

ICT teacher training: Evaluation of the curriculum and training approach in Flanders

Martin Valcke

Isabel Rots

Marjolein Verbeke

Johan van Braak

Correspondence concerning this article should be addressed to dr. Martin Valcke, Ghent University, Department of Education, H. Dunantlaan 2, B9000 Ghent, Belgium, [martin.valcke@UGent.be](mailto:martin.valcke@UGent.be), tel +32 9 264 8675

This study was funded by the Department of Education of the Ministry of the Flemish Community

Publication Style: APA fifth edition  
Software used for editing: Microsoft Word 2002

**REVISED VERSION March 29, 2005**

Teaching and Teacher Education

Five copies of the paper should be submitted with effect from January 1st 2004 to

Professor John Fitz, Cardiff School of Social Sciences, Cardiff University, Glamorgan, Building, King Edward V11 Avenue, Cardiff, CF10 3WT, UK.

Abstract

Number of words: 100

A policy-evaluation study was set up of ICT teacher training in Flanders, focusing on the following questions:

(a) What is the validity of the content and format of the teacher training, and (b) to what extent is the ICT teacher training linked to policies of schools? In-depth interviews were organised with respondents of primary, secondary, and adult education schools. The results indicate that ICT school policies are not well developed and reveal a partial match between policies, needs, and the actual in-service training. Innovative applications of ICT are not promoted. The supply-driven approach, the school-based nature, and follow-up activities are questioned.

Key words

computer uses in education, information technology, in-service teacher education, school policy

(cf. ERIC descriptors)



## **ICT teacher training: Evaluation of the curriculum and training approach in Flanders**

### Introduction and problem statement

Recent reviews of evaluative research about the impact on learning of Information and Communication Technologies (ICT) in primary and secondary education do not present an overall optimistic picture (Burns & Ungerleider, 2002; Cox, Abbott, Webb, Blakeley, Beauchamp & Rhodes, 2003; Murphy, Penuel, Means, Korbak, Whaley & Allen, 2002; Waxman, Connell & Gray, 2002; Waxman, Lin & Michko, 2003). Burns and Ungerleider (2002) come at the end of their meta-analysis of over a 1000 studies to the very critical conclusion that “There are simply too few studies of sufficiently rigorous design to permit informed policy choices”. A common issue that returns in the overview studies is that the professional development of teachers is presented as a crucial variable to foster a more successful integration and impact of ICT in instructional practices. Research concludes that the actual use of ICT in instruction is positively related to the mastery of specific ICT-competences of teachers (Becker, 1999 and 2001; Becker & Riel, 2000; Riel & Becker, 2000). The former grounds the central importance of pre-service and in-service education approaches. At both national and international levels, educational authorities and bodies have invested in large-scale pre- and in-service education programmes. Also in the Flemish educational context, a large scale initiative has been set up since 1999 to foster ICT teacher in-service education. Since there is no national set of standards that directs the teacher education programmes and approaches, the Ministry of Education called for an evaluation study. The present study reports on the results of this evaluation study. It focuses upon the validity of the current curriculum content and the organisational suitability of the current training approaches of the programmes. It has to be stressed that the study did not research the effectiveness of the training (see Galanouli, Murphy & Gardner, 2004 for an example).

Before discussing the study in more detail, we first examine approaches to develop curricula for ICT teacher education and critical issues in relation to their implementation in view of teacher needs and the school context. Next, we centre on some particularities of the Flemish educational context. This helps to understand the specific nature of the general research problem as it was stated above. The next section of the article reports on the research study, building on interviews with 185 respondents of 100 schools. The article concludes with a discussion of the results and the implications for future ICT education programmes in the Flemish context.

## The nature of ICT teacher training curricula

Current ICT teacher education practices reflect a variety of approaches to direct the curricula of the training programmes: (a) based on national standards, (b) based on a benchmark approach, and (c) building on the opinion of teacher education experts or teacher education centres.

A dominant approach is based on the definition of national standards. A typical example is the National Educational Technology Standards (NETS) Project of the International Society for Technology in Education (ISTE) that presents the standards for ICT teacher competences to direct teaching practices in the USA (ISTE, 2004). In Australia, education departments have published lists of competencies (minimum standards) that are related to the use of ICT in education (Martin, 2001). In the UK, the Teacher Training Agency (TTA) has developed specific skills tests, including tests related to ICT, to get recommended for e.g., the award of Qualified Teacher Status (QTS) or subsequent standards. At an international level, the UNESCO Institute for Information Technologies in Education (IITE) presents a list of ICT-related standards for ICT-competencies of teachers (Knierzinger, Rosvik & Schmidt, 2002).

An alternative approach is based on benchmarks. A recent example is found in Kirschner & Davies (2003) who analyzed – for the Dutch national inspection authorities - 'best practices' in ICT teacher education from 6 different countries (Australia, Canada, Finland, the Netherlands, Northern Ireland, and the USA). The team of authors derived from the good practices a common core of critical knowledge and skills that are presented as pedagogic benchmarks for future ICT teacher education.

A third approach is based on the views and opinions of teacher education experts. This approach is said to respect the specific context and culture of the target audience. It has been adopted in the USA by e.g., the Society for Information Technology and Teacher Education (SITE) and resulted in the well-known AMES White Paper (2004). It resulted in a grant system that fostered the design and implementation of a wide variety of ICT teacher education initiatives. This third approach is commonly found in countries where educational policies are less centralised and high levels of school autonomy are being observed.

The standards-approach to ICT-teacher education stresses the individual accountability of teachers. Teacher evaluation, career development and formal qualifications depend on mastery of these standards. But, the question can be asked to what extent this is in line with the specific needs at school level. In the context of the present study, we link this question to the validity of the content of the teacher education courses for the specific group of teachers in a school, and the way ICT teacher training is linked to the educational policy and ICT policy

plans of schools. In the European Fetiche-project researchers clearly pointed at this critical issue when they stated that “(ICT) *integration will only come when the links between ICT, the curriculum and teachers’ needs and professional development in schools are forged within a framework*” (Morel & Filliol, 1996).

Recent evaluation studies in the Netherlands point at the very critical issue of ICT-policies and the importance of a consistent teaching and learning model to fully exploit the potential of ICT (ITS & IVA, 2003). Other authors also stress this school level in focusing on teacher ICT-competencies and ICT teacher education. Selinger & Austin (2003) refer to the situation in Northern Ireland and England where there are few schools with a coherent ICT policy plan (see also Pritchard, 2001). Also Niemi (2000, 2003) points at the need to link ICT-strategies to the growth of schools as communities and requires the development of school specific policies. In the Finnish context, authors therefore stress school-based efforts in relation to the development of ICT-competencies. They criticize projects that are isolated from schools or the school education community. The Finnish TEACHER.fi project is in line with these remarks (Niemi, 2003). Kirschner & Davis (2003) come – after analysing 18 international teacher education case studies - to the striking conclusion that “an alarming number (almost half) report that they pay no attention to the critical step in policy implementation” (ibid, p.138). It is therefore no wonder that in the governmental ICT policy paper of Ireland, there is a very specific focus on the role of the principal to “consider the ICT level in their own school; be made aware of optimum ICT infrastructure for their school; and be shown how to develop an ICT plan for their school” (Irish Department of Education and Science, 2003). American researchers come to comparable conclusions as to the role of school leaders (Riel & Becker, 2000).

The question about linkages between teacher education programmes and school policies is of importance since ICT is not to be considered as a pedagogy-neutral tool. In most teacher education programmes it is stressed that ICT influences largely the approach to learning and instruction. Most teacher education programmes clearly link the integrated use of ICT to new pedagogies, such as social constructivism, active learning, experiential learning, reflective learning, etc. (see for an overview Cox, Webb, Abbott, Blakeley, Beauchamp & Rhodes, 2004). A clear indicator of this advanced educational role of ICT is when ICT is presented as a Mindtool for supporting learning and instruction (Jonassen, 1994, 1999; Kommers, Jonassen & Mayes, 1992). But it is atypical that teacher education programmes stress this relationship with school policies. A rare exception is the Western Australian list of standards, discussed above (Martin, 2001). The fourth dimension in this list of teacher competency standards focuses on participation in curriculum policy activities and team building.

Teachers' individual needs and the needs of school teams are critical in view of the validity of the content and the design of ICT teacher education programmes. Ling & Mackenzie (2001, p. 93) state that centrally organised ICT teacher education programmes, based on standards, can run the risk of being system-driven. The authors argue that a more effective teacher education is school based and could take the form of *curriculum days* or *school development days*. Pearson (2003) is in line with this remark when he puts forward the idea that the teacher education should be relevant and useful and integrated within the professional experiences of teachers. Davis & Nilakanta (2003) point at this critical issue and state that standards for ICT teacher education should be embedded in the culture and context of the local school.

In summary, we can conclude that the current state-of-affairs reflects a variety of approaches to direct ICT teacher education programmes. But the overview also points at the critical link between teacher education and school (ICT) policies and the concrete needs of teachers at a specific stage. We will return to these two issues when presenting the research questions for the study in the Flemish educational context.

#### In-service ICT teacher education in the Flemish context

Flanders is the Dutch-speaking part of Belgium. Domains such as education, culture and welfare are not national policy areas, but are responsibilities of the Flemish Community. A central characteristic of educational policies in Flanders is the very high level of local school autonomy. Schools are free in the way they organize the teaching and learning process at micro-level and at school level. Schools are responsible to develop their own quality control policies, educational policy, student participation policy, curriculum content, ICT-policy, professional development policy, etc. The government pre-defines a number of financial boundaries, puts forward minimal criteria to meet educational standards and a system of external quality control. A typical indicator of this particular high level of local autonomy is that the government does not organize central examinations. But, schools have to organize their own quality control cycle to be able to prove that they meet the minimum standards put forward by the government. In the context of the present article, school autonomy clearly affects the way ICT is embedded in school practices and the way schools invest in in-service ICT teacher education.

This much decentralised approach to the organisation of the educational system limits the role of the central government. The department of Education of the Ministry of the Flemish Community especially “promotes” the integrated use of ICT in primary and secondary schools (Schoolnet, 2004). However, it is up to

the schools to implement the educational policies. Next to promotion, the government also invests in ICT in education. There is e.g., a special programme for hardware funding. Flanders is actively involved in international ICT-projects such as SchoolNet. In the official school curricula, ICT is in the side-line mentioned in relation to subject-independent skills (e.g., learning to learn, information processing skills, presentation skills, ..), next to a specific school subject for secondary school children that focuses on the acquisition of technical ICT-knowledge and skills. Very recently, a set of - yet not official – ICT-competencies for the primary school have been published (DVO, 2004). Teachers and schools can find extra resources on a governmental website (<http://www.ond.vlaanderen.be/DVO/english/ICTprimary/ictcompetenciesprimary.htm>).

As to guidelines for teacher education, only a limited list of ICT-competencies for pre-service teachers has been formally put forward. Teachers in nursery, primary, and secondary school must be able to handle multimedia working methods, and a teacher must be able to find and consult information about learning tools by means of information technology. No formal list of teacher ICT competency standards has been put forward for in-service teacher training or education.

Since 1999, a large-scale in-service teacher education project started, funded by the Ministry of Education. Five regional expertise networks (REN) are responsible to coordinate and organise this programme. As to the content of the teacher education programme, only general guidelines were presented to these RENs. The programmes had to focus especially on (a) educational issues, (b) organisational questions, and (c) only to a limited extent on technical topics. A clear description of the target audience was presented: primary and secondary school teachers, school ICT-coordinators, staff of adult education institutes and educational school support staff, and staff members of centres for learning support. The RENs were encouraged to develop, next to a supply-driven teacher education programme, a demand-driven approach to ICT teacher education. The specific network structure of the regional centres helped to bring together existing expertise about ICT in education to develop a multi-faceted programme for teacher education. In the context of the approaches described above as to the design of teacher training curricula, the third approach has been adopted in Flanders. As an indicator of the quantitative impact of the REN initiative, we refer to the figures of the school year 2003-2004. In total, 19.643 teachers participated at least once in a REN activity during this school year (17,80%).

The RENs were expected to organise their own internal quality control. But in 2002-2003 the government started to raise questions about the quality of the ICT teacher education programmes. The government decided to ask an external body to evaluate the current approach. This article summarizes the results of this evaluation. Key questions put forward by the government were: To what extent can we be sure that the current in-service training

Met opmaak: Lettertype: 10 pt, Markeren

curricula mirror the actual training needs of schools and teachers in the field? Is the training approach in line with the school policy? The research study was monitored by representatives of the regional expertise centres and the Department of Education of the Ministry of the Flemish Community.

#### Research design

##### *Research approach*

In view of the general research problem an exploratory study, based on a structured interview – organised *in situ* - was chosen as the research method. The interview technique is a very time consuming research technique but guarantees a high level of control over the way respondents replied to the structured interview questions and also allowed the interviewers to gather extra information in a systematic way. Given the central importance attached to school level perspective in relation to ICT teacher education, it was decided to organize the interviews with school leaders (principals) and the persons responsible for ICT-coordination and teacher professional development. In some schools these roles are shared by the same person.

##### *Research sample*

A stratified sample of 100 schools was selected from the total number of schools. The following variables were used as a base for the sample stratification: regional distribution and school level. In Flanders, there are 2350 primary schools, 1025 secondary schools, and 29 adult education institutes. The number of staff in Flemish primary school is 48.518, and 61.785 in secondary education (Ministerie van de Vlaamse Gemeenschap, 2003). Schools for special education were not included in this study, given the very different focus on the use of ICT in the instructional setting. To anticipate non-response, 50 extra schools were extracted from the school population. A very strict follow-up of school response resulted in a final response rate of 98%. Only two schools could not be replaced in time due to time limitations. The final group of schools included 64 primary schools, 30 secondary schools, and 4 centres of adult education. Interviews were carried out with 185 respondents: 92 school leaders, 78 ICT-coordinators, and 15 staff members responsible for professional development. Post hoc analysis of other characteristics of the schools in the research sample revealed that the sample was also representative as to the size of the school (number of teachers/pupils), and the organising body (community schools, subsidised

private schools, subsidised publicly run schools). The respondents are experienced educationists with many years of teaching expertise (60% with 10 years experience or more) and are well acquainted with ICT (87% with more than 6 years of ICT-expertise). **The sample consisted of 70% male and 30% female respondents.**

#### *Research variables and research questions*

As stated earlier, the study builds on two general questions: To what extent can we be sure that the current in-service training curricula mirror the actual training needs of schools and teachers (validity) and to what extent is the current ICT teacher training linked to the educational policy and ICT policy of schools?

The following variable model was developed in view of the design of the interview instrument. In this model, presented in Figure 1, teacher education is linked – at school level – to a number of key processes and factors.

<Insert figure 1 about here>

The central variable in the model is the participation in the teacher education programmes of the RENS. The model depicts a number of variables that influence participation. All these variables are positioned at school level. Three variables focus on gathering information about the *actual*, *expected* and *future* educational use of ICT in the school. They are expected to influence the opinion about the content and set-up of the current teacher education programmes. One variable focuses on the perceptions of the respondents about educational uses of ICT. The impact of attitudes and perceptions on the adoption of ICT-use and teacher education has been clearly demonstrated in earlier research (Dawes, 1999; Reynolds, Treharne & Tripp, 2003; van Braak, 2001).

#### *Interview instruments and interview protocol*

To direct the structured in-depth interviews, a research instrument was constructed that reflects the variable structure as presented in figure 1. Open-ended questions were formulated for each variable and a number of pre-defined answering categories were provided for each question. Interviewers were expected to listen to the answers to the open-ended questions and to check the responding answering categories. If the answer was not in line with one of these categories, the answer was noted down as detailed as possible. To guarantee a high reliability, a detailed interview protocol was designed. The coding categories to structure the answers of the

respondents were derived in large from the existing approach towards ICT teacher education in the RENs. Typical examples are the list of ICT related skills of teachers and the list of objectives of teacher training programs. In this way it is possible to validate the current orientation of the ICT training offered by the RENs.

### *Procedure*

The study was set up in the spring 2003. After receiving a written invitation each selected school in the sample was called by phone to make an appointment. If schools were not able or willing to participate in the study, they were replaced by another pre-selected school from the extended sample.

An independent research organisation was hired to carry out the interviews. All interviews were taped, after obtaining informed consent of the interviewees. The interviewers were experienced researchers. They received a specific training for this study, building on the instrument and the detailed protocol. All information about the schools and interviewees was coded. This anonymous information was passed to the research group to be analysed.

All answers to the questions were registered in a structured way. Elements of the answers that could not be related to the available coding categories were written down literally. Content analysis was applied by two independent researchers to structure the answers of respondents that could not be coded by the interviewers. This resulted in a reliable additional coding of open answers to the pre-structured questions. If necessary, the researchers could listen to the audiotapes to check the interpretation of a specific answer.

Statistical analysis is largely based on descriptive statistics, considering the exploratory nature of this evaluation study. When reporting descriptive results, only the most important percentages have been reported (top 3, top 5). When comparing responses (e.g., primary versus secondary schools), Chi-square helped to test differences in proportions. Differences between educational levels are only reported when they are statistically significant. Both tests help to determine whether the distributions of proportions are equal or the ranking is comparable. When significant, the proportions/ranks that deviate the most will be given as an illustration of these significant differences.

### *Results*

To find an answer to the two central research questions, a very extensive structured interview instrument was developed. To present a planned report of the results, we will present the findings structured along the following list of questions. In the discussion section, the results will be used to answer the two central research questions.

- To what extent is there an explicit and operational ICT-policy plan at school level?
- What is the current use of ICT in the school?
- What are the actual ICT-qualifications of teachers
- What are the training needs of the teachers?
- What is the approach of the current ICT teacher training?
- What is the content of the current ICT teacher training?
- What are the expectations as to future ICT training programmes?

*To what extent is there an explicit and operational ICT-policy plan at school level?*

ICT receives a high to a very high priority in about half of the school policies: primary schools (45,9%), secondary schools (68,7%), and adult education (57%).

But only a minority of the schools have developed an explicit ICT-policy plan: primary education (11,9%), secondary education (31,3%), and adult education (37,5%). Most schools (74%) indicate that an ICT-policy is “under construction”. Analysing the open responses to the question about the focus of the school ICT policy, it is striking that infrastructure dominates the discussion: infrastructure (53,1%), integration of ICT in all subjects (25%), professional development (18,8%), development of an educational ICT model (15,6%), finances (12,5%), and staff support (12,5%). If we limit the analysis to schools who already possess an explicit ICT-policy, professional development of teachers drops to the fourth position (12,5%). In the context of the present study, the low proportion of attention paid to professional development is a question of concern.

During the interviews, the issue of an ICT-policy was also raised in an indirect way by presenting a list of 15 possible ICT related objectives for the school. Again infrastructure (61,1%) and use of educational software in the classroom (58,7%) received a high priority. The development of a ICT professional development strategy is only of high priority for 34,2% of the schools.

If we compare primary and secondary schools as to the issue of an ICT-policy, there are significant differences – if a policy is available - in the ICT policy objectives.

In secondary schools, the following objectives receive higher priority: the development of technical ICT-skills of teachers ( $\chi^2 = 26.88, p < 0.01$ ), task division as to management of the ICT-infrastructure ( $\chi^2 = 148.8, p < .001$ ), and development of a professional ICT training policy ( $\chi^2 = 6.96, p < .05$ ).

In primary schools, the following objectives receive significantly higher attention: integration of educational software in the classroom ( $\chi^2 = 11.41, p < .01$ ), and elaboration of an ICT curriculum for the consecutive class levels ( $\chi^2 = 7.58, p < .05$ ).

The reported recognition by key actors of ICT use in the school policy is high to very high: school leaders (85.8%), ICT-coordinator (94.5%), teachers (71.7%), pupils (89.6%), and parents (77.1%).

But, in contrast to this central recognition of ICT in the school policy, the results also indicate that there is not a shared vision in the school as to the integrated use of ICT. Up to 44.6% report that there is only “to a certain extent” a shared vision. Only 8.5% reported a strong and shared vision.

A last indicator in the context of ICT and school policies is related to the extent to which teachers are explicitly required to use ICT in their education. The results are clear. At all educational levels, it is still mainly up to the individual teacher to decide whether he or she will use ICT: primary education (63%), secondary education (54.5%), and adult education (75%).

#### *What is the current use of ICT in the school?*

If we compare “occasional use” of ICT in school practice and “regular” use of ICT in the teaching activities, there are some differences in the educational levels. Occasional use is reported as follows: primary education (39.1%), secondary education (53.7%), and adult education (50%). Regular use is reported in a different way: primary education (45.5%), secondary education (25.4%), and adult education (12.5%)

In only 10.9% of the primary schools, the respondents report a constant use of ICT as integrated tool. In primary schools, 62% of the respondents state that less than half of the teachers use ICT at least once a week; this is 63.5% in secondary education, and 87.5% in adult education.

Analysis of the relationship between school subjects and ICT-use results in a different picture for primary and secondary schools. If we take the proportions of respondents that state that ICT is used daily up to a few times a week, we obtain the following results for the primary schools: mathematics (55.5%), mother tongue (Dutch, 54.3%), foreign language (French, 39.3%), world orientation (history and geography, 37.5%), and sciences (28.8%). In secondary schools, we obtain the following pattern: mathematics 36.2%, technological

education (32.6%), mother tongue (Dutch, 19.7%), and foreign languages (French and English, 11.9%). It is striking that in secondary education the highest proportions of teachers use ICT only a few times per semester in relation to most school subjects.

When the respondents are asked why teachers are in favour of ICT-use in their teaching a remarkable list is given: greater variation in teaching technique (53%), to better answer the needs of individual pupils (45.9%), to make learning more fun (43.2%), to motivate the pupils (38.9%), and to help pupils to get better school results (35.7%). This list illustrates how ICT is rather perceived as an extra tool to support existing teaching practices. The respondents do not mention the potential of ICT to innovative teaching and learning approaches. The same is true when respondents are being asked to give their general motives to promote ICT-use in their schools. Respondents stress the importance of ICT-use to prepare students for the society (61.1%), to present a richer learning environment (42.7%), or to motivate the students (31.9%).

Building on the former questions, the respondents were asked what variables accounted for the low level of integrated ICT-use. The following three reasons were mentioned most by the respondents: low technical % expertise level of the teachers (52.6%), lack of infrastructure (29.9%), and teachers are not convinced of the added value of ICT (24.7%). These results are remarkable given the very different priorities as expressed in the school ICT policies.

#### *What are the actual ICT-qualifications of teachers?*

A critical issue in the context of the present study is the status of the actual ICT-skills of the teachers. Table 1 summarizes the reported levels of mastery of a number of ICT-related skills.

<Insert Table 1 about here>

It is apparent from Table 1 that none of the mentioned skills is mastered at advanced level. There are hardly differences when we compare the distribution of the proportions between the different educational levels. Significantly larger proportions of teachers in primary schools are reported to master the following skills at basic and advanced level: integration educational software in teaching practice ( $\chi^2 = 17.25, p < 0.001$ ). Significantly larger proportions of teachers in secondary schools are reported to master technical ICT-skills at basic and advanced level ( $\chi^2 = 6.95, p < 0.05$ ).

Table 2 compares the actual ICT-qualifications of teachers with the training priorities of schools. The table only includes the most important training objectives, mentioned earlier. We have to conclude that the professional development priorities policies are sometimes consistent with the teacher mastery levels but they do also reflect skills already mastered by the majority of the teachers at basic or advanced level.

<Insert Table 2 about here>

*What are the current training needs of the teachers?*

In the context of detecting the current training needs of teachers, the respondents were asked to indicate how they determine the training needs of their teachers. The responses show that a variety of approaches are being adopted, but that a systematic approach is lacking: via meetings (35.1%), based on a questionnaire among the teachers (25.9%), via informal discussions with teachers (23%), and based on a school development plan of an external (21.8%). It is also important to note that 23% of the schools do not analyze the training needs of the teachers. There are no important differences in approaches between the educational levels.

When focusing on the concrete training needs of the teachers, the respondents centre especially on technical skills: basic introduction to computers (49.7%), the use of the Internet (23.3%), and the use of office software (22.7%). The proportion of respondents that mentioned objectives in relation to the educational use of ICT was rather low: the use of software to support specific school subjects (15.3%), and the integration of educational software in the classroom (14.1%).

When the respondents are presented with a concrete list of training objectives, the same picture emerges. At the technical level, especially a basic introduction to computers is rated as very important (42,9%). None of the objectives about the educational use of ICT were rated as “very important” by a large proportion of the respondents. The objectives rated as “important” by the largest proportion of respondents are: the use of software to support specific school subjects (61.7%), the integration of educational software in the classroom (59.6%) and the use if Internet in the classroom (57.9%). Both organisational objectives were rated by most respondents as important: developing ICT school policy (50.6%), and planning and organisation of integrated ICT use in the classroom (58.6%). There are some differences between the educational levels as to the priorities in the current training needs. Although the number of adult education schools in the sample is small, it is

noteworthy that higher proportions of respondents of these schools rate the following training needs as important and very important: educational use of office packages ( $\chi^2 = 7.66, p < .05$ ), working with multimedia ( $\chi^2 = 6.75, p < .05$ ), and learning to determine and solve ICT-problems ( $\chi^2 = 6.43, p < .05$ ). At this educational level less importance is attached to the selection and evaluation of educational software ( $\chi^2 = 6.13, p < .05$ ). Training about e-learning – although in general considered as unimportant to completely unimportant by 69.6% of the respondents, a significantly larger proportion of secondary school respondents considers this as important and very important ( $\chi^2 = 7.04, p < .05$ ).

In general it can be stated that the actual training needs are dominated by a focus on technical ICT-skills and basic educational uses of ICT. Innovative ICT-uses related to electronic assessment, online learning, computer based collaborative learning, ... have not been mentioned. We can repeat an earlier conclusion that ICT-use in Flemish schools is rather perceived as a tool to support or substitute existing teaching and learning practices.

#### *What is the approach of the current ICT teacher training?*

When asked whether there is a systematic professional development approach at school level, the general answer is “no”: primary education (71.8%), secondary education (62.7%), adult education (75%). When asked whether teachers are required to attend ICT training sessions, the answers are very consistent. As mentioned earlier, professional development depends mainly on the initiative of the individual teacher: individual initiative of teacher (72.8%), required for some teachers (16.7%), and required for the complete staff (10.6%). These results raise questions as to how the priorities in the (ICT) policies of most schools can ever be realised.

Respondents were asked to indicate the most suitable professional training methods to increase ICT-competences of the teachers. This question is of importance since it helps to validate the current methods used in the approaches of the RENs. Until now, the current approach reflects a supply-driven approach (predefined objectives and content) with teachers attending training sessions in a training centre, together with teachers of other schools. The following approaches are considered as “very suited”: tailor-made courses at school level (54.6%) and coaching by colleagues (50.8%). The following approaches are considered as “unsuited” to “completely unsuited”: on-line training (77.5%); courses supported with a distance teaching component (70.3%); via e-mail, telephone and electronic discussion forums (61%); and independent self-study (60.5%).

As “rather suited” are considered the current approach based on external supply-driven training sessions (55.2%), conferences (44.8%), and visits to examples of good practices in other school (53%).

It is no understatement that these answers question the current training strategies of the RENs.

Training methods that stress individualised professional development (self-study, on-line learning, etc.) are consistently more rejected by respondents of primary schools as compared to secondary schools: self-study ( $\chi^2 = 11.17, p < .05$ ), online learning ( $\chi^2 = 17.14, p < 0.001$ ), and courses supported with a distance teaching component ( $\chi^2 = 9.63, p < .05$ ).

When teachers have received professional training, there is the concern about the dissemination of the training experience in the broader school setting. The answers to a question in relation to dissemination approaches indicates the following dissemination through informal contact with colleagues (72.2%), via the ICT coordinator in the school (58%), via the organisation of internal courses/meetings in the school (27.6%), via subject team groups (25.4%, in secondary schools), and through communication during a staff meeting (19.9%). The results reveal that dissemination deserves more consideration.

#### *What is the content of the current ICT teacher training?*

The following objectives of current ICT teacher training were mentioned by more than 10% of the respondents: technical ICT-skills (24.4%), educational use of office packages (51.1%), use of Internet and e-mail (34.8%), and integration educational software in teaching practice (14.1%). Objectives in relation to multimedia, e-learning, electronic assessment, computer supported collaborative learning, or development of an educational ICT-policy were hardly mentioned or even not at all.

When asked to evaluate the current ICT teacher training programs, respondents are generally satisfied to very satisfied (quality, variety, length/duration, expertise of trainers, location, and timing). But they are more critical about the possibility to determine beforehand the quality of the training program (63.4% rather unsatisfied to very unsatisfied) and the degree of follow-up activities (58% rather unsatisfied to very unsatisfied). More and better communication seems to be needed about the content of the training programmes and more attention should be paid to follow-up activities. As to the follow-up activities, a significant larger proportion of the respondents of primary schools report higher dissatisfaction levels ( $\chi^2 = 7.22, p < .05$ ).

#### *What are the expectations as to future ICT training programmes?*

Respondents were asked to point at criteria that will be used by teachers to opt for a professional training program. The following two criteria are predominant: the immediate suitability for the own teaching practice (49.7%); and the degree to which the professional training is adapted to the experiences, skills level and interests of the teacher (26.4%).

In the former section, especially content related topics were discussed in relation to the ICT teacher training. In this section, the responses are analysed about organisational factors that constrain teacher training: timing, duration, and location. As to the timing, the majority of the respondents insisted on training during the school hours. This is in sharp contrast to the current setting where most training is offered outside school hours and during holidays. When asked about the duration of courses, the opinion shared by most respondents is to organize a rather restricted number of sessions that may last somewhat longer. As to the training location, the own school setting or a location near the own school is preferred. When asked what kind of organisational characteristic affects dominantly the efficacy of ICT teacher training, the answer given by the largest proportion of respondents is to organise the training within the own school setting.

In view of future training programs, the respondents ask especially to pay attention to follow-up activities: via a special contact person through email, phone contact, etc. (41,6%); via an additional meeting afterwards to share experiences; to ask questions that emerged from application in the own classroom setting (31,2%); and follow-up of the trainer of what was learned by the teacher is his/her own teaching practice (13,9%).

## Discussion

The findings reported above help to answer the two main research questions: (a) How valid is the current ICT teacher training programme of the RENs, and (2) to what extent is the current ICT teacher training linked to the educational policy and ICT policy of schools?

As to the first general research question about the validity of the current teacher training approach of the RENs, we repeat that the basic coding of the answers of respondents reflected the structure, content and format of the current REN curricula. This allowed the researchers to mirror the existing approaches to (a) the information obtained about the actual ICT mastery levels of teachers, (b) priorities in school policies, and (c) the

content of current ICT teacher training of teachers. Respondents are satisfied to very satisfied about the content of the training programmes on offer. There is a clear match when it comes to the strong focus on the development of basic ICT-skills, the educational use of office packages and software in relation to school subjects.

There is a first mismatch when we consider more challenging and advanced uses of ICT. Respondents hardly indicate policy priorities or actual training needs in relation to the educational use of multimedia, on-line learning, and electronic assessment. There is a second mismatch when we look at the kind of training teachers actually get. Objectives in relation to multimedia, e-learning, electronic assessment, computer supported collaborative learning, and also development of an educational ICT-policy plan have hardly been mentioned or not at all. In the context of this research question it is worth repeating that the actual use of ICT in teaching practices remains limited. Respondents of primary schools report higher levels of ICT-use. But the use in secondary schools remains overall restricted. Hardly any mention was made of ICT-use that is cross-curricular and is related to e.g., group work, projects, extra-curricular activities, etc. This might explain the predictable nature of the needs for teacher training. The respondents report training demands that reflect traditional teaching approaches.

Analysis of the validity of the training format shows that respondents are generally satisfied with current ICT teacher training programmes. They indicate that these programs possess some of the features that are widely considered to be important for successful ICT-training. Studies abroad point at a number of obstacles perceived by teachers when it comes to successful ICT-training. Galanouliet al (2004) mention the exploitation of teachers' own time, the lack of technical and social support, and good equipment and resources. In our study too, respondents express their concerns about the following issues. The ICT teacher training should be organised during school hours, by preference in the own school as the training location, and school-based. The latter especially implies that the training has to be linked to the specific questions, needs, or problems of the own school. Galanouli et al. (2004) indicate that successful models of ICT professional development for teachers need to be flexible and need to reflect the individual needs and levels of ICT competence of the teachers involved. This challenges the dominant demand-driven nature of the current REN curricula. Another very clear indicator in relation to the training format that is considered to be critical is the need for more follow-up activities. In accordance with other studies regarding ICT professional development of teachers (e.g., Williams et al., 2000), respondents stress the importance of ongoing support and advice to foster a more successful

integration of ICT in teaching practice. The need of flexible training is stressed, allowing choice and guidance where appropriate for teachers who are in different stages of ICT-literacy.

To what extent is the current ICT teacher training linked to the educational policy and ICT policy of schools? In the opinion of about half of the respondents, ICT is a central issue in school policies. But professional development of teachers is not rated as being the most important policy issue. Most policies are focused on hardware issues. But, and this is the most critical point, the number of schools with an explicit ICT-policy plan is rather small. A ICT policy plan (or a 'Technology Plan') acts as a blueprint to the sequence of events the school hopes to achieve, describes the overall philosophy of technology use and explores how technology will improve teaching and learning (Baylor & Ritchie, 2002). Up to this moment, our research findings suggest that the integration of ICT in educational practice is mainly fragmented and not situated in a broader vision on the subject-specific and overall potential of ICT for teaching and learning. Building ICT capable schools should be part of general programme of school improvement (Russel in Lelliot, 2002). A professional ICT-policy plan should therefore include elements on vision building, professional development, ICT-curricula, – planning and –evaluation. The results of this study challenge the RENS and the policy makers in the Flemish context. Policy development should be at the centre of the focus of attention.

We have to add to this the low priority attached to professional teacher development. This results in a situation where professional development is mainly based and dependent on the initiative of the individual teacher. The question is whether this is an acceptable situation. Moreover, earlier research clearly indicated the value of self-empowering, group based in-service training in the use of computer assisted language learning (Murray, 1998). The approach of Tan et al (2003) in Singapore to teacher training in using computer technology is moving away from 'trainee-based' and 'IT skills orientated' strategies in favour of new approached based on various learning models such as direct learning, constructivism and group work.

The strengths of this study are related to the fact that an in-depth interview was set up with respondents in their own school setting. We expect that this helped to guarantee the reliability of the responses. But the approach has also some weaknesses. A first weakness is the fact that school leaders (principals) and ICT-coordinators have been interviewed and not teachers. The study is also based on perceptions and not on the actual use of ICT, or the actual participation in ICT teacher training. A third remark is related to the number of schools in the sample. Although the sample is representative, the number is still restricted and has especially affected the inclusion of a restricted number of adult education schools. A last remark has to be made in relation

to the statistical analyses techniques adopted in this study. These were restricted to descriptive results and basic levels of comparison between school levels. Follow-up studies should involve teachers in the in-depth interviews and pursue the research data that can be researched with more advanced and multivariate analysis techniques.

### Conclusions

This article reported on an evaluation of ICT teacher training programmes in the Flemish educational context. The study focused on an assessment of the relevance of the content and approach of the current teacher training curricula organised by regional expertise centres (RENs) and the links between teacher training and (ICT) school policy. School policies are not well developed and focus to a too small extent on teacher training. The further results reveal a partial match between policies, need/demands and the actual in-service training of teachers. But the results also reveal a mismatch at the level of some crucial objectives. The most important finding is that more innovative applications of ICT are not promoted in the current approaches towards teacher training. As to the training format, clear questions have been raised about the supply-driven nature of the programs, the school-based nature and the need for more follow-up of the teacher training. The results of the evaluation have already resulted in policy changes at the level of the Flemish Department of Education. Key changes have been the adjustment in the ratio of supply-driven programs versus demand-driven programs. In three years time, over 50% of the teacher training initiatives have to be demand-driven. Also school-based and team-based approaches are now considered as important indicators of good ICT teacher training. The fact that the study has resulted in observable changes in training policies can be considered as a fruitful outcome of this research.

### References

- AMES White Paper (2004). SITE Position Paper: Statement of Basic Principles and Suggested Actions.  
Retrieved June 1, 2004, from <http://www.aace.org/site/SITEstatement.htm>
- Baylor, A.L. & Ritchie, D. (2002). What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? *Computers & Education*, 39(4), 395-414.
- Becker, H.J. (1999). *Internet use by teachers – Conditions of professional use and teacher-directed student use*. California / Minnesota: Centre for Research on Information Technology and Organizations.

- Becker, H.J. (2001). *How are teachers using computers in instruction?* Paper presented at the Meeting of the American Educational Research Association, San Diego, Ca..
- Becker, H. & Riel, M. (2000). *Teacher professional engagement and constructivist-compatible computer use*. Irvine: University of California - Centre for research on Information Technologies and organizations.
- Burns, T.C. & Ungerleider, C.S. (2003). Information and Communication Technologies in Elementary and Secondary Education: State of the Art Review. *International Journal of Educational Policy, Research, & Practice*, 3(4), 27-54.
- Cox, M., Abbott, C., Webb, M., Blakeley, B., Beauchamp, T. & Rhodes, V. (2003). *ICT and attainment - A review of the research literature*, ICT in Schools Research and Evaluation Series, 17. London: DfES/BECTA.
- Cox, M., Abbott, C., Webb, M., Blakeley, B., Beauchamp, T. & Rhodes, V. (2004). *ICT and Pedagogy – A review of the literature*, ICT in Schools Research and Evaluation Series, 18. London: DfES/BECTA.
- Davis, N. & Nilakanta, R. (2003). Quality @ a distance includes preservice teachers: one democratic approach. In G. Davies & E. Stacey (Eds.). *Quality Education @ a Distance*, Proceedings of the IFIP Conference Proceedings 2003, pp. 145-152. Amsterdam: Kluwer Academic Press.
- Dawes, L. (1999). First Connections: Teachers and the National Grid for Learning. *Computers & Education*, 33(4), 235-52.
- DVO (n.d.). ICT competencies in primary education. Brussels: Department of Education. Retrieved July 8, 2004, from <http://www.ond.vlaanderen.be/DVO/english/ICTprimary/ictcompetenciesprimary.htm>
- Galanouli, D., Murphy, C. & Gardner, J. (2004 ). Teachers' perceptions of the effectiveness of ICT-competence training. *Computers & Education*, 43(1-2), 63-79.
- Irish Department of Education and Science. (2003). *Blueprint for the Future of ICT in Irish Education – Three year strategic action plan 2001-2003*. Retrieved June 1, 2004, from [http://62.17.172.233/servlet/blobServlet/ict\\_strategy\\_01\\_03.pdf](http://62.17.172.233/servlet/blobServlet/ict_strategy_01_03.pdf)
- ISTE (2004). *International Society for Technology in Education*. National Educational Technology Standards web site. Retrieved March 22, 2004, from <http://www.iste.org> and <http://cnets.iste.org>
- ITS & IVA (2003). *ICT in cijfers - ICT-onderwijsmonitor schooljaar 2002-200*. Nijmegen/Tilburg: ITS/IVA.
- Jonassen, D. H. (1994, 1999). *Computers as Mindtools for Schools, Engaging Critical Thinking*. NJ: Prentice-Hall.

- Kirschner, P. & Davies, N. (2003). Pedagogic benchmarks for information and communications technology in teacher education. *Technology, Pedagogy and Education*, 12(1), 128-148.
- Kirschner, P. & Selinger, M. (2003). The state of affairs of teacher education with respect to information and communications technology. *Technology, Pedagogy and Education*, 12(1), 5-18.
- Knierzinger, A., Røsvik, S. & Schmidt, E. (2002). Elementary ICT curriculum for teacher training. Moscow: UNESCO Institute for Information Technologies in Education.
- Kommers, P., Jonassen, D. H. & Mayes T. (Eds.). (1992). *Cognitive tools for learning*. Heidelberg FRG: Springer-Verlag.
- Lelliott, A. (2002). Developing the ICT capable school. *Computers & Education*, 39(3), 313-317.
- Ling, L. & Mackenzie, N. (2001) The professional development of teachers in Australia. *Australian Journal of Teacher Education*, 24(2), 87-98.
- Martin, G. (2001). *Competency Framework for Teachers*. Perth: Education Department of Western Australia.
- Ministerie van de Vlaamse Gemeenschap (2003). *Statistisch jaarboek van het Vlaams onderwijs*. Brussel: Ministerie van de Vlaamse Gemeenschap, Departement Onderwijs.
- Morel, R. & Filliol, P.D. (1996). CMC (1) and NICTs (2) in Teachers' Education. Retrieved June 1, 2004, from [http://wwwedu.ge.ch/cptic/prospective/projets/fetich/fetich\\_draft.html](http://wwwedu.ge.ch/cptic/prospective/projets/fetich/fetich_draft.html)
- Murphy, R., Penuel, W., Means, B., Korbak, C., Whaley, A., & Allen, J. (2002). E-DESK: A review of recent evidence on discrete educational software (SRI International Report). Menlo Park, CA: SRI International.
- Murray, L. (1998). CALL and web training with teacher self-empowerment: a departmental and long-term approach. *Computers & Education*, 31, 17-23.
- Niemi, H. (2000). ICT in Finnish teacher education – evaluation with special reference to active learning and democracy. In W. Day & D. van Veen (Eds.), *Educational research in Europe*, pp.139-154. Leuven-Apeldoorn: Granat Publishers & EERA.
- Niemi, H. (2003). Towards a learning society in Finland: Information and communications technology in teacher education. *Technology, Pedagogy and Education*, 12(1), 85-104.
- Pearson, J. (2003). ICT and teacher education in Australia. *Technology, Pedagogy and Education*, 12(1), 39-58.
- Preston, C., Cox, M., & Cox, K. (2000). Teachers as innovators in learning: What motivates teachers to use ICT. London: Teacher Training Agency.

- Pritchard, A. (2001). Meeting the requirements of the initial teacher training national curriculum for the use of information and communications technology in subject teaching. *Journal of Information Technology for Teacher Education*, 10, 293-312.
- Reynolds, D., Treharne, D. & Tripp, H. (2003). ICT-The Hopes and the Reality. *British Journal of Educational Technology*, 34(2), 151-167.
- Riel, M. & Becker, H. (2000). *The belief, practices and computer use of teacher leaders*. Irvine: University of California - Centre for research on Information Technologies and organizations
- Schoolnet (2004). *ICT policies in Belgium*. Retrieved June 1, 2004, from <http://www.eschoolnet.org/ww/en/pub/eschoolnet/index.htm>
- Selinger M. & Austin, R. (2003) . A Comparison of the Influence of Government Policy on Information and Communications Technology for Teacher Training in England and Northern Ireland, *Technology, Pedagogy and Education*, 12(1), 19-38.
- Tan, S.C, Hu, C., Wong, S.K. & Wettasinghe, C.M (2003). Teacher training on technology-enhanced instruction – a holistic approach. *Educational Technology & Society*, 6(1), 96-104.
- van Braak, J. (2001). Individual characteristics influencing teachers' class use of computers. *Journal of Educational Computing Research*, 25 (2), 141-157.
- Waxman, H., Connell, M, & Gray, J. (2002). *A Quantitative Synthesis of Recent Research on the Effects of Teaching and Learning with Technology on Student Outcomes*. Naperville, IL: North Central Regional Education Laboratory.
- Waxman, H.C., Lin, M.F. & Michko, G.M. (2003). *A Meta-Analysis of the Effectiveness of Teaching and Learning with Technology on Student Outcomes*. Illinois: Learning Point/NCREL.
- Williams, D., Coles, L., Wilson, K., Richardson, A. & Tuson, J. (2000). Teachers and ICT: current use and future needs. *British Journal of Educational Technology*, 31(4), 307-320.

**List of Table captions**

Table 1. Mastery of technical, pedagogical and organisational ICT-skills ( $N = 178$ )

Table 2. Consistency between priorities in school policies and mastery levels of teachers

**List of Figure captions**

*Figure 1.* Variable model for the present study.

## List of Tables

Table 1. Mastery of technical, pedagogical and organisational ICT-skills ( $N = 178$ )

	Not developed	Beginners level	Basic mastery	Advanced level	<i>M</i>
Technical level	0	1	2	3	
Technical ICT-skills	14%	<b>33.1%</b>	<b>51.1%</b>	1.7%	1,4
Educational use of office packages	3.4%	<b>23.9%</b>	<b>67%</b>	5.7%	1,75
Working with multimedia	<b>43.5%</b>	<b>39%</b>	15.8%	1.7%	0,76
Development and management of a website	<b>84.3%</b>	<b>13.5%</b>	2.2%	0%	0,18
Determining and solving technical ICT-problems	<b>80.8%</b>	<b>16.4%</b>	2.8%	0%	0,22
Pedagogical-didactic level					
Knowledge of ICT policy of Ministry	28.2%	<b>42.5%</b>	<b>25.9%</b>	3.4%	1,05
Selection and evaluation of educational software	12.4%	<b>41.6%</b>	<b>41%</b>	5.1%	1,39
Integration educational software in teaching practice	5%	<b>38.5%</b>	<b>48%</b>	8.4%	1,60
Internet-use in the classroom	6.2%	<b>44.9%</b>	<b>41%</b>	7.9%	1,51
Educational use of ICT for specific subjects	6.7%	<b>38.2%</b>	<b>47.2%</b>	7.9%	1,56
E-learning (online, distance teaching)	<b>70.3%</b>	<b>21.8%</b>	6.7%	1.2%	0,39
Organisational level					
Developing ICT school policy	<b>46.6%</b>	<b>37.4%</b>	13.8%	2.3%	0,72
Planning and organisation integrated ICT use in the classroom	<b>38.6%</b>	<b>43.2%</b>	15.9%	2.3%	0,82

Table 2. Consistency between priorities in school policies and mastery levels of teachers

Training objectives	Level of priority in ICT policy <sup>a</sup>	Level of mastery by teachers <sup>a</sup>
<i>Technical level</i>		
Technical ICT-skills	normal priority (75.4%)	basic mastery/advanced level (52.8%)
Educational use of office packages	normal to high priority (76.7%)	basic mastery/advanced level (72.7%)
<i>Pedagogical level</i>		
Integration educational software in teaching practice	normal to high priority (95.1%)	basic mastery/advanced level (56.4%)
Educational use of ICT for specific subjects	normal to high priority (85.4%)	basic mastery/advanced level (55.1%)
<i>Organisational level</i>		
Developing ICT school policy	normal to high priority (85.6%)	no mastery / beginners level (84%)
Planning and organisation integrated ICT use in the classroom	normal priority (± between 40 en 50%)	no mastery / beginners level (81.8%)

<sup>a</sup>  $N = 178$

List of Figures

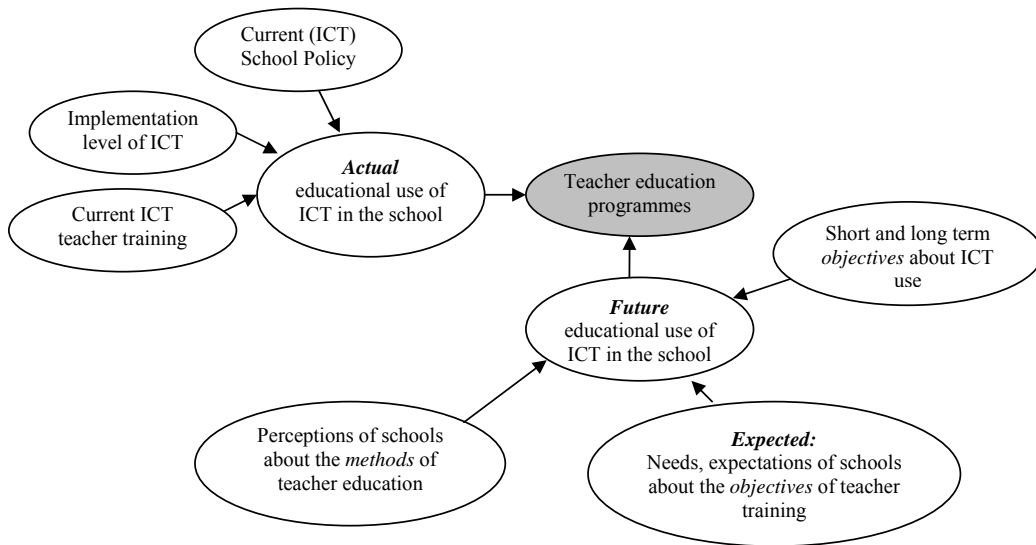


Figure 1. Variable model for the present study.