ICT Related Tasks and Challenges In The New Model of Technical Teacher Training

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Abstract— **As constant changes become a commonplace of everyday life, the clearly perceptible processes by which learning spaces are expanding are releasing new teaching and learning potentials and creating the opportunity to build knowledge networks. The symptoms of this development can be seen in the behaviour of learners, the formation of e-learning habits and the spread of community-based forms of communication. The effect of these changes can be perceived in the transformation of the roles of both teachers and students, and of the learning environment. The results of the survey conducted on a micro-scale in connection with the performance appraisal of the new elements may be relevant to the new educational and graduation requirements for technical teachers currently being formulated, and may help to guide future syllabus design and teaching material development. The results of the survey informs future teachers on how the new benchmark analysis is implemented in micro environment and can help appoint future training requirements and develop the appropriate curriculum.**

Keywords-ICT; learning network; Web 2.0 communication; e-portfolio.

I. INTRODUCTION

If the development of the learning environment is analysed in terms of changes in human behaviour, it can be seen that a new generation is developing whose members are devotees of online education. This generation moves more easily in the info-communication space than previous generations and it is becoming ever more informed and organized. With these competencies, the members of this generation get more information and support from each other than from the various institutions.

Forecasts predict that the role of learner communities will grow. These new communities are characterised primarily by their common areas of interest, where the learners interact with each other, learn together and amass shared reserves of information sources [1].

This nascent practice does not, however, preclude learning opportunities in a system of higher education in a period of transition. In this dynamized "learning space", the classic roles (teacher-student) are scarcely perceptible, as thanks to the altered architecture of the net, an architecture which is based on collective knowledge sharing and content

generation with simple user interfaces, "every downloader will potentially become an uploader" [2].

First, the paper presents the items in the digital learning, then the E-portfolio support system, and, finally, shows an empirical research.

II. ICT IN LEARNING ENVIRONMENTS

A. Items in the Digital Learning

ICT (Information and Communications Technology) and the development of forms of e-learning is characterised by ubiquitous computing, in which it is necessary to take into consideration the technical and societal qualities of a learning space shaped by virtual reality. In this space, an organic learning environment, an educational theoretical basis may be provided by e-learning. In this learning paradigm the key differentiating features are interactivity, the ability to manage time and space and asynchronous learning. All this is understandably in tension with traditional forms of education and instruction—teaching and learning which in some cases has remained unchanged for decades, cloistered in a closed world of classrooms. The forms of learning, which are taking shape under the influence of new technology are characterised by a focus on devices for individual use, alongside constant striving for interactivity and the application of networks.

The learning network is not merely a pedagogical theory, but an environment where the application of a new pedagogical theory of learning effectively supports the acquisition and generation of knowledge. Currently, the main features of the interaction between education and information are:
- Developed forms of human-machine interaction
- Spatial and temporal independence
- The ubiquity of mobile telephony
- The opportunity to create a complex multi-media "learning space"

The Web 2.0 [4] concept does not only refer to new forms of websites and services, but also to the technologies they are based on which allow community content development, and to the ability of these social networks to democratically locate the individual. Pedagogically speaking, the Web 2.0 implies openness to constructive forms of communication, which include free or low-cost

services with well-developed ICT support. Currently, such services can be said to include (and this list is far from complete) social networking services (Facebook, iWiW), photograph sharing sites (Flickr), video sharing sites (YouTube, Videa) and various types of blogs. Wikipedia and other open freely editable information resources have significant potential for content development, and auction websites (Vatera, eBay) can also be counted as part of Web 2.0, Twitter, various social bookmarking sites (delicious), forums, online office suites (Google Docs), web (news)feeds (RSS) and file hosting services (Dropbox, Google Drive). In the Web 2.0 environment, the fundamental orientation is towards community participation and creative application of methods which are based on community content development. From a pedagogical standpoint, it is particularly important to recognize that in the Web 2.0 space the users jointly create the content and share the knowledge thus generated with each other [2]. It is, however, typical of web 2.0 services—and in this the progressive institutions of higher education are pioneers—for the institution to provide a technological framework and organizational structure where the users upload and develop content themselves, and where the system facilitates the further development of knowledge, knowledge sharing and the expression of opinions. All this requires the establishment of technical and ethical norms, which will have a defining role in the development of these systems.

The technical criteria of individual-oriented learning are also changing in step with the spread of information technology, broad-band internet access and access to mobile networks. The greatest challenge for traditional pedagogical thinking in the coming years will come in the shape of the spread of nonformal learning. It is becoming a universal tendency in developed countries for this form of learning to play an ever more important role in comparison with institutional study. This is also the case when this form of learning is not typified by formal qualifications or degrees, although learning goals and content are still important in their absence. Mobile learning is growing in significance for learners/students in initial training, as well as in later periods of study.

Beyond those learning forms which function outside of formal education (in the school system): informal learning, atypical learning encompasses all the methods (distance learning, open learning), which exercise an influence on the intellectual and physical development of the individual [2].

Digital pedagogy has arisen as a response to the questions raised by the interplay of new technology and education described above. Its aim is to make as wide reaching a study as possible of all related challenges and opportunities which affect active participants in the teaching and learning process. As the media environment has transformed, the teaching objectives and roles need to be reformulated too. It is worth considering the ways and means in which interactive solutions and online and mobile support can be incorporated when planning courses in

various contexts. The aspects of the latest incarnation of the Web (wikis, blogs) make ICT device based education usable on an everyday level.

Grouped from a pedagogical perspective, work on the following content types, activities and processes is especially applicable to Web 2.0 communication:

▪ Varying levels of education, competence and knowledge. Raising awareness, boosting motivation. Communication management implementation in learning
▪ Computer literacy; development of required abilities and attitudes. Giving recognition of an individual's level of knowledge
▪ Formation of learning communities. Collaborative and co-operative learning
▪ E-learning as the application of distance learning in a virtual educational environment
▪ The use of blogs in education: course-blog, podcast, videoblog as (homework) assignments [4].

B. E-portfolio support system–Mahara

Portfolio is a word of Italian origin meaning a dossier or folder of documents, or an expert's dossier, or in more prosaic terms it refers to a collection of a student's work. Many definitions have been proposed, the one used here is that cited by Iván Falus and Magdolna Kimmel: "The portfolio is a purposeful, systematic collection of works completed by a student on one or more courses". It has two objectives: on the one hand it is for assessment purposes, on the other hand to aid in learning [5].

Three basic types of portfolios can be distinguished: [6][7]:

• The Working portfolio (progress documenting collection): The student collects all documents pertaining to a particular learning process in this portfolio. This type of portfolio fulfils the role of demonstrating the presence and level of development of teaching competences. The student can then receive regular feedback on the basis of these documents, and evaluate her own progress.

• Showcase (Best works) Portfolio: Only the best work of the student is included in the showcase portfolio. This work is selected by the student himself from among the documents in the working portfolio which in his opinion best reflect him and his achievements. Naturally in order to do this the student must be able to judge which his best pieces of work are, and it is necessary for the student to have access to a clear evaluative framework.

• Assessment portfolio (evaluation of results): this is a type of alternative assessment, measured against external assessment criteria. Every document has to meet a certain standard of achievement, and so the assessment criteria are the boundary lines for this type of portfolio. The main aim is for the teacher to evaluate the student's achievement not by means of traditional grades but holistically, with the help of representative samples of the student's work.

Portfolios have a long history in Hungarian public education, as when, for instance, portfolio-based methods were tested in a number of primary schools as part of the Hungarian Institute for Educational Research and Development's "MAG" ("seed") project. The results of this initiative are presented in the OKI (National Institute of Public Education)'s publication "Magtár–Ötletek tanítóknak a fejlesztő értékeléshez és az adaptív tanulásszervezéshez" (Seed-store–Ideas for educators towards formative evaluation and adaptive learning management) [8]. The goals of the portfolios which were created in this project were decided upon by the teachers involved, and consequently the aims and content of the portfolios were extremely varied. Some educators set out to assess all of the students' work over a school year, while others focused on the students' progress in a single subject or course. Some teachers focused on the achievements of only one student, while others dealt with whole classes or larger groups.

In 2009, the BME Department of Technical Education and the BME Institute for Applied Pedagogy and. Psychology (APPI), recognising the difficulties of implementing a traditional portfolio system drawing on experience garnered from the final examinations of the first graduating year, while bearing in mind environmental protection, and the growing power of electronic forms of learning, introduced an electronic portfolio framework employing the Mahara electronic environment integrated into the Moodle system, which has been in use since 2006 [9]. The applications of a electronic learning environment and computer based learning have become widespread in Hungarian higher education [10][11].

The e-portfolio, that is, an electronically-based portfolio, aims to face the challenges of the constantly and rapidly evolving ICT environment and fulfil the learning needs of the digitally savvy "generation Z" as well as the need to optimize the process of gathering work for assessment. The e-portfolio is especially suitable for the following tasks:

- Management of multifaceted complex dossiers
- Handling large quantities of documents in a single system
- Continuous preparation and monitoring (by mentor teachers)
- Gaining experience in the use of current technology-centred theories of learning
- Excellent ICT support
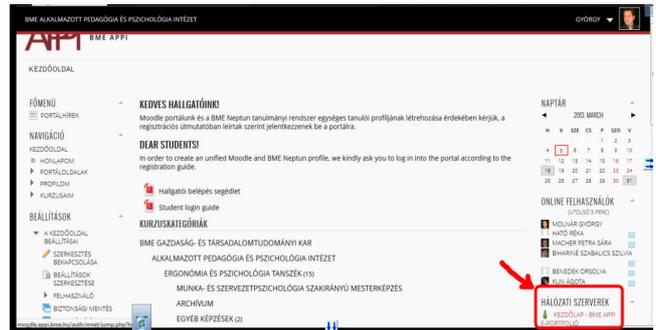
Figure 1. E-portfolio in the BME Moodle.

The Mahara system can be directly accessed at the [12]. It can also be reached through the Moodle system via a link in the bottom right hand corner of the page (See Figure 1.). The figure below shows the main options page ("dashboard") after logging on:

Figure 2. The Mahara interface after logging on.

Using this interface is relatively simple for users, and the "drag and drop" technique can be used to edit the user profiles. Uploading files and blog posts is also straightforward, by means of the browser function and text box editing (See Figure 3.) [13].
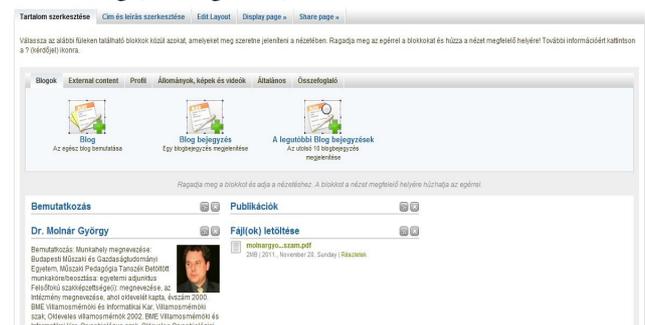
Figure 3. Editing a Mahara profile.

The e-portfolio system facilitates the creation of community forums and groups, and it even has an instant messaging function. Employing this model, for example, the BME Department of Technical Education established a group for mentor teachers and students pursuing engineering teacher training, for which all participants had to register and create their own profiles. The members of the groups

could thus directly contact each other through the system, as well as the mentor teacher and a maximum of 4-5 trainee teachers assigned to him. The interface also facilitated the tracking, monitoring and evaluation of work added to the portfolios over the course of the semester.

The uploading of documents takes place by means of the file management interface on the first page of the site. Trainee teachers belonging to the group are able to edit the folders containing work they have already uploaded, which they can then share to make them accessible to university students and mentor teachers. The structure of the portfolio, in accordance with the theoretical elements of the relevant legislation, is organized into 3 main folders. A student's e-portfolio created in this way is shown in the following screen capture image (See Figure 4.)[14].
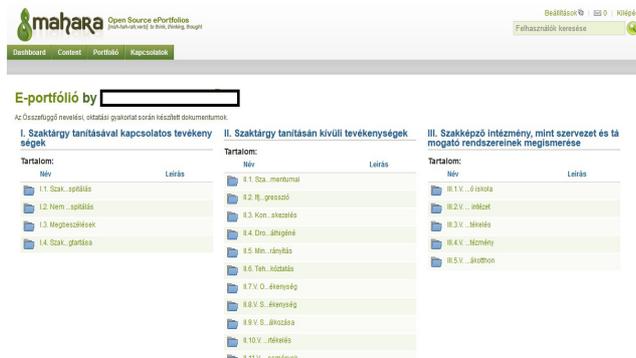
Figure 4. A Trainee Teacher's portfolio in Mahara.

C. Description of the research

The main hypothesis of the research is that, in order to provide high quality education, there is just as much of a need for future teaching professionals who are well-versed in methodology, learning technology and their own subject area at school and vocational college level as there is in higher education. At the same time, the recent changes present student teachers with significant challenges along with the increased burdens related to admission and graduation requirements and new types of tasks.

The numbers of university students graduating and beginning courses under the Bologna system were initially rather modest. The figures obtained retrospectively after 4 years were:

- 1st generation–6 students (2009)
- 2nd generation–18 students (2010)
- 3rd generation41 students (2011)
- 4th generation57 students (2012)

A cross-sectional performance appraisal was conducted in autumn 2012 to gauge participants' impressions of and satisfaction with the new education format. The investigation employed a well-established approach in pedagogical practice: the online questionnaire. This comprised 24 closed-ended multiple choice questions or Likert-scale type items. Number of the answers are N=116.

The survey used a closed-ended type survey engine to collect the respondents' answers [15].

The figure below shows the distributions of several typical results of the survey.

The area where students had the greatest difficulty in creating their teacher portfolios was assembling and organizing suitable documents to include.
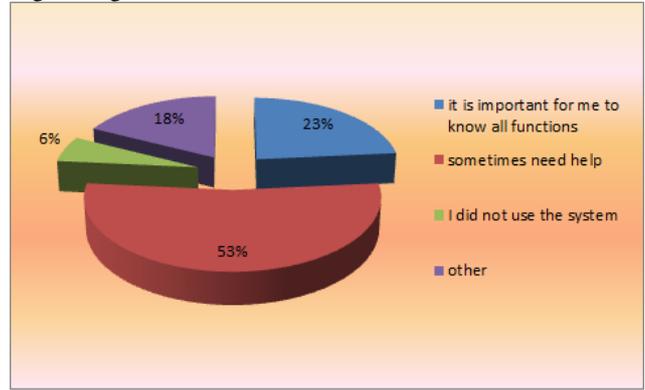
Figure 5. Competencies in using Mahara.

53% of the respondents were satisfied with their ability to use the Mahara system, and only rarely required assistance with it (See Figure 5.).
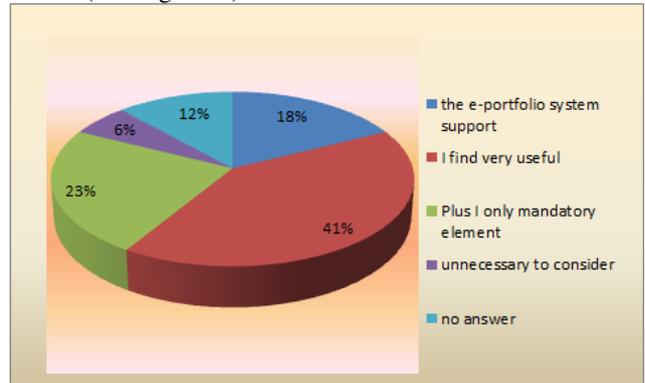
Figure 6. The role of Mahara in preparing teacher portfolios.

41% of the respondents rated the Mahara system as very useful for preparing the e-portfolio (See Figure 6.).
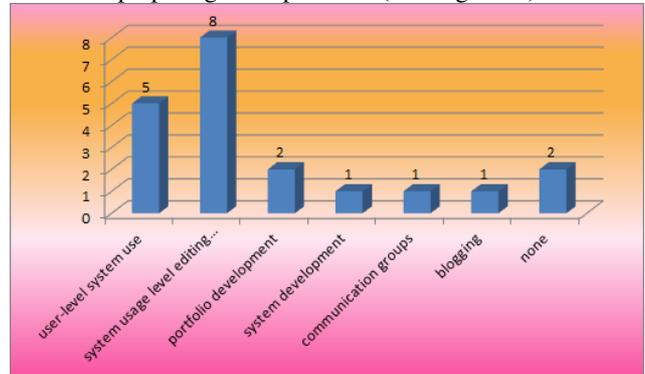
Figure 7. Further reasons for using Mahara.

More than half of the respondents required assistance connected to editing their portfolios, and a quarter needed help to use the system at all (See Figure 7.).

III. CONCLUSION

The evaluation indicates that 35% of those asked found the preparation of the portfolio the most difficult part of the assessment, while 28% found teaching practice the hardest, and the final examination was considered to be the least challenging of the tasks they faced. This may be explained by the need for students to familiarize themselves with elements of the course which were new to them, and to gradually learn the necessary skills by the time they took the final examination. The majority of respondents rated the Mahara portfolio management system as very useful, and only occasionally required minor assistance in using it, and would willingly use it in the future for other applications. In addition the respondents wished to learn more about other portfolios created by the community, and would welcome reinforcement of the system's approach. The majority would support the incorporation of material regarding the e-portfolio into one of the course modules. According to one written opinion, "Wide-scale use of (the system) becomes increasingly essential as the pedagogical work progresses." [15].

The new, currently still evolving teacher training model raises numerous important questions and will replace current courses by 2016 at the latest. The road to that destination is a long and rather winding one. The results of the survey conducted on a micro-scale in connection with the performance appraisal of the new elements may be relevant to the new educational and graduation requirements for technical teachers currently being formulated, and may help to guide future syllabus design and teaching material development.

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