachers could start their TPD.

Case 3: The online learning community (Lektion.se). Lektion.se is, according to the Website (Retrieved from http://www.lektion.se), a Web-based teaching material resource produced for teachers by teachers. It is a database of lessons and materials free for use where teachers are voluntarily sharing among themselves. Lektion.se is the largest online community for teachers, teacher trainees and other stakeholders in Sweden, sharing an interest in the practice of schools. Its history dates back to 2003, and originally, the community was built in order to make possible for teachers to publish, search and download lesson plans. Activities that are provided free of charge, are member driven and flexible in time and space. There are different resources provided for the members. Lektion.se contains an online forum where teachers communicate with other teachers actively on the site in a community, as well as providing publishing houses and other producers of educational materials as a way to reach a large group of teachers. In the community, it is also included a database of work opportunities. The forum contains almost 20 smaller sub-forums where discussions have been available for the members for several years. The discussions in the forums are built up by threads, and everyone has the possibilities to get a notice each time a new message is written in the forums one chooses to follow. Additionally, there is the possibility to create one’s own page and construct private networks or groups. Lektion.se is with its idea and target group a unique OLC (on-line learning community) in Sweden. Many groups of stakeholders of the Swedish schools are active in different discussions. Among others, one can find teachers working in pre-school, compulsory school, upper secondary school and different kinds of adult education. In addition, school leaders and school politicians are participating in the discussions.

Case 4: PIM (practical ICT and media skills, a service from the Swedish National Agency for Education).The Swedish National Agency for Education provides an Internet-based tool for the Swedish schools in order to give them increasing access to new tools in schools, such as digital cameras, projectors and other teaching resources on the Internet. In the PIM brochure (Retrieved from http://www.skolverket.se), it is stated that PIM offers the opportunity to enhance and broaden skills in the field of ICT use, both on one’s own

and together with others. PIM consists of 10 guides in which teachers with experience of working in schools describe how IT and media can be used. The guides cover different topics, from mailings for a meeting with parents, search techniques and source criticism on the Internet, and compile images and music to create slideshows. The guides provide “step-by-step” support, showing how to work with computers. For all sections, there are exercises, which can be done alone or together with colleagues. As an Internet resource, studying the content in PIM can be done whenever it is suitable. PIM also contains a study map, which shows different routes that can be taken through the courses, depending on what level of competence that is strived for. If a municipality wishes to implement more wide ranging skills for its staff, PIM can be used to give teachers the opportunity for examination in practical information technology and media skills. Examinations take place under the auspices of the municipality and are attainable at five different levels: Individual level, working group level, teaching in the modern classroom, resources for individual schools and resources in the municipality. These examinations are based on both practical skills and theoretical knowledge. The Swedish National Agency for Education creates the examination environment for the municipality on the Internet and trains the future examinees.

As with the Chinese cases, the Swedish cases are not exhaustive of all models and programs for TPD and TETPD in Sweden. But they display variation within the framework in a similar manner as the Chinese making a comparison between them possible, at least on some features.

Comparing the Swedish and Chinese Cases on Some Features

Another question to address is how to compare these cases and make as much use of their similarities and differences in the multiple-case design. For each case to be better understood each case is discussed from the following four features and sub-sequent questions:

(1) Stakeholders: Who or what kind of organizations aid, finance and organize the practices of TETPD?

(2) Features and characteristics: What are the behavioral features and characteristics of teachers, educators and organizers involved in the TETPD?

(3) Primary technologies: What kinds of technologies are used, and what roles and functions do technologies play in the TETPD?

(4) Effect and evaluation: What are the assessment and evaluation of the TETPD, in terms of comments from teachers who are involved, input-output analysis, etc.?

In Tables 1 and 2, the four Swedish and Chinese cases respectively are presented in a short comparison of the four features above.

Table 1

The Chinese Cases Compared to Four Features

	Case 1: NPBKCET	Case 2: NANTE	Case 3: Tianhe blogosphere	Case 4: John Wu
Stakeholders	Central government	Common wealth of institutes and central government	Local education departments and teachers	A teacher
Features and characteristics	Top-down Compulsory	Semi-government,	Teachers and schools are encouraged and attracted	Personal subjective
Primary technologies	Face-to-face training and Websites	Online community, Website with resources	Online community based blog, workshops	Air mail and e-mail, IM (instant message) tools and Website, etc.
Effect and evaluation	National, one-fits-all	To be investigated	Neighbors help neighbors	Personal effective

Table 2

The Swedish Cases Compared to Four Features

	Case 1: ITiS	Case 2: Lifting the teachers	Case 3: Lektion.se	Case 4: PIM
Stakeholders	Government but voluntarily participation of municipalities	Government, but voluntarily participation of teachers	Personal	Local, voluntarily participation from municipalities and teachers
Features and characteristics	Top-down model, but support for local adjustments	Top-down model	Bottom-up approach	Top-down model, with support for bottom-up use
Primary technologies	Face-to-face training	Face-to-face training combined with distance education technologies	Online community	Online tool
Effect and evaluation	National, municipality and teachers	National teachers	Not yet investigated	Local municipality and teachers

Discussion and Conclusions

So, what could be said about these cases and their potential for being programmes or models of TETPD? In Gu and Lindberg (2009), Jiao et al. (2009), Jiao et al. (2009) and Lindberg and Gu (2009), the following points were made.

In the Chinese cases, NPBKTCET can be regarded as a top-down, one-fits-all model of TPD. All K-12 teachers are required to accept training and pass the test. Face-to-face training is the dominant approach. In case 2, NANTE, is a mixture with real institutes and community of practice. It is funded and supported by the government. A Website with abundant resources, as a virtual community of teachers, has been created. In case 3, the Tianhe blogosphere is a model which satisfies the needs of teachers, schools and local educational authorities. More and more teachers have been involved in it. In case 4, John Wu is a special case of a teacher who tried to find more room for his/her own development and sharing this experience through the Internet.

Among these four Chinese cases, different technologies are used to improve TPD. But "Introducing new technology alone is never enough. The big spurts in productivity come when a new technology is combined with new ways of doing business" (Freidman, 2005). That means, only when ICT and new ways of teaching, learning and professional developing are dynamically integrated, TETPD will truly promote the growth of teachers to enhance teaching quality and efficiency.

As for the four Swedish cases, the case of ITiS seems to be such a model, where a government initiative provides a framework for the integration of ICT in teaching and learning leading to professional development at teacher level. The long-term effects of ITiS are yet to be investigated. The case of Lektion.se has also several features that have a potential to be a powerful model of TETPD. What are yet to be investigated in the case of Lektion.se are the effects that the teachers' participation based on their school practice, i.e., their own teaching and learning. The case of PIM also seems to have a potential to be a model which could provide technology enhanced TPD for teachers. The case, which seems to be most traditional and furthest from a TPD that might use technology to enhance the teaching and learning, is the latest initiative "lifting the teachers". In this case, there are several features of the model that remind of the identified barriers of effective TPD.

The cases provide the ground for claiming that there could not be one given model for TETPD. As it was expressed by Darling-Hammond and Hammerness (2005), "In the recent past, many teacher education programs have been criticized for being overly theoretical, having little connection to practice, offering fragmented and incoherent courses, and lacking in a clear, sharing conception of teaching among faculty" (p.

391). The specific aspects of each case might provide a sound basis for adhering to Darling-Hammonds and Hammerness' point. Learning about practice could be done in practice, in technologies enriched settings, in professional communities of teachers and learning by doing designed and effectively integrated in models of TETPD drawing on a more in depth comparison of these cases. Deng Xiaoping said that it does not matter whether the cat is black or white, as long as it catches mice. For educators, the most important thing is to explore, compare and introduce approaches, strategies and models to improve TPD, especially which is enhanced by ICT.

TPD that is anchored in participation, collaborative activities and dialogue intertwine possibilities for a professional development that offers a way to bridge theory and practice and enhance teaching and learning. Productive arenas for this purpose may be identified in the forthcoming comparisons, as well as arenas for integrating the possibilities that the technology of today affords. Several cases of such TPD are included in the project, enterprises in which technology as innovation will have a crucial place both as leverage and catalyst of change, and as a pedagogical tool in itself. In such enterprises, TETPD may be realised.

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