Learning supported by technology in higher education: From experience to practice

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Abstract
This exploratory paper focuses on applying information and communication technologies (ICT) in educational settings, particularly in higher education. Based on qualitative data studying four courses in detail, the article starts by discussing educators’ expectations associated with technological advances. It proceeds to discuss the concept of learning based on Bruner’s concept of agency, collaboration, reflection and culture concerning the transformations that ICT brings to the educational environment. It analyses the ICT-supported activities employed by teachers in four different types of courses: a) face-to-face (f2f) with a formal use of ICT; b) f2f with a creative use of ICT; c) online learning; and d) blended learning. The paper concludes with design considerations for a university course that reveals the potential of ICT to support intense, varied and continuous engagement in the learning process within the framework of Bruner’s principles.

Keywords: ICT, learning, educational environment, university pedagogy

Introduction
The extensive employment of Information and Communication Technologies (ICT) at many colleges and universities shows that we have entered a new era in higher education. However, a number of expectations concerning the improvements that technology could bring to teaching and learning were not realised (Trinkle, 2005). One of these is that the implementation of advanced technologies alone did not transform learning and teaching processes from being highly teacher-dominated to student-centred. The other is that the use of technology did not automatically enable students to develop their problem-solving abilities, information-reasoning skills, communication skills, creativity and other higher order thinking skills (Guri-Rosenblit and Gros, 2011; Katz, 2005; Zemsky and Massy, 2004). The simple fact that today’s learners use ICT for entertainment to present themselves and show off their work does not mean they are enthusiastic about studying through the Web (Guri-Rosenblit and Gros, 2011). "What is growing ever more obvious is that today’s undergraduates are generally far less prepared to do research than were students of

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earlier generations, despite their familiarity with powerful new information-gathering tools” (Breivik, 2005, 22). As a result “boundless access to information has led to a decrease in the critical thinking skills needed to deal with information” (Katz 2005, 5).

In order to manage technology-enhanced learning effectively, the role of teachers and educational establishments should be re-evaluated and the importance of constructing knowledge rather than imparting information should be emphasised (Guri-Rosenblit and Gros, 2011). It has become clear that academic faculty should focus on the use of digital technologies in schooling in educationally meaningful ways (Starkey, 2011).

The aim of this article is to analyse the use of ICT in the learning environment from a university teacher’s perspective. The article presents findings of participant observations of fully online learning and blended learning as well as Web facilitated face-to-face courses. The courses presented in this study are designed by a state university in Sweden and a private research university in the USA. Moodle and a Blackboard learning management system are the central computer applications that provide students and teachers with a platform for communication and sharing content online.

The aim of the analysis is to show how university teachers employ ICT in different educational contexts during a pilot study on ways to enhance students’ active participation in the learning process, foster their self-reflection, and stimulate the active exchange of experiences. The main research question was: How can teachers best design educational environments to support the cognitive side of the learning process by means of ICT?

**Theoretical Perspective**

To understand the benefits of the use of ICT in the educational environment it is necessary to analyse the concept of learning itself. Learning can be viewed from three different perspectives (Brown, 1997). They are what, where, and how. The what of learning includes the curriculum within the set of courses and their content which students are supposed to acquire. The where and how are the situations where the learning is happening (p. 399).

Advances in technology can be applied to all of these aspects. The content is no longer limited to books. Classroom instruction is no longer the only way of acquiring new information and mastering new skills. On the contrary, the networked content is more attractive to learners because it incorporates colourful visualisations, animated graphics, and interactive applications. The content that appeals to learners’ needs and interests is accessible across the globe. Technology has made it possible to connect students with remote and virtual laboratories, and to involve them in ‘mixed reality’ environments. Software applications support the search for, organisation, interaction and distribution of materials that make educational environments much richer.
Wireless, mobile computing, not just laptop computers but also mobile phones are making learning more accessible and interaction more realistic.

Although collecting and managing information is really important for learning, it is not the ultimate goal of education. The main focus should be put on the process of knowing (Piaget, 1978; Vygotsky, 1978). This means that educators should encourage learners to construct meaning rather than to simply sort knowledge into categories. According to Bruner (1996), it is possible to foster the learning process if the following learning principles are considered. They are: (1) agency; (2) reflection; (3) collaboration; and (4) culture of a learner.

The first principle of agency emphasises the active strategic nature of learning. According to Bruner, a learner is one who takes control of his/her own mental activity. A learner’s mental activity is a proactive, selective and problem-oriented process that leads to the transfer and creative use of knowledge. Consequently, learners should be involved in a dynamic process in the course of which they actively choose and evaluate strategies, consider resources and receive feedback.

In the ICT world it is important for learners to recognise when they need new information, to ask good questions in order to find this information, and to evaluate whatever they find (Collins and Halverson, 2010; Jenkins, 2006). Such a shift from “just-in-case learning” to “just-in-time learning” (Collins and Halverson 2010, 20; Garrison and Vaughan 2008, 116) requires new “digital didactical designs” (Jahnke 2012, 68). These designs must have a focus on developing generic skills and should provide opportunities and resources for learners to engage in authentic activities that lead to the co-construction of new knowledge in the process of interaction (Fischer, 2011; Jahnke, 2013; Jenkins, 2006).

The second principle is reflection which Bruner defines as “learning in the raw”. Since understanding is an ultimate goal of the educational process it is important to help learners recognise and monitor their learning experiences. This type of knowledge and control over thinking has also been studied under the heading of metacognition. A metacognitive approach to learning focuses on sense-making, self-assessment, and reflection on what worked well and what needs improving (Palincsar and Brown, 1984). It helps increase knowledge transfer and helps learners keep acquiring adaptive expertise.

Web 2.0 tools as educational blogs, podcasts and e-portfolios allow learners to create a dynamic, reflective and multimedia record of their achievements. For example, educational blogs can encourage reflective discussions through reading the ideas of others and posting work for community comment and feedback. However, this activity cannot be successful if learners do not fully understand the purpose and aim of their blogging (Granberg, 2010; Mason and Rennier, 2010; Wood, 2012). E-portfolios encourage reflection on learning as they help students relate new material to concepts with which they are already familiar, prompt them to think further about issues and consider other perspectives (Mårell-Olsson, 2008).
Podcasts can be part of e-portfolios that present students’ oral histories about the results of their work (Mason and Rennier, 2010).

The third principle is collaboration. Initially, learning is a social process. Intellectual development is achieved when learners are involved in learning activities in which they interact with each other (Vygotsky, 1978). In recent years, an expanded analysis of the zone of proximal development (ZPD) has emphasised the importance of a cooperative environment (that includes cultural tools, varied forms of social interaction, and interpersonal scaffolding) for the co-construction of knowledge (John-Steiner and Mahn, 2002; Wells, 2002). Some authors refer to these processes as the “collective zone of proximal development” (Moll and Whitmore, 1993). Bruner (1996) underlines that to promote an atmosphere of joint responsibility, mutual respect and a sense of personal and group identity expertise should be deliberately distributed among members of the community. “No one is an island; no one knows it all, collaborative learning is necessary for survival” (Brown 1997, 411).

In an atmosphere where knowledge is produced collectively and communication occurs across boundaries, careful listening and deeper communication allows for the sustained social production of knowledge (Jenkins, 2006). Networked communication leads to creating “affinity spaces” (Gee, 2004) where participants from different backgrounds share their knowledge and work through interpretations with others studying the same problems. In such communities, participants are both learners and active contributors (Fischer, 2011) and knowledge is no longer viewed as a product, it is always in process (Jenkins, 2006). The shift in teacher-learner roles has currently served as a basis for developing some open online courses such as peer to peer (P2PU) per se. By promoting values such as openness, community and peer learning, the courses attempt to develop a model for lifelong learning alongside formal higher education (Ponti, 2013).

The extensive use of ICT has resulted in further development and reconceptualisation of the Vygotskian concept of Zone of Proximal Development (ZPD). Lund and Hauge (2011) propose artifact as a third constituent of learning and teaching in addition to speech and writing. They underline the importance of a teacher to understand the role of artifacts in educational activity. They also emphasise the need to re-estimate the “teaching | learning balance” (Lund and Hauge 2011, 269) when developing design for learning environments. Ponti (2013) views networked technologies as a mediator between self-directed learners and facilitators. In her study, she shows that digital media can sustain “a horizontal learning process among peers, and not a vertical one, where one person transmits content to many” Ponti (2013, 12).

In other words, pedagogy of the current era relies significantly on interaction. However, this interaction is not necessarily limited to communication between human beings. Learners can nowadays interact with rich technological environments such as a computer tutor or a game on the Web as well as with other people by means of a computer network.
The fourth principle is culture which “shapes the mind, . . . [and] provides us with the toolkit by which we construct not only our worlds but our very conception of ourselves and our powers” (Bruner 1996, x). Learning cannot happen outside of a situated, cultural context. Understanding and knowledge construction is based on what is already known and believed (Piaget, 1978; Vygotsky, 1978). The meanings that are attached to cultural knowledge are important for promoting transfer. If students’ initial ideas and beliefs are ignored, the understandings they develop can be very different from what the teacher intends (Bransford, 2000). It is important to design classrooms that foster the active exchange of multiple roles and multiple voices (Bakhtin, 1986). In this case, the culture of learning, negotiating, sharing and producing work that is displayed to others forms the backbone of the educational environment (Brown 1997, 401).

The new media environment brings people with different cultural backgrounds together. It creates a space where it is possible to cluster like-minded people together as well as introduces groups or individuals with conflicting values and assumptions. The emergence of new knowledge cultures requires the mastering of new social skills that ensure mutual respect and do not ignore differences (Collins and Halverson, 2010; Jenkins, 2006). In the modern world, educators “should help students acquire skills in understanding multiple perspectives, respecting and embracing diversity of views, understanding a variety of social norms, and negotiating between conflicting opinions” (Jenkins 2006, 53).

This discussion began with the suggestion that in the “new pedagogy era” (Collins and Halverson 2010, 23) the use of ICT can be beneficial in educational environments if teachers understand what learning is and how it is achieved. This principle will be explored in the next section based on experiences gained in the course participations and teacher interviews analysis. The main focus is to reveal how participation in ICT-supported activities can enrich learning dimensions such as agency, reflection, collaboration and culture.

Method
A qualitative pilot case study was carried out in two universities, namely:

1. a private research university in the USA; and
2. a state university in Sweden.

The courses target graduate students in Education. The first qualitative method used in the current study was ethnography and participant observation (Bryman, 2008). In the first university, seven courses were taken during the 2010/2011 academic year and, in the second, two courses during the 2012 Fall Semester. The researcher participation included attending all the classes and/or watching teachers’ tutorials online, reading the required course literature, active participation in discussions
and/or forums and group projects, and completing all the assignments, except the final ones. Four courses were chosen for the further qualitative analyses. The main criteria for this selection were: (1) the number of hours students spend in online sessions and face-to-face meetings; and (2) the nature of the ICT-supported activities provided by the teachers during the course. As a result, the following four courses were selected for the current study: a) face-to-face with the formal use of ICT; b) face-to-face with the creative use of ICT; c) fully online learning; and d) blended learning.

In-depth interviews were conducted in order to reveal the teachers’ thoughts concerning their purposes for using ICT in the educational environment and the way in which Bruner’s four principles can be supported during the courses. This method is typically used with a small number of respondents to explore their perspectives on a particular idea, programme or situation. Such interviews are often used to provide context to other data, offering a more complete picture of what happened in the course and why (Boyce and Neale, 2006). This type of interview requires purposeful sampling and in this study participants were selected according to the courses they teach. Eight teachers from the American university were contacted through e-mails and were asked open-ended questions. Two replies were received. Six Swedish teachers were interviewed face-to-face in their offices. The interviews were tape-recorded and transcribed verbatim. Among the interviewees there were: one participant who was teaching a face-to-face course with the formal use of ICT (Teacher 1); two participants who were teaching a face-to-face course with the creative use of ICT (Teachers 2, 3); three participants who were teaching a fully online course (Teachers 4, 5, 6); and two participants who were teaching a blended course (Teachers 7, 8).

The following section outlines the four courses and each course activity is identified with letters and numbers to clarify subsequent discussion. Each letter refers to the course category while the numbers specify the activities within the course.

**Course Descriptions**

**Face-to-face course with the formal use of ICT (A)**

Course A is a traditional lecture-based course with seminars that lasts for 12 weeks with two sessions per week on one day. Thirty-four students were registered and completed the course. During the course the lectures were presented in PowerPoint format. Seminars were supported by a collection of academic journal articles. The main focus of the lectures was for the teacher to interpret difficult passages from the reading materials. Seminars were mainly based on the course literature discussions in small groups (A1). The discussions were moderated by a group of students (A2) and limited in time. The groups were formed during the first class session according to the topic of the group project. The ideas for the projects were offered by the teacher. The conclusions of the discussion were presented by each group to the whole class at the end of the seminar. The assessment for the course consisted of...
moderating the small group discussions during the seminars, preparing a group project presented at a final seminar session (A3), and a final paper (A4).

ICT was primarily used during the course as an administrative tool rather than a tool for participating in inquiry-oriented activities. As stated by Teacher 1, “... ICT is used mainly for group messages, sharing course materials and teacher announcements” (A5). However, the same respondent stated that “... it is more my initiative to use ICT in the educational process although it is a policy of the university ...”.

**Face-to-face course with the creative use of ICT (B)**

Course B was delivered via a three-hour class session and lasted for 6 weeks with two sessions per week. The classes were not separated into lectures and seminars. Twenty-six students were registered and completed the course. The course was designed to involve students in: (1) negotiating activities during the class meetings both as the whole group and in small teams; and (2) online activities that encouraged students to become more actively engaged in their learning between classes.

Class discussions were based on online reflections the students had shared prior to each class session (B1). The course requirements specified: “... you will select a passage (or passages) from each of the assigned readings for that class that has challenged your point of view, told you something new, or had some significance to you. A brief (one paragraph) discussion of why the passages were selected will give context to the selected text (e.g. why these passages were important for you to include and how they work together). Include a set of questions that you have based on your reading. We will use these questions in class discussion”. During the course, each student was required to take at least one turn at leading the class discussion in either the whole class or a small group (B2). After each class, the students shared their reflections on a wiki page where they articulated what they had learned from the class activities, readings and discussions (B3). Sixty percent of a student’s grade was allocated for participation in the course activities.

During the course, the students were also required to conduct a research project. The topics for the projects were brainstormed with the whole class and then refined in small groups of peers during the first meeting. The project itself presented a case study where the major requirement was to develop an implication section. The main idea of this task was to analyse “... how what you learned could be implemented in K-12 classrooms” (B4). The projects were presented during the last class session (B5 similar to A3) and as a webpage (B6).

**Fully online course (C)**

The fully online asynchronous course was not limited to student teachers. Out of 160 students who had registered for the course, 41 participants completed it successfully. The course lasted for 20 weeks plus a 4-week extension was given to students in case they had not managed to complete and submit the required assignments. The course
was divided into several parts that cover key topic areas. Each part was labelled and accompanied with a video-taped tutorial from the teacher (C1). For each key topic of the course students had assignments to work on (C2). The assignment section included an introduction to the topic area where points to consider were highlighted. Here, the criteria for passing and instructions on how to hand the assignment in were clarified. Each topic area was supplemented with recommended literature and extra online resources. The assignments were required to be completed individually and submitted electronically to the teacher. Each assignment was graded and served as the basis for the course assessment. There was no final exam at the end of the course. Although students were quite free to plan their studies by themselves – “... you can start the course whenever you want and do it in any pace you want ...” (Teacher 6) – the teachers provided students with an overview regarding when they should work on each assignment. Since there were no synchronous meetings the course was supported with forums (C3). There was a forum that covered general questions about the course (C3.1), and others to cover each key topic area (C3.2). These forums were moderated by the teacher. To facilitate communication and enhance social presence among the students in the fully online courses, the learners were encouraged to create a profile that could include their digital image, a short biography, their e-mail address, and location which could be viewed by their peers (C4). The students were also encouraged to create an e-portfolio where they registered their achievements during the course (C5).

**Blended course (D)**

‘Blended Learning’ is the fusion of face-to-face and online learning experiences. Eight students registered for the blended learning course, and six of them completed it successfully. The duration of the course was 10 weeks. The course structure was very similar to the fully online asynchronous course, although it provided on-campus meetings. The meetings or seminars were organised once a month and lasted approximately four hours each. The first meeting took place a month after the course was launched. The purpose of the meetings was “... to participate in seminars where they [students] present their findings and discuss them in small groups” (Teacher 8). The discussion was moderated by the teacher (D1). Each seminar covered one of the key topic areas.

The online component of the course was designed in a blog format (D2). This consisted of a blog where teachers posted all the information concerning the course (D2.1), and then the students’ personal blogs (D2.2). In the personal blogs students described their prior knowledge and goals for the course. They also reflected on the process of completing each assignment, posted their assignments, and made conclusions about the learning outcomes they had achieved. The student blogs could be viewed by both the teacher and the student’s peers. As part of the reflection process, the students were encouraged to comment on each other’s blogs (D3).
The following section provides an analysis of the teachers’ interviews to allow a deeper understanding of how the ICT-supported activities reflect Bruner’s principles in the analysed courses. The activities in this section are also labelled with a letter/number code for reference in further discussion.

Findings of the interviews
Statements taken from the teachers’ interviews illustrate that advances in communication technology are bringing changes in higher education. Teacher 2 commented “I embrace this shift/movement rather than resist it”. However, it is not the Internet and online learning per se but transformations in society that have an effect on higher education. All of the interviewed teachers stated that there is no longer any reason to use the lecture to simply transmit information. Educational environments should be used for critical and creative knowledge construction. Nowadays there is a tendency in higher education establishments to decrease contact hours with teachers and at the same time enlarge class sizes. Introducing ICT is viewed as a solution to maximise the effectiveness and efficiency of higher education. The following section examines each course format to establish how ICT has influenced learning in the educational setting.

Face-to-face course with the formal use of ICT (A)
The teachers stated that the reduced amount of lecture time required that the assignments be adapted for self-studying. Although the main focus of the lectures was for the teacher to interpret difficult passages and various concepts, the class was still used for transmitting information. However, the PowerPoint presentations allowed clearer explanations illustrated by various resources. Teacher 1 said “I can show them different resources with very simple modifications”. Students were given the floor during the seminar sessions where they reflected on the readings in a small group discussion (A1). Such discussions encouraged learners to appeal to their previous experiences in the field and connect them to new knowledge. Further presentation of the results of their discussions to a bigger group (A2) and listening to their peers’ feedback provided a background for further reflections. Although the students were active participants of the learning process during such classes, the main function of ICT in this scenario was to enrich the content, i.e. the what of learning.

Face-to-face course with the creative use of ICT (B)
A distinguishing feature of this course was that students became involved in the active learning process by starting with pre-class reading activities. The students’ reflections and their questions related to the readings that had been published on a wiki page prior to each class session (B1). This helped the students responsible for the discussion adjust the subsequent discussion to the other students’ needs (B2). Teacher 3 commented “This assignment is designed to facilitate the collaborative construction
of meaning and content around the concepts and theories we will be addressing in class”. During the class sessions, the learners shared and compared their perspectives and experiences related to the topic area (B7 similar to A2). The core focus was on fostering critical dialogue among the students. After the class discussion, the students shared their reflections and insights on a wiki page (B3). This process allowed the students to see how their understandings of the discussed concepts had developed and which new meanings had been constructed. During this activity they became more conscious of the way they were learning in the context of acquiring content knowledge. It fostered their ability to monitor and regulate their own understanding of the concepts. In other words, the use of the ICT tools helped make learning, i.e. constructing new knowledge, visible for both learners and teachers.

The class sessions in this course were also used to discuss the group projects. The students then employed ICT to further explore the researched topic and gather and process data, and publish the results. To support collaboration and share the files, the learners were encouraged to utilise online spaces such as Google Docs and Dropbox. These tools allowed them to collaborate and exchange information between class sessions. This function is difficult to achieve in traditional learning environments (B8). Publishing a webpage with the results of the research and practical implementations for the local community that were publically accessible online increased the learners’ motivation (B6). This online resource not only allowed the students to demonstrate their newly constructed knowledge but also enabled them to show the practical implementation of what they had learnt.

**Fully online course (C)**

Although the transfer of classroom-based learning into cyber space might at first seem quite simple, in reality it is much more complicated. Students do not learn by sitting and watching the video tutorials. To really understand the material, they should actively interact with it. Teacher 4 commented “When they [students] are studying on their own, the learning process will be worse. It is much better to have cooperation and collaboration …”. This concept makes designing online courses more challenging. In the analysed course, the teachers divided all the content into parts and supplemented each part with a video tutorial where they highlighted key issues for each topic area. These highlights initiated and directed students’ retrieval practices, the results of which they presented in their assignment. Although the primary purpose of the assignments in the course was to evaluate the students, the assessment tasks also guided learning by serving as a background for completing the subsequent activities.

The main advantage of the online courses was that the computer does not ‘get tired of’ showing the same video over again. Students can have more time to complete the tasks. In addition, they do not all have to complete the same task at the
same time. Particular students can read and reread the information and think about it as often as they wish. Every single student is engaged with the material (C1, C2) and this customisation makes the learning more personalised. Teacher 4 stressed that “I get the feeling they [students] do not want to send the questions [to the teacher when they experience any problems] too fast, they really try to solve them on their own”. The same person stated that “It is a good thing but sometimes they wait too long before they ask for help or use the forums”. This statement reveals another challenge students are facing in the online courses. This concerns how students overcome their physical isolation from one another. The solution to this issue might be to initiate discussion forums that have different functions. In the analysed course, the major purpose of the forums was to provide student-to-student help (C3.1, C3.2). However, this course lacked activities to help students enhance their understanding of concepts through knowledge sharing in collaborative communication. Teacher 4 said “If you want to collaborate and work together in groups, I think it is more or less necessary to meet each other in real life. If you do not know a person it is quite hard to communicate”.

Overcoming physical isolation is also a big challenge for the teachers who monitor the studies, moderate the discussions, and give students feedback on their activities. In such courses, “…the risk is that a student is just a name on paper” (Teacher 5). One of the strategies the teachers used to get to know the students’ background was by providing a ‘Scrap Blog’ where students shared personal information they felt was of interest to their peers. Teachers in turn made video presentations of themselves in the settings where they enjoyed their spare time. Teacher 5 commented “…I am just doing the presentation of myself and the surroundings are also showing what I am interested in”. These devices helped the teachers develop closer connections not only among their peers but also between the teachers and students.

The E-portfolio in this course (C5) was a private document that contained information about a student’s previous knowledge and their experience of the subject. This resource was used by students at the end of the course as a stimulus to support them as they looked back and reflected on their learning process and their learning outcomes.

**Blended course (D)**

The experience of teaching in both face-to-face and online courses has logically led to the development of blended courses. Teacher 7 commented “We could have done those things we did on campus via the Internet but we wanted to meet our students personally because much of the work in the course was conducted on- or offline but at least off-campus”. The core challenge the teachers face while developing this type of courses is not only understanding the properties of synchronous verbal and asynchronous text communication but also to be able to skilfully fuse these forms
of communication to achieve the intended learning outcomes (Garrison and Norman, 2008). Teacher 7 said “It is difficult to replace face-to-face meetings. You should have more time working together with your course mates and teachers in dialogue instead of just listening to them talking, because you can do that on your own”.

In the analysed blended learning course, the key activity was creating blogs (D2). Before the course started the students were asked to share their previous experience concerning the subject and the course expectations (D2.2.1). This process permitted the teachers to adapt some of the assignments to the students’ interests in order to make the learning more personalised.

The big emphasis in the course was put on developing students’ self-reflective skills. In the blogs (D2.2), the students shared their experiences about completing home assignments and the practical implications of these tasks. This activity helped contextualise and personalise their learning experience and supported them in building their confidence. The process also promoted their critical and analytical thinking as well as encouraged their writing skills and self-expression (Granberg, 2010). Unfortunately, during the analysed course the students were not active in sharing feedback about their peers’ online blogs (D3). However, they did have the opportunity to participate in discussions during their face-to-face meetings on campus (D1). The on-campus meetings were also accompanied by coffee breaks during which the students could meet each other in an informal setting. This social event made the communication more personal and encouraged the students to create socio-emotional ties. As a result, the learners could choose whether to complete further home assignments individually or with a peer.

Discussion

Only ICT-supported activities were selected for the analysis. Bruner’s principles were then matched to each activity. The results of this analysis are presented in Table 1.

It appears from the information presented in Table 1 that in the majority of cases the teachers used ICT as an ‘environment’ where learners could explore, build and present their understandings of different concepts (wiki discussions, blogs, e-portfolios) rather than as a ‘tool’ to be picked up and used to do a task (Loveless, 2011). However, almost all of the activities across all four courses seemed relatively limited to the syllabus and course requirements. Only in the face-to-face course with the creative use of ICT (B) were students given an opportunity to prompt the leader of an in-class discussion with issues of real interest to them. In all the other cases, the students had to act within the borders of the course that were defined by their teachers. The data indicated that almost all of the provided activities developed the students’ ability to reflect. The reflection, however, was mostly about the content that the teachers brought to the course. Teacher 5 commented “When I start a new
course, I feel like a person who is putting rails in front of a train running at high speed”. In such educational environments, students cannot choose what to learn and how to learn it. They have to be passive recipients of new knowledge rather than active participants in the process of knowledge construction.

However, in a world with an avalanche of information sources one of the central requirements of future professionals is to recognise when you need information, what information you need, and how to be critical about what you find (Collins and Halverson, 2010; Jenkins, 2006). This means that in higher education learners should be given more opportunities to make decisions about the content and organisation of the course. Students should be “pro-sumers” (Gee, 2004), i.e.
both producers and consumers of new knowledge, rather than just perceivers of information. Greater emphasis should be put on the agency of a learner and his/her culture.

The new perspective of teaching and learning in a digital context may lead to changes in course design. For example, a new phase (known in theory but quite neglected in practice) – syllabus construction – should be more actively implemented in higher education. Although teachers quite often ignore students’ input to a course, research supports the notion that “students bring a nearly boundless supply of energy and new ideas about how to enhance teaching and learning” (Trinkle 2005, 22). Giving students an opportunity to make decisions about the content and organisation of a course encourages their independent thinking and gives them a responsibility to take charge of their learning. This involvement enables students to have a better understanding of the learning process and develops the skills they need to progress towards their own goals in a particular subject (Zhang and Head, 2010; Zipernovszky, 2010).

This approach automatically raises questions about the content of the course, i.e. who decides what exactly should be learned during the course, how should it be learnt, what is the role of teachers in delivering new knowledge, to which extent we should rely on students choices, and how learning can be measured.

**Concluding remarks**

This article has attempted to attract the attention of university faculty to the use of ICT in an educational environment in meaningful ways. The exploratory study highlighted the importance of rethinking syllabus design. Although this discussion recommends that students be given more opportunities to choose what and how to learn, the question of content is still an issue. How much initiative can be given to students? How flexible should teachers be about the content they teach? To what extent can teachers adjust course objectives to the learners’ interests and needs? Answering these questions will help us provide a basis for educating lifelong learners, an outcome that is crucial in a world of rapid advances in all spheres of life.

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