



IMPACTS OF ICT IN EDUCATION, THE ROLE OF THE TEACHER AND TEACHER TRAINING

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Abstract

The literature dealing with technology and pedagogy attests to the powerful impact ICT can have on the teaching and learning process. In terms of generic learning, the research indicates that levels of collaboration and communication are enhanced by the use of computers as are knowledge building and thinking skills. In various subject areas, there is also evidence that new technologies afford a range of opportunities that can transform teaching and offer improved possibilities for learning. It has also been claimed that using technology well in classrooms can even enable teachers to be more successful in helping students to be more effective citizens. While there may be some questions surrounding the methodology of these studies as well as some ex party extrapolation, it is certainly true to say that incorporating ICT into classroom situations can and does alter the traditional balance between teacher and learner. Whether this effect is ultimately 'good' or 'better', however defined, still depends on a host of variables, in particular, the way in which ICT interacts with teachers' epistemological and personal theories and the concomitant challenges it presents to the established subject sub-cultures of schools. The purpose of this paper is to provide some broader understanding of these challenges and thereby provide more theoretical contour to the various subject design initiatives already presented in the symposium.



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Introduction

The use of Information and Communication Technology in Teacher education is lagging behind expectation and desire. Hence, the advisory 'Committee On Multimedia In Teacher Training' The committee argues for a powerful role of teacher training in the process of educational innovation and the implementation of ICT. The teacher training institutes are providing the teachers of the future and the committee assumes that teachers are the key figures in arranging learning processes. The institutes, therefore, have to anticipate new developments and prepare prospective teachers for their future role. The nature and extent to which ICT is being used in education is considered to be a result of synergy between 'top-down' and 'bottom up' processes. In the latter especially, a contribution of the teacher training institutes can be expected. According to commit, teacher training institutes therefore have to shift their focus from dealing with present education to that of 'future education'.

Research method

This paper will discuss the questions concerning ICT and education . Several methods of data collection were used for this component of the project.

As described in the first paragraph, the main research question concerned the future learning environment and the teacher's prospective role. To know more about this future, several scenarios on future developments in education have been studied. Because many scenarios have already been completed, we did not perform our own study, but used the available literature. Published studies were scanned especially for the role and impact of ICT. Furthermore, experts were heard about this topic. We gathered additional information on the role of the teacher by visiting schools where ICT is already being used 'extensively'. Information on organizational level was gathered and interviews were conducted with teachers. These interviews were aimed AT the teacher's tasks, roles and required competences to fulfill these tasks and roles properly. In addition, literature on job profiles of teachers and implementation literature was studied.

A teacher requires many educational and didactical skills to deal with questions adequately. In concrete terms, it concerns matters like:

- A great pedagogical, didactical an educational psychological craftsmanship.
- To be a professional on the subject matter (vocational content)
- A large knowledge of (the application possibilities of) modern educational tools.
- Skilled to 'cut to size' of student guiding processes (e.g., formulating assignments, structuring the guiding process, assessment etc.)

The new learning environment differs from the one we are familiar with; the teacher has to cope with many more uncertainties. A curriculum in which lessons and content are fixed no longer exists. As a result, the teacher has to organise his work in another way (working in projects is mentioned explicitly). Moreover, the teacher cannot create new learning environments completely independently (anymore). He has to depend on al kinds of things like the technical infrastructure, timetables and the activities of other teachers. In doing so, the teacher loses a part of his autonomy (another core problem) and therefore, he is forced to collaborate with his colleagues in a way entirely different from that he was used to.

It requires skills like:

- Creativity
- Flexibility
- Logistic skills (e.g. for assigning work- and study places and grouping students)
- Skills for working in projects
- Administrative and organisational skills
- Collaborating skills.

Furthermore, the interviewed teachers especially underline the teachers' attitude concerning the use of ICT in education. New things are intimidating and are causing resistance. The teachers point out a 'professional attitude'. Important features of this attitude are being accessible for innovations in general and of ICT in particular. In the published literature, there are indications for this as well. Within this topic, one of our respondents pointed out the fact that ICT is the most fundamental of changes (in education) so far. For the first time, children can do something their parents cannot and which parents actually will never learn it in the same way.

Typically for vocational education in The Netherlands is the fact that schools often (called Regional Training Centre) provide small-scaled courses, mostly for the regional labour market. This requires an open attitude with a strong accent on exchanging information and a diverse offer of opportunities. Even for this, the teacher requires specific skills. It concerns skills like constructing and maintaining networks, social skills and sympathy for the problems companies are facing.

From the literature and our interviews we picked up signals about so-called basic ICT knowledge and skills a teacher had to possess. Therefore, so called 'ICT-driver's licences' have been created to serve as instruments for professional development of teachers. However, several questions can be asked about their usefulness. The opinions differ on this matter.

On the one hand, it is said that these drivers' licences present at least a minimal mastery-level of ICT. Moreover it can diminish some uncertainty and 'fear for the unknown'. In politics, furthermore, there is hardly any doubt about the future necessity of specific ICT knowledge that a teacher has to possess in order to function in his profession. Instruction should be compulsory if a teacher lacks this knowledge .

ICT in Teacher education

ICT is a generic term referring to technologies which are being used for collecting, storing, editing and passing on information in various forms. A personal computer is the best known example of the use of ICT in education, but the term multimedia is also frequently used. Multimedia can be interpreted as a combination of data carriers, for example video, CD-ROM, floppy disc and Internet and software in which the possibility for an interactive approach is offered .

Generally, the following functions of the use of ICT in education are described in literature ICT as object. It refers to learning about ICT. Mostly organised in a specific course. What is being learned depends on the type of education and the level of the students. Education prepares students for the use of ICT in education, future occupation and social life.

4. ICT as an 'assisting tool'. ICT is used as a tool, for example while making assignments, collecting data and documentation, communicating and conducting research. Typically, ICT is used independently from the subject matter.
5. ICT as a medium for teaching and learning. This refers tot ICT as a tool for teaching and learning itself, the medium through which teachers can teach and learners can learn. It appears in many different forms, such as drill and practice exercises, in simulations and educational networks.
6. ICT as a tool for organisation and management in schools.

However, given the lack of a sufficient response, a reliable image for the entire sector cannot be given, but an impression of the status quo of the use of ICT in vocational education is possible. ICT is never being used as a objective by 33 of 55 teachers; 27 teachers do not use ICT as teaching material and 21 teachers do not use ICT as an aid. If the computer is being used, then this is mainly for the purpose of word processing and exercising the lessons. Thus, it seems that the computer is being used especially for supporting more traditional educational settings

We can conclude that ICT has many technical possibilities, but that the real innovative use of ICT is not broadly adopted in Dutch vocational education.

A disadvantage of these digital driver's licenses, and of standardizing specific sets of ICT-skills in general, is the temporary character of these programmers.

ICT develops rather rapidly, and hence, we do not know and use all its opportunities yet. Moreover, these opportunities are still changing. Accordingly, teachers should be equipped with competences that prepare them for these constant changes; 'How does a teacher explore the opportunities and subsequently use them in his teaching?'

Because of the rapidly changing learning environments, teachers should be conscious of the fact that the skills they acquired, in their own training, reflect the current state of affairs. Therefore, they are expected to be responsible and act to be up to date their entire lifetime (life-long learning).

Also other counter-arguments can be mentioned:

- A variety of learning situations will (continue to) exist in the future as well. There will be schools and teachers who will hardly use ICT in education.
- Teachers have their own responsibility to acquire some ICT-skills. It is part of their professionalism. Hence, digital driver's licenses should not be legally compulsorily.
- The problem will solve in time. 'We should focus on the students and the problem will solve in time' (according to a respondent).

A different position of Teachers and teacher training institutes.

Our results call for a re-evaluation of the research assumptions. The hypothesis was that well-educated teachers are the answer for successful implementation of ICT in education. This is but a partial requirement. Our argumentation follows below.

In our research, we mainly focused on the role of the teacher. Gathering from our case studies, it seems we have to do with enthusiastic teachers in richly ICT-designed learning environments, who enjoy to explore the possibilities of ICT and who like to experiment. Furthermore, they themselves take action to solve their (possible) lack of knowledge and skills. This information may give the impression that the implementation of ICT in education will succeed merely with well-motivated and capable teachers. In practice, it seems that a large part of the so-called ICT pilot projects are not being implemented within the broad range of the entire school. For eventually creating 'new' education in which ICT is being used adequately (where possible), we need more than just well-equipped teachers. The teacher is part of an entire school organisation. Published literature concerning implementation processes of innovations (in general and of ICT in particular) point out relevant factors within the school organization which influence a successful implementation of ICT. It concerns the following, related, factors:

- Organizational preconditions (vision, policy and culture)
- Personnel support (knowledge, attitude, skills)
- Technical preconditions (infrastructure)

The teacher depends on the specific situation in the school and therefore, he cannot act autonomously.

The teacher training institutes

As for the implementation of ICT in education, the PROMMITT committee assumes a great contribution of the teacher training institutes and considers them a driving force (a key-position via so-called "bottom up" processes). Presently, the teacher training institutes fulfill this key-position on only a very small scale, as we concluded from our interviews and

literature analysis (Janssen Reinen, 1999). Teachers mention they are hardly prepared for new didactical teaching methods and not in the least for the use of ICT. The learning process often is organized based on the subject matter. Even if these teacher training institutes are well-equipped and students are educated properly, we can not expect young and just starting teachers to act as 'change agents'. They have to adjust to the situations they encounter, and have to familiarize themselves with new concepts and new applications. This is no simple task. To enlarge the role of the teacher training institutes in the process of implementing ICT, it is suggested to stimulate a collective approach (teachers, schools, teacher training institutes and teachers in training) of solving problems in concrete teaching and learning situations. The following arguments support such an approach;

- Richly ICT-designed learning situations are created and are needed for both vocational education and the training of future teachers (in the teacher training institutes) The more the teacher training institutes develop their curriculum using up-to-date applications, the greater the risk of educating students for unrealistic situations (comparable situations do not exist) (cf., the Dutch so-called experimental teacher training institutes). Teacher training institutes can anticipate by helping and equipping the schools (vocational education). The institutes may even consider to finance or to invest.
- Teachers could learn from each other. The rapid developments of ICT require a communication network which actually can be established by the proposed approach. Teachers learn most from their own networks . There is a great need especially for learning about ICT and its rapid developments. Teacher training institutes can fulfil an active role in (learning) networks, on the one hand by arranging and facilitating these networks and on the other hand by providing the knowledge from which people can learn. Additionally, the institute can develop its post-initial education in this way.
- Schools and teacher training institutes experience a comparable process. Schools and teacher training institutes can learn from each other's experiences and expertise as well. They experience the same processes in designing new education. They have similar questions and face the same challenges. Co-operation based on shared responsibility for educating proper teachers requires a search for as many ways as possible to fulfill this ambition .

NEED of ICT

- 8) **Source of information** – ICT covers most of the mass media such as newspapers, television, satellite, internet, etc. Thus there is a vast ocean of knowledge and information available waiting to be tapped and disseminated.
- 9) **Balanced development in rural and urban areas** – There is a strong need to remove social and economic heterogeneity in society especially in a highly populous country like ours where nearly 70% of our population lives in villages. True progress of our nation can only take place when the rural areas are also equally involved and upgraded with modern technology.
- 10) **Distance education** – More and more people are opting for distance education for several reasons – earn and learn, part-time education or just for gaining more knowledge. Thus with ICT the best of education can be received sitting in any remote corner.

- 11) **Online or e-learning** – E-learning is the new mantra where anything and everything is available on the World Wide Web. But to avoid overloading of information, one needs to use ICT for the proper organization and distribution of this knowledge.
- 12) **Conferencing** – Time is money and the jet-setting executives and professionals need to constantly stay in touch and updated. With the help of ICT, people can stay in touch personally and in real-time.
- 13) **Exchange of views and ideas** – Man is a social animal. He constantly needs to interact with other people of his kind and ICT greatly facilitates this process.
- 14) **Shrinking the globe** – Due to globalization and huge influx of mass media, the world has become a small place and it is needed to know about all the peoples of the world for better social understanding and development. Here too ICT can play a key role.

Challenges of ICT

- 9) **Infrastructure** – No electricity, no proper personnel to handle computer labs, improper facilities like spoilt switches, broken, unplugged wires, etc all hampers the implementation of ICT.
- 10) **Finance** – Lack of funds or their improper distribution to buy latest technology gadgets such as computers, k-yans, OHPs, LCDs, tape drives, UPS systems, servers, etc.
- 11) **Lack of Trained Teachers** – Inexperienced teachers who do not know the fundamentals on how to operate the ICT devices or help students to make use of ready software
- 12) **Student Ability** – All students may not have the requisite skills or abilities tuned to using or learning through ICT.
- 13) **Load Shedding** – Electricity is a pre-requisite to running computer labs and load-shedding is a common problem in our country.
- 14) **Psychological preparation** – Students and Teachers both can have mental blocks in using ICT devices thinking these are complicated and difficult to use.
- 15) **Technical challenges** – Qualified hardware technicians need to be called or employed for the regular maintenance of ICT tools.
- 16) **HOTS** – For certain tasks and understandings, and preparation of education software people with high cognitive abilities are required.

Conclusion

Rapid changes in technology will ensure that ICT will proliferate in the classroom. It is predicted that there will be many benefits for both the learner and the teacher, including the promotion of shared working space and resources, better access to information, the promotion of collaborative learning and radical new ways of teaching and learning. ICT will also require a modification of the role of the teacher, who in addition to classroom teaching, will have other skills and responsibilities. Many will become specialists in the use of distributed learning techniques, the design and development of shared working spaces and resources, and virtual guides for students who use electronic media. Ultimately, the use of ICT will enhance the learning experiences for children, helping them to think and communicate creatively. ICT will also prepare our children for successful lives and careers in an increasingly technological world.

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