Computers & Education 56 (2011) 974–982

Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

ICT in teacher education in an emerging developing country: Vietnam's baseline situation at the start of 'The Year of ICT'

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ARTICLE INFO

Article history:
Received 17 January 2010
Received in revised form
28 September 2010
Accepted 25 November 2010

Keywords:
Country-specific developments
Improving classroom teaching
Pedagogical issues
Cross-cultural projects
Integration of ICT

ABSTRACT

In many developing countries, integration of ICT is a key component of an educational reform agenda. These countries can draw on a tradition of research in the developed world on factors determining integration of ICT in education. In this tradition, this study investigates the current situation of ICT integration in teacher education in Vietnam, an emerging developing country at the beginning of integrating ICT in education. 783 educators of five Vietnamese teacher education institutions completed a questionnaire. This analysis illuminates teacher educators' access to ICT, their intensity of use, their related skills, and their confidence in using ICT, as well as their conceptions of learning. Exploratory multiple regression analysis addresses the importance of these different factors at the level of the educator for use of ICT in teaching practice. Even though teacher educators adhere to a constructivist approach to student learning, the use of ICT applications in teaching practice remains limited, mostly replacing traditional teaching practices. The factors currently determining the use of ICT in teaching practice are ICT skills ($\beta = .522$) and computer confidence ($\beta = .158$). Suggestions are provided for the country to move beyond an access and skills based approach of integration of ICT in education and for emerging developing countries to cease the promise of ICT for education.

1. Introduction

Worldwide, integrating Information and Communication Technology (ICT) in teaching and learning is high on the educational reform agenda. Often ICT is seen as an indispensable tool to fully participate in the knowledge society. ICTs need to be seen as "an essential aspect of teaching's cultural toolkit in the twenty-first century, affording new and transformative models of development" (Leach, 2005). Also developing countries are investing in ICT. Especially also Asian governments recognize that this can be the way to enable pupils to connect to knowledge available in the wider world and become active processors rather than passive recipients of this knowledge (Latchem & Jung, 2010). There is a large body of research on factors determining the integration of ICT in education, mainly emerging from research in developed countries. Emerging developing countries can draw on this research. Hawkridge (1990) already advised that nations need to pause for reflection and that policies on integration of ICT in education need to be tested.

Vietnam is an interesting case for research on integration of ICT. In the latest ICT Development Index Vietnam received special attention as, from 2002 to 2007, the country has jumped 15 spots on a worldwide list measuring ICT development, putting it amongst the top 10 developing countries (International Telecommunication Union, 2009). The Vietnamese government, the highest organ of state administration, sees ICT as a driving force for socio-economic development (International Telecommunication Union, 2009). In 2000, The Ministry of Education and Training (MOET) announced its Master Plan for ICT in education for the period 2001–2005, mainly targeting infrastructural development and IT training. UNESCO's country report for Vietnam stated that the country had been eager to be a hub for ICT development in South-East Asia, but observed that efforts seemed to be tinkering with the establishment of infrastructure to secure greater access for the Vietnamese to ICTs (Farrel & Wacholz, 2003).

Worldwide, Ministries of Education have been changing their priorities when it comes to integration of ICT in education (Hawkridge, 1990). Developed countries in Asia strongly endorse and support ICT as an essential component of innovative student-centered

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doi:10.1016/j.compedu.2010.11.015

pedagogy (Latchem & Jung, 2010). With directive 55 (MOET, 2008b), an educational reform rationale puts the emphasis in that direction in Vietnam too. In the context of the movement for friendly schools and active students (MOET, 2008a) the role of ICT is conceptualized as to support educational renovation towards a creative learning society. In the school year 2008–2009 the MOET launched 'The Year of ICT' in education. Educators in Vietnam were encouraged to reasonably implement ICT applications as part of new and innovative methods of teaching and learning (MOET, 2008b). As Hawkridge (1990) believed and foresaw more than two decades ago, this is now an absorbing and intellectually exciting period as developed and developing countries "shake out the wrinkles" and decide exactly what they want to do, why, and whether they can afford it.

2. Background

2.1. ICT and educational change

Although many countries are still at the beginning of using new technologies, its use in education cannot be underestimated (Carnoy & Rhoten, 2002). It is assumed that ICT can bring revolutionary change in teaching methodologies. The innovation lies not per se in the introduction and use of ICT, but in its role as a contributor towards a student-centered form of teaching and learning (Scrimshaw, 2004). Researchers warn to be cautious when speaking of the affordances of new technologies and when assuming that a given medium or technology will automatically afford particular learning outcomes since there is nothing inherent in technology that automatically guarantees learning (John & Sutherland, 2005). In developed countries, a number of critiques on the use of ICT in education have emerged. Two particular observations serve to temper expectations: first, there has been a disappointingly slow uptake of ICT in education even though high investments have taken place in improving access to technologies and in improving the skills of teachers and learners; secondly, there hasn't been an educational revolution in teaching and learning (Selwyn, 2007). So far, computers have not transformed teaching practices (Becker, 2000). Researchers, such as Kirkup and Kirkwood (2005), indicate an abundance of computers and technological infrastructure in higher education institutions. But in campus- based contexts, teaching staff learn to use those technologies, which can be incorporated into their teaching activities most easily, rather than those which could most radically change teaching and learning practices (Kirkup & Kirkwood, 2005).

2.2. Influencing/constraining factors for the use of ICT for teaching practice

Much research in the developed world has been done to find out what goes wrong, attempting to grasp what factors are influencing or constraining integration of ICT in education in general and the use of ICT for teaching practice in particular. In a framework addressing challenges to classroom technology use, Groff and Mouza (2008) distinguish between critical factors including legislative level factors, district and school level factors, factors associated with students and teachers, factors inherent to the technology itself, and factors associated with the technology-enhanced project. Mumtaz (2000) distinguishes three interlocking factors: institution, resources, and teachers. Ten Brummelhuis (in Drent & Meelissen, 2008) categorizes factors into those which can be manipulated and those which cannot be manipulated. At the school level, important contextual factors include the socio-cultural setting of a school and structural characteristics like government ICT policy, ICT infrastructure and school type. At the level of the teacher, two types of barriers are common; external or first-order barriers, such as limited resources or lack of technical support, and internal or second-order barriers, which include teachers' attitudes to ICT (Snoeyink and Ertmer in Jones, 2004).

2.3. Study purpose

In this research tradition, we now aim to assess to what extent ICT is integrated in teacher education in an emerging developing country. We focus on an assessment of the use of ICT in teaching practice and determining factors on the level of the educator. Based on research literature (see Section 2.4–2.6) we developed our research model in Fig. 1. Use of ICT in teaching practice is the dependent variable. Non-manipulative factors are gender, age and teaching subject. Influencing first-order manipulative factors are access to ICT, intensity of use,

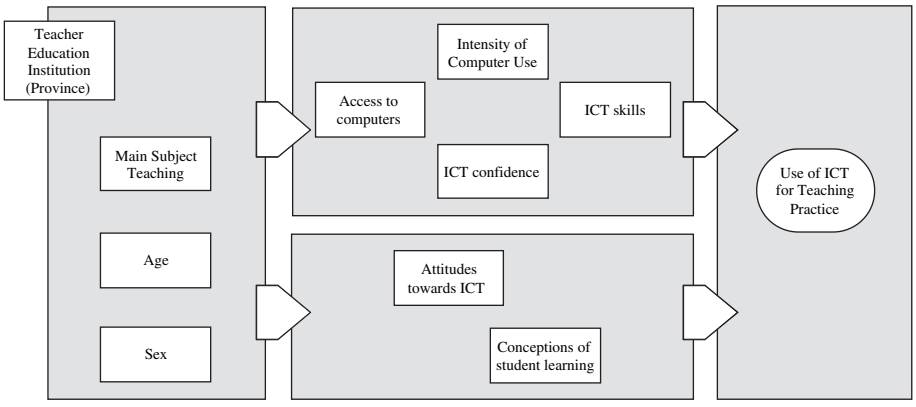

Fig. 1. Model of influencing/constraining factors for the use of ICT for teaching practice.

confidence, and skills. Second-order or internal factors are perceived values of ICT and conceptions of student learning. Province gives an indication of the additional influence of contextual factors at the level of the individual teacher education institution.

In the first place we aim to describe to which extent ICT is used in teacher education in Vietnam at the start of 'The Year of ICT' and the state of the art regarding the factors in the research model described above. The second aim of the study is to assess the effect of these various factors on the use of ICT for teaching. In particular, we aim to estimate the influence of external and internal manipulative factors at the level of the educator. This information will allow us to reflect on which factors to target and on the appropriate strategies to integrate ICT into teacher education in Vietnam and other developing countries.

In what follows we draw the theoretical background of this research, reflecting in turn on the factors of access, confidence, and skills (Section 2.4). In additions, we look at research on digital divides (Section 2.5) and on the role of attitudes towards ICT and educational beliefs (Section 2.6).

2.4. Barriers of access, confidence and skills

Researchers like Mumtaz (2000) point out that a lack of computers and software can seriously limit what teachers can do in the classroom with regards to integration of ICT. Access to ICT is obviously a first and necessary step in the integration process. According to Campbell (in Alampay, 2006) the digital divide refers to situations in which there is a marked gap in access to or the use of ICT devices. Other crucial barriers to the integration of ICT are ICT competence, or skills, and ICT confidence. A very significant determinant of teachers' levels of engagement in ICT is their level of confidence in using the technologies. Teachers who have little or no confidence in using computers in their work will try to avoid them altogether (Dawes, 2000; Larner and Timberlake, 1995; Russell and Bradly, 1997 in Jones, 2004). Jones' review demonstrates that there is a close relationship between barriers to the integration of ICT. A lack of personal access, technical problems, or a lack of teacher competence can lead directly to a lack of teacher confidence, but, in turn, a lack of confidence could itself magnify the effects of these three barriers (Jones, 2004).

2.5. Digital divides

Individual differences between educators influence access to ICT, use, confidence and skills (Jones, 2004). Often non-manipulative factors at the level of the teacher like age and gender are described (Cooper, 2006; Meelissen & Drent, 2008; Prensky, 2001; Todman & Day, 2006). Computer anxiety is often highlighted as the fundamental problem behind the digital gender divide (Cooper, 2006; Todman & Day, 2006). However, there are contradictions in research about the influence of gender on the use of ICT and even the very notion that there is a gender problem is problematic for a number of commentators (Abbiss, 2008). Furthermore, age can influence the uptake of ICT for teaching (Jones, 2004). Prensky (2001) distinguishes between ICT natives, who are born in a digital world, and digital immigrants who have to learn the digital language and for whom ICT will always be a second language. Apart from gender and age, the teachers' subject domain may influence the use of ICT. John (2005) argues that school subject cultures are built on deep traditions and that these need to be addressed if ICT is to become more embedded in the curriculum of schools. The way ICT is used in lessons is influenced by teachers' knowledge about their subject and how ICT is related to it (Cox et al., 2003).

2.6. Attitudes towards ICT and educational beliefs

It is believed that at the core of *effective* integration of ICT in teaching and learning, lie capacities which go beyond mere access and ICT literacy. Ertmer (in Jones, 2004) states that there is little point in providing large quantities of equipment if teachers do not have the attitudes necessary to change their classroom practices. In developed countries, many researchers therefore move from investigating environmental barriers of access to individual teacher characteristics like beliefs and attitudes (Hermans, Tondeur, van Braak, & Valcke, 2008; Mueller, Wood, Willoughby, Ross, & Specht, 2008). One key area of teachers' attitudes towards ICT is their understanding of how it will benefit their work and their students' learning (Jones, 2004). Cox (2008) expresses the need to measure, among other factors, teachers' beliefs and understanding of the role of IT within the subject being taught. Kirkup and Kirkwood (2005) distinguish innovators, who are enthusiastic for the technology as valuable itself, and later adopters who are less interested in the technology and need evidence that it will improve their lives or work. Hermans et al. (2008) shed light on the mediating role of teachers' educational beliefs in the resistance and receptiveness to integrate computers in classroom practice. Mumtaz (2000) concludes in a meta-analysis that teachers' own theories about teaching are central in influencing them to use ICT in their teaching. A number of commentators suggest that teachers' educational beliefs can form barriers to ICT integration (Ertmer in Hermans et al., 2008), while, alternatively, Becker (in Hermans et al., 2008) suggests that highly active computer users appear to adopt a constructivist position, despite inconsistent findings (Chen, 2008; Mueller et al., 2008). Positive attitudes towards ICT or constructivist perspectives on learning will not automatically lead to the uptake of ICT or innovative teaching practice as Judson (2006) suggests that there may be little correlation between stated beliefs and actual practice.

3. Methodology

3.1. Participants and data collection

Five teacher education institutions from north and central Vietnam participated in the research. These institutions are partner institutions in a development cooperation program contributing to improved quality of education through integration of ICT in teaching and learning. The choice of the five provincial institutions as partner institutions was led by criteria of equity and quality of education of the MOET. The institutions are representative for teacher education institutions in Vietnam and eventually take a pioneering role in their respective province on integration of ICT in education.

Data collection took place at the beginning of the school year 2008–2009, 'The Year of ICT', using a self-report questionnaire presented to all staff members working in the five teacher education institutions. The questionnaire was developed based on literature and consists of a set of

existing measurement instruments and scales on factors determining integration of ICT (see Section 5). The final questionnaire was translated into Vietnamese and re-translated afterwards into English in order to check for any mistakes and misunderstandings as the result of different linguistic or cultural interpretations. Any such interpretations were discussed with Vietnamese ICT experts. In total 783 questionnaires were filled out by respondents during plenary sessions in the five teacher education institutions, resulting in a response rate of 91%.

At the start of the school year 2008–2009 the five institutions were also instructed to develop a technology plan, following the Planning Guide on ICT in Teacher Education (UNESCO, 2002). These Technology Plans were written by educational managers and ICT coordinators of the five institutions to address different operational components of integration of ICT. Questionnaire data on access to ICT on the level of the educator is supplemented with information from these technology plans.

3.2. Data analysis

With regard to the first research aim, descriptive analysis of the questionnaire data were applied to draw a picture of the situation of teacher education institutions in Vietnam concerning teacher educators' use of ICT for teaching practice as well as access to ICT, intensity of use, ICT skills and confidence, and teacher educators' attitudes towards ICT and their conceptions of student learning. Data from the technology plans was used to give extra information concerning availability of technologies for teaching such as data projectors and screens.

Exploratory multiple regression analysis was applied to analyse the influence of the non-manipulative and manipulative external and internal factors at the level of the educator on use of ICT in teaching practice. A hierarchy of sets of independent variables was formed and tests were carried out on the significance of increments to R^2 by means of the F ratio. The hierarchy of sets is an important part of the investigator's hypothesis statement (Cohen, 1968). In our research we started with non-manipulative variables at the level of the teacher educator (set 1). These variables were expected to be relevant to the dependent variable, but had to be controlled when measuring the contribution of manipulative teacher-level factors. In the first place we wanted to assess the importance of external manipulative factors (set 2) after which we wanted to assess the net influence of the internal manipulative factors (set 3). We finally wanted to reflect on the importance of the educator's institution of employment (set 4).

4. Variables

The questionnaire consists of a set of measurement instruments and scales which are based on existing scales to measure the described influencing/constraining factors and the dependent variable (see Research Model, Fig. 1). The final questionnaire consists of 123 items. Descriptive statistics and reliability coefficients as well as example items for all scales can be found in Table 1.

4.1. Non-manipulative variables

Main teaching subject, gender, and age are all included in the questionnaire. All respondents received a code which links them to their respective provincial teacher education institution.

4.2. Access to computers and intensity of use

Given the particular context of a developing country, at the very beginning of integration of ICT in education, access to computers and intensity of use is measured using the list of ICT Core Indicators, developed by the Partnership on Measuring ICT for Development, an international, multi-stakeholder initiative to improve the availability and quality of ICT data and indicators, particularly in developing countries (UNCTAD, 2005, 2007). Access to computers can vary: teacher educators may, or may not, have access to a computer at home and/or in their teacher education institution and when they do have access this may be for their own individual use, or to share with others. Concerning access to the internet, teacher educators may have access both at home and at their teacher education institution, only at home, only in their teacher education institution, or only in other places. Computers can be used with different intensity. When respondents reported that they had used a computer in the last 6 months of the last semester, they were asked whether they used the computer on a daily, weekly, or monthly basis. In addition, a difference can be made between using a computer for general purposes and using a computer only for the purpose of work. This informs us about the added value or the opportunities it creates.

Table 1
Descriptive statistics, reliability coefficients and example items of used scales.

	N	α	M	SD
Computer skills				
E.g. I can send an attachment via e-mail	19	.951	64.55	18.367
Basic computer skills	7	.859	25.79	6.341
Internet skills	7	.909	22.23	7.850
Maintenance and security skills	5	.842	16.13	5.365
Computer confidence				
E.g. I can make the computer do what I want it to do	7	.801	27.46	7.633
Cognitive attitudes towards ICT				
E.g. Computers would help students work with one another	15	.724	80.32	9.166
Conceptions of learning: learning as intake of knowledge				
E.g. Students have to know definitions and other facts by heart	9	.523	32.29	3.774
Conceptions of learning: learning as construction of knowledge				
E.g. Students should take the initiative themselves to look for connections in the subject matter	8	.710	34.38	3.151
Use of ICT for teaching practice				
E.g. Word processing for production of documents (e.g. overhead transparencies and handouts)	7	.869	9.56	5.130

4.3. ICT skills and computer confidence

A computer competence scale (five-point scale) is included based on qualitative indexes of van Braak (2004), which is a self-perceived computer competence scale. This index focuses on the in-depth knowledge of ICT skills. Three different subscales are included in the questionnaire and measure different ICT skills: competence in basic software applications; Internet skills (use and design); and maintenance and ICT security skills. Within the subscales, respondents were asked to indicate their knowledge of basic operations. A seven-point Likert scale is used to measure computer confidence with high scores indicating comfort in the use of a computer and perceived control over the computer (Kay, 1993).

4.4. Cognitive attitude towards ICT

The cognitive attitude towards ICT scale is a subscale of the computer attitude scale developed by Kay (1993). It is a self-report measure expressing the perceived value of computers on a seven-point Likert scale, while three subscales, included in the questionnaire, measure perceived value of computers in general, perceived value of computers for personal life and perceived value of computers for students.

4.5. Conceptions of learning

Vermunt and Vermetten (2004) define conceptions of learning as a coherent system of knowledge and beliefs about learning related phenomena. They distinguish five conceptions of learning: construction of knowledge, intake of knowledge, use of knowledge, stimulating education, and cooperative learning. In this study only two conceptions of learning are assessed and included in the questionnaire, due to pragmatic reasons: 'Construction of knowledge' and 'Intake of knowledge'. The first refers to conceptions of learning as constructing of own knowledge and insights. Most learning activities are seen as tasks of students. 'Intake of knowledge' refers to conceptions of learning as taking in knowledge provided by education through memorizing and reproducing; other learning activities are seen as tasks of teachers (Vermunt & Vermetten, 2004). Respondents were asked to indicate on a five-point scale the degree to which the described views and motives, in the form of statements, correspond to their educational beliefs.

4.6. Use of ICT for teaching practice

One of the characteristics of innovative use of ICT for teaching according to Drent and Meelissen (2008) is that there is variation in ICT use: different ICT applications are combined. When only one application is used, it is less likely that the teacher educator has fully-integrated ICT in support of student-oriented educational practice (Drent & Meelissen, 2008). A four-point scale is developed and included in the questionnaire. The scale, inspired by Simpson and Payne (1998) and Simpson, Payne, Munro and Hughes (1999), consists of items which gradually address more innovative ICT applications for teaching practice. The use of 'word processing software for production of documents' or 'presentation software for lecturing' is replacing traditional practices of hand-written preparations and overhead slides. ICT can be used as a source of information e.g. through the use of 'CD-ROM/DVD as resource material during lecturing' or the 'internet as source of information.' 'Integration of subject specific software in lessons' or 'electronic communication with students', can add more value to teaching and learning. One item asks about the 'use of classroom management software' in teaching practice. High scores on the scale indicate a more regular and more diversified use of ICT for teaching practice.

5. Results

5.1. Reliability of developed scales

Reliability coefficients for each instrument are given in Table 1, together with descriptive statistics for each scale and example items. Reliability of the instruments was examined using Cronbach's alpha when applicable. Nunnally and Bernstein (1994) state that a value of .70 is sufficient for early stages of research. Most instruments of our study show satisfactory internal consistency, except for the scale on conceptions of 'student learning as intake of knowledge.' This scale was not used for the multiple regression analysis.

5.2. Access to computers and intensity of use

Access to computers is high. At home, 91.3% of the respondents have access to a computer, although they mostly have to share an available computer. 11.3% have a computer for their individual use. 8.7% have no access to a computer at home. Frequencies are similar for access to a computer in the teacher education institution (see Table 2), but on campus access is most often shared (88.9%).

Access to the Internet is also high. Only 10.0% of the respondents claim to have no access to the World Wide Web in their teacher education institution or at home. Teacher educators use the computer on a regular basis for work. When asked about their typical use of ICT

Table 2
Access to a computer at home and at campus.

Access to a computer	At home (%) ($N = 783$)	At campus (%) ($N = 783$)
Only for myself	11.3%	6.0%
Sharing	80.0%	88.9%
No	8.7%	5.1%
Total	100%	100%

for working purposes during the last semester of the previous academic year (6 months), 85.3% claimed to have used the computer on a weekly or daily basis.

Information from the technology plans shows that throughout all the institutions, there are in theory enough computers for each staff member. About half of the computers (52.02%) are connected to the Internet. In most institutions most of the computers are located in computer rooms. There are few projectors on the other hand: only three to four projectors for every 100 lecturers. The planning documents of the different institutions make clear that future provision of access to ICT is planned in phases. Often the institutions started with the installation of a computer room and a basic package of equipment for each department consisting of computers, a projector with a screen, printers, a fax, and a Local Area Network. After that most institutions plan to equip classrooms with fixed data screens and eventually projectors. In the future most institutions plan to have access to the internet in more classrooms. Some institutions experiment with wireless internet access. In the first instance, all institutions focus on improving access for managers, lecturers, and administrative staff.

5.3. ICT skills and confidence

The means of the three subscales of ICT skills indicate that teacher educators have on average good basic ICT skills ($M = 3.68$), while internet, maintenance, and security skills can be labeled 'medium' ($M < 3.50$). There is a strong positive and significant correlation between the factors (with $p < .05$), indicating that good internet skills and computer maintenance skills go together with good basic ICT skills. On average, teacher educators are not so confident about their computer skills with a mean score of 3.92 (min. = 1.00, max. = 7.00), indicating a perceived lack of control over the computer. There is a significant correlation (with $p < .01$) of .576 between ICT skills and computer confidence.

5.4. Perceived value of ICT

Most respondents see the advantages that ICT can bring. Teacher educators highly value ICT in their personal lives, for students and in general. They agree e.g. that computers would help them organize their work ($M = 5.79$), or would provide them with better quality products ($M = 5.71$). Computers would motivate students ($M = 5.80$), help students working with one another ($M = 5.86$), stimulate creativity ($M = 5.82$), and improve the quality of students' education ($M = 5.32$). The overall mean on the combined scale is 5.43 (max. = 7).

5.5. Conceptions of student learning

Factor analysis on all items asking for conceptions of student learning (Extraction method: PCA, 2 factors retained) reveals two dimensions: student learning as intake of knowledge and student learning as construction of knowledge. Only 3 of 17 items do not load as theoretically expected. Only the subscale of conceptions of learning as construction of knowledge is reliable, however. The respondents in this study strongly find themselves in the conception of learning as construction of knowledge ($M = 4.30$, max. = 5). All items on both theoretical scales, except for two, are positively correlated. For these respondents student learning as intake of knowledge and as construction of knowledge are not opposing positions.

5.6. Use of ICT applications for teaching practice

Most teacher educators do not use many ICT applications intensively (see Table 3). 57.6% never or rarely use subject specific software for integration into lesson practice, 65.3% never or rarely use electronic communication tools like e-mail for communication with students, and 86.0% never or rarely use classroom management software. It is different for other applications like word processing and presentation software where respectively 73.7% and 55.0% of teacher educators use these applications on a more regular basis (sometimes or regularly). 57.4% sometimes or regularly access information through a CD-ROM or DVD and 73.6% sometimes or regularly use the Internet as source of information.

Correlation analysis revealed strong and significant correlations (with $p < .05$) between the uses of different ICT applications for teaching practice.

5.7. Influence of non-manipulative and external and internal manipulative factors

Hierarchical multiple regression analysis resulted in four models, which each significantly explain a proportion of variance in the use of ICT applications for teaching practice (see Table 4). Non-manipulative factors at the teacher level alone explain 16.1% of the variance. Women tend to display a more limited use of ICT for teaching practice than men, while age has a negative influence on intensity and diversity. The

Table 3
Descriptive statistics of the 'Use of ICT for Teaching Practice Scale'.

	M	SD	Never (%)	Rarely (%)	Sometimes (%)	Regularly (%)
Production of documents	1.95	.909	8.9	17.4	43.9	29.8
Presentation	1.48	1.030	23.7	21.3	38.2	16.8
Integration into specific subjects	1.19	1.037	34.8	22.8	31.2	11.2
Access offline information	1.55	.975	18.8	23.8	41.1	16.3
Electronic communication	1.01	1.059	44.3	21.0	23.6	11.0
Access online information	1.88	.971	13.7	12.7	45.5	28.1
Classroom management	.47	.850	72.1	13.9	9.2	4.8

influence of gender, age, and teaching subject looses significance however, after entering external manipulative factors such as access to ICT, intensity of use, ICT skills and confidence. It is remarkable that use of the computer for working purposes positively contributes to the use of applications for teaching practice ($\beta = .173$), but that ICT use in general has a significant negative influence on the use of ICT for teaching practice ($\beta = -.129$). In addition, access to a personal computer in the institution negatively influences the uptake of ICT for teaching practice. ICT skills is a strong influencing factor ($\beta = .499$) and together with computer confidence ($\beta = .164$), the influence of these factors remains significant after adding other variables to the model.

Internal factors like attitude towards computers and conceptions of student learning do not significantly influence the use of ICT applications for teaching practice. Model 3 does not significantly differ from model 2 in explained variance. Finally, the dummy variables representing the different institutions significantly increase the explained variance, indicating that apart from the aforementioned factors on the level of the educator, the educator's teacher education institution influences the uptake of ICT for teaching practice significantly. The final model explains 58.1% of variance in the dependent variable. The factors contributing the most to the explained variance in the final model remain ICT skills and computer confidence, with a standardized beta coefficient of .52 and .158 respectively.

Table 4
Factors Influencing the use of ICT for teaching practice: standardized regression coefficients, proportion of explained variance and F change.

		Model 1	Model 2	Model 3	Model 4
Non-manipulative factors	Gender (female)	$-.187^{***}$	n.s.	n.s.	n.s.
	Age	$-.311^{***}$	n.s.	n.s.	n.s.
	Natural science	$.141^{**}$	n.s.	n.s.	n.s.
	Social sciences	n.s.	n.s.	n.s.	n.s.
	English	n.s.	n.s.	n.s.	n.s.
	Vietnamese language	n.s.	n.s.	n.s.	n.s.
	Educational sciences	n.s.	n.s.	n.s.	n.s.
	ICT/technology	$.233^{***}$	n.s.	n.s.	n.s.
	Mathematics	$.098^{*}$	n.s.	n.s.	n.s.
Manipulative, external factors	Internet access at home and in TEI	–	n.s.	n.s.	n.s.
	Internet access at home only	–	n.s.	n.s.	n.s.
	Internet access TEI only	–	n.s.	n.s.	n.s.
	Personal access computer at home	–	n.s.	n.s.	n.s.
	Personal access computer TEI	–	$-.084^{*}$	$-.086^{*}$	$-.099^{**}$
	Computer use general	–	$-.129^{*}$	$-.125^{*}$	n.s.
	Computer use for work	–	$.173^{**}$	$.172^{**}$	$.138^{*}$
	Intensity internet use	–	n.s.	n.s.	n.s.
	ICT skills	–	$.499^{***}$	$.503^{***}$	$.522^{***}$
	Computer confidence	–	$.164^{**}$	$.160^{**}$	$.158^{***}$
Manipulative, internal factors	Attitude towards computers	–	–	n.s.	n.s.
	Student learning as construction	–	–	n.s.	n.s.
Contextual factors	Province 1	–	–	–	n.s.
	Province 2	–	–	–	$-.185^{***}$
	Province 3	–	–	–	n.s.
	Province 4	–	–	–	n.s.
Adjusted R^2 'Use of ICT in teaching practice'		.161	.555	.553	.581
F change		10.579	39.880	.316	8.115
df1		9	10	2	4
sig. F change		.000	.000	.730	.000

Note – not included in model, n.s. not significant, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

6. Conclusions

It is clear that important conditions for successful ICT integration are met in Vietnam. At this stage, access to computers is not a main barrier, even though it seems that personal access to a computer in the teacher education institution only implies that the computer is used for other purposes than teaching. Personal access to a computer in the teacher education institution even results in lower use of ICT for teaching practice ($\beta = -.099$). As described in other research it could be that many teachers own and use computers for their own administrative work, but never use them in their classrooms (Watson, 2001). Analysis of the technology plans for the different institutions revealed moreover that access to teaching technologies such as a data projector and a screen is currently limited. Increased personal access to computers for teaching staff and access to teaching technology could make a difference. Vietnamese teacher educators are in general skilled to perform basic operations like word processing or creating electronic presentations. Their ICT literacy is limited though: more than half of the respondents perceive to have low internet, computer maintenance, and security skills. Vietnamese teacher educators are in general not very confident in using computers ($M = 3.92$, max. $= 7$). It is mainly ICT skills of teacher educators ($\beta = .522$) and computer confidence ($\beta = .158$) which influences whether or not ICT applications are used for teaching practice. Better skilled teacher educators tend to use more diverse ICT applications and on a more regular basis than teacher educators who perceive lower ICT skills. As described by Jones (2004), a lack of competence goes together with a lack of confidence. Gender, age, and teaching subject influence the integration of ICT in teaching practice. The younger teacher educators can be seen as ICT natives (Prensky, 2001) who have been more exposed to ICT. The same applies for teacher educators teaching subjects like technology and ICT, mathematics or natural sciences. This confirms the importance of subject cultures (John, 2005) for the integration of ICT in education. However, there is no significant influence of gender, age, or teaching subject on the integration of ICT in teaching practice, over the variance explained by ICT skills and computer confidence.

But as described by Selwyn (2007) for developed countries, it is clear that also no educational revolution is taking place yet in Vietnam. Computers are highly valued for their contribution to the personal life, for society in general, as well as for students and education in

particular. But this appreciation has no influence on the use of ICT for teaching practice ($p > .05$). For most Vietnamese teacher educators, student learning should be concerned with constructing knowledge as well as with taking in knowledge provided by education through memorization and reproduction. This is similar to the findings of Marton et. al. (in Vermunt & Vermetten, 2004) who found that Chinese students do not experience memorizing and understanding as opposite poles, as is often found among Western students. Conceptions of teacher educators of student learning play no significant role in their use of ICT for teaching practice ($p > .05$), indicating a gap between stated beliefs and actual practice as described by Judson (2006). Vietnamese teacher educators mostly use ICT in ways that mainly replace traditional teaching practice. Teacher educators sometimes, or regularly, use word processing software for the production of documents (73.7%), while presentation software is used for lecturing or they use ICT to access information. When it comes to more advanced, subject specific applications or electronic communication, which have a stronger potential to engage students in the learning process, use of ICT remains low. Similar results are found in research on the use of ICT by teacher mentors. Cuckle and Clarke (2002) found that their respondents used a range of ICT applications for lesson preparation, but that these applications were used a lot less in classroom teaching. Gülbahar (2007) described teachers who feel competent in using the ICT resources available in the school, but no successful integration of ICT in the classroom is taking place. Mills and Tincher (2003) described a pervasive use of computers by teachers in preparing lessons, but a limited use of computers by teachers for the delivery of lessons and in integrating technology in the classroom. There are strong and significant correlations between the uses of different ICT applications for teaching practice (from .226 to .650). This indicates that there are Vietnamese teacher educators who are ICT minded, enthusiasts, or innovators, in the sense described by Kirkup and Kirkwood (2005). These educators apply their skills in their teaching practice, while there are teacher educators who do not use ICT in any way for teaching practice. Teachers who could not be considered 'innovators' or 'early adopters' are unlikely to be adventurous in their use of ICT; instead they will use the technology to replicate or supplement existing teaching practices (Laurillard in Kirkup & Kirkwood, 2005). There are differences between respondents from different teacher education institutions and probably context-specific variables like ICT policy, budget, and educational management, play a role in the integration process of ICT in individual teacher education institutions. Analysis of the integration of ICT in education cannot afford to decontextualize the computer from wider social and political variables that shape the larger context of schools (Selwyn, 1999). Methodologically, multilevel models have to be developed to explore how these factors of the school level contribute to integration of ICT in education (Wong & Li, 2008).

7. Discussion

The present study offers some answers to successful integration of ICT in teacher education in Vietnam and other emerging developing countries. Integration of ICT in education is a slow process and observations bring to light a number of steps to be taken in the process. Researchers emphasize the notion of ICT adoption as a staged or sequential process (Farrel & Wacholz, 2003; Tearle, 2003). In the first place, investments are often made in technology and skills training, and ICT is seen as an object of education. ICT as an object of education refers to learning *about* ICT and the acquisition of ICT skills: teachers and learners have to know how to work with the medium and the technology and therefore have to acquire the necessary skills to become ICT literate. The 2007 Asia Policy Forum on ICT integration into Education (World Links, 2007) suggested that ICT integration should not start with providing the technology and infrastructure but with educating the teachers. The current study shows that ICT skills do still make a difference for teacher educators in Vietnam. ICT skills training for educators remains important, especially for more advanced Internet applications. Skills training is ideally part of the continuous professional development of teacher educators. Skills training can result in improved computer confidence and a more diverse use of ICT in teaching practice.

Vietnam and other emerging developing countries could now make a difference and aim to go beyond an access and skills based approach, striving instead for integration of ICT in education as a tool for creative learning. Researchers revealed that a lack of teacher confidence in ICT use may be caused by a lack of self training, a lack of skills training, as well as lack of pedagogical training. Even though an element of ICT skills training is necessary (Preston et al. in Jones, 2004), courses which lack pedagogical aspects are likely to be unsuccessful (Veen in Jones, 2004). This study shows that Vietnamese teacher educators do adhere to constructivist approaches of learning. Richards (2004) points out that abstract ideas about learner-centered pedagogy are well known and even perhaps the theoretical orthodoxy today in many Asian countries. But Richards also observes that "… despite the attraction and obvious relevance of 'new learning' theories and policy, it is not easy in practice to give up or change the traditional habits of hierarchical organization and transmission model of the authoritative teacher-passive student relations" (p. 342). As observed elsewhere, guidelines on ICT are often too weak to spell out exactly how integration of ICT in teaching and learning should look like or what teachers needed to know or believe (Lee, Hung, & Cheah, 2008). Countries and institutions need clear visions, strategic plans, along with commitment and implementation capabilities (Latchem & Jung, 2010). Vietnamese policy makers and educational managers should focus on ICT as a tool for teaching and learning and not merely a tool for education administration. At the level of the educator, ICT training should include reflection on teaching pedagogy and trainees should be provided with opportunities to apply the acquired skills in teaching practice. Establishing change in pedagogic practices is difficult to accomplish, and it is equally difficult to be clear about what change is ongoing (Erstad, 2006). Educational managers can provide appropriate incentives for faculty members to engage in continuous professional development. Educators should have an intuitive understanding of teaching content with appropriate pedagogical methods and technologies (Schmidt et al., 2009) and need to know exactly how ICT can be used as a teaching tool (UNESCO, 2004). At the same time of improving access and skills, teachers and teacher educators in emerging developing countries should be prepared for a changing role and should know *how* ICT can be used in a way that improves the learning process towards creative learning.

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