New ICT Tools in Education – Classroom of the Future Project

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Summary

This paper focuses on the Classroom of the Future project. It shows the whole process of building the classroom of the future from a normal classroom. It points out the problems and questions arising during the realization of the project, highlights the benefits of some ICT tools and shows the main lines of research running in connection with this issue. The main aims of the project are: (1) to build an Ideal Classroom for the 21st century, (2) to integrate multimedia learning environment into teacher-education, (3) to test the efficiency of the newest ICT tools in education (4) to develop curriculum materials for different ages to foster deep understanding and to motivate students through bringing real-life problems and new directions of teaching methods to school. Flexible furniture and technology is also a perfect environment for students to obtain the skills they will need in the real-life knowledge-based digital world.

Key words: ICT, innovation, multimedia learning environment

This paper focuses on the Classroom of the Future project at the University of Szeged. It shows the whole process of building up the classroom of the future from an ordinary classroom. It points out the problems and questions arising during the realization of the project, highlights the benefits of some ICT tools and shows the main lines of research concerning this issue.

Innovative teaching, multimedia in education

Multimedia is the combination of various digital media types (e.g. images, sound, video, text) they compile an integrated multi-sensory interactive application to present the information to an audience (Neo and Neo, 2001). According to Agnew, Kellerman and Meyer (1996) multimedia means "an individual or a small group using a computer to interact with information that is represented in several media, by repeatedly selecting what to see and hear next".

Using multimedia in education results in the increasing productivity and retention rates, because people remember 20% of what they see, 40% of what they see and hear, but about 75% of what they see and hear and do simultaneously. It means, by using multimedia tools we can create a learning environment, where the communication of the information can be done in a more effective manner and it can be an effective instructional medium for

delivering information. With multimedia technologies students create multimedia applications as part of their required project. This makes them active in developing their own learning process, instead of just being passive learners of the educational content (Neo and Neo, 2001).

Multimedia application design offers new insights into the learning process, and gives possibilities to represent information and knowledge in a new and innovative way. But technology alone will not result in higher achievement. The ideal classroom for the 21st Century calls for an amount collaboration, conscious design and technological innovation to make the classroom into a place of positive learning environment.

Aims of the project

The main aims of the Classroom of the Future project are: (1) to build an Ideal Classroom for the 21st Century (2) to integrate multimedia learning environment into teacher-education, (3) to test and research the efficiency of the newest ICT tools in education (4) to develop curriculum materials for different ages to foster deep understanding and to motivate students through bringing real-life problems and new directions of teaching methods to school. It calls for a place in which it is easy to use technology to locate or deliver content and where one can use technology to collect data about teaching and learning. It calls for a place where technology is not an add-on, but rather an integral part of the curriculum, where teachers can try out newer techniques, find the combination of technology and instruction best suited to the subject and the instructional goals, and work in arrangements that permit fluid transition between approaches to teaching and learning.

Building an Ideal Classroom for the 21st century - some aspect of an ideal classroom

Within the confines of the project of the future classroom it must be built from an ordinary classroom, which is an ideal one for teachers and students as well. First of all we must decide what makes a classroom an ideal classroom of the future. We have found some similar projects in the world (e.g. the COFT project sponsored by NASA; at the Pennsylvania Department of Education; Devon Country Council; at the Leigh University). The classroom of the future project at the University of Szeged is supported by Microsoft Corporation.

In the first phase we defined some main, basic factors as (1) mobility, (2) home-like atmosphere, (3) fostering learning environment, (4) the latest multimedia tools, which can foster teaching and learning. In the second phase we had to decide how to rearrange and rebuild the room (e.g. which wall should be the main one, where later the board would go and where the plugs should be located). In the third main phase we had to organize the blue color workers, to choose and order the multimedia tools. In the fourth main phase we had to build and set up the whole multimedia system (e.g. to install the PC-s, the interactive white board, to register every tools on the router, to install the projector).

Electricity

It follows from this that the first step to rearrange the classroom was the wiring. The electrician installed plugs in every half a meter along the longer wall in height of half meter from the floor, built outlet for the projector close to the ceiling and built some outlets close to the place where we planned to put the interactive white board. It had to solve the

charging of the computers (notebooks, UM PC-s, tablet PC). So we planned several plugs installed along side one of the longest walls. We planned a special build-in cupboard (about this see later by furniture) in a cleft in the wall. We also installed several plugs behind this cupboard. To these outlets belongs a main switch, which makes possible to switch off the power in the outlets behind the cupboard, to avoid the break down of the chargers under permanent charging.

Colors

In most of the cases faculties, prefer classrooms which wall color is "institutional" white. But white walls do not help to reduce tension and anxiety and do not produce a home-like atmosphere. However, there exists an empirical evidence of the human reaction to colors. Colors best suited for classrooms promote a sense of well-being and reduce agitation (Nuhfer, 2004), which means that wall colors are important factors to design an appropriate learning environment. Studies about students' reactions and motivations in connection with different wall colors point out that there are colors which foster learning. The consensus of these studies is that light yellow-orange, which promote cheerful, lively and sociable moods is desirable in a classroom or beige, blue-green can also be good choices for covering three of the four wall surfaces (Nuhfer, 2004). Greens or blue-greens in pastels are relaxing and they well fit into a learning environment where tasks require concentration. According to the literature, if we want to design the most motivating interior, it is not enough to have the same colors on all of the walls. The fourth wall, the front of the room must be different from the rest of the walls, it must be complementary or at least have a darker shade than that of the other walls. The different color at the front helps to reduce the students' eyestrain as they look up and down while working on computers or write notes (Mahnke, 1996).

Regarding this literature, we designed our classroom as the following: the colors of the walls are orange and beige, which promote a sense of well-being and produce a home-like atmosphere. The shape of the classroom is a narrow rectangle, but the darker orange color reduces the tunnel effect.

White curtains cover the windows (they run along one of the longest walls) of the classroom and the chairs are covered with blue textile, they give a cozier atmosphere to the classroom. Because of the huge amount of natural light and cheerful colors the classroom looks always sunny (see figure 1, 2).

Figure 1. The colors of the Classroom of Future

Figure 2. The colors of the Classroom of Future 2

Mobile furniture

One of the most important factors of designing a perfect classroom is the good selection of furniture. We wanted to have such tables and chairs, which allow for an easy and quick rearrangement of the room for different types of learning (frontal teaching, individualized learning, pair study or group work) (see figure 3-5). Therefore, we designed mobile furniture, which means tables mounted on wheels and rolling chairs, which makes possible to reach the desired rearrangement of the furniture within three minutes. 20

trapezium-shaped tables make possible to higher the variability of the sitting order (see figure 6).

In the back of the classroom we designed a place with 3 comfortable chairs and a round table. It is the place where students can watch and analyze the lesson and consult separately with the teacher.

Figure 3. Mobile furniture allows for an easy rearrangement

Figure 4. Mobile furniture allows for an easy rearrangement

Figure 5. Mobile furniture allows for an easy rearrangement

We also had to solve the problem of storage and charging the computers in a safe place. To do this, it was designed a special cupboard in the cleft, mentioned previously, was designed. By designing the cupboard, we had to keep in mind that (1) the air circulation of electronically tools is important, (2) charging the computers must be solved, (3) to make sure that an average-sized person is able to reach the location where the computers are. The cupboard is divided into four parts. It has a part with a fixed and 15 telescopic trays, where altogether 30 notebooks, their chargers and the router take place. It has a part with 15 small trays, where the UM PC-s and the other accessories (projector's remote control, whiteboard pens, web cameras etc.) can be stored. On the remaining two parts the bigger multimedia tools are situated. The back of the cupboard is open and behind the trays there is a free space, where there is good air-circulation for the computers.

Figure 6. Some possibilities of sitting order
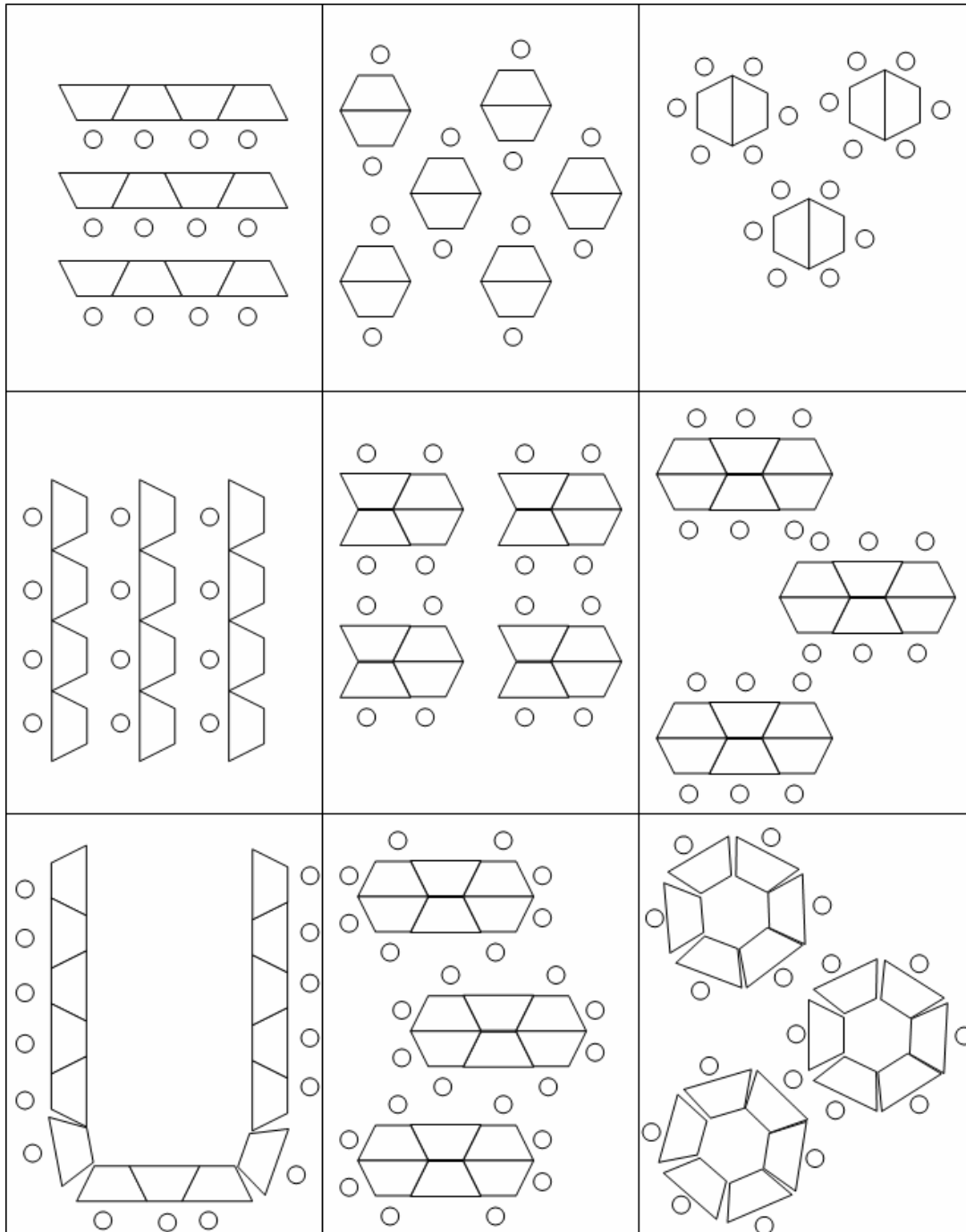
Whiteboards

We prefer whiteboards to blackboards. On one hand, the reason for this is that the classroom is equipped with electronic gear and computers. The use of chalk for blackboards produces chalk dust over time that settles over the circuits, causes overheating, and ruins vulnerable equipment. On the other hand, interactive whiteboards fit better into a learning environment, where innovative teaching and learning with multimedia tools is inevitable. Interactive whiteboard helps teachers to structure their lessons, supports

collaborative learning, can help to develop student's cognitive skills, enables ICT use to be more integrated into classroom, allows text and images to be moved around the board and/or changed, and finally allows work to be saved or to be printed out (Gage, 2006).

The high mobility of the furniture allows the students to see the fixed interactive whiteboard placed on the orange wall in front of the classroom. We also put an other whiteboard, but not an interactive one, in the classroom. It is positioned opposite the windows on one of the beige walls. It makes possible to change the direction of teaching and gives the students more surface to work in groups, to write their ideas with for instance the method of problem based learning.

From the wide variety of interactive white boards we decided to choose a durable, easy-to-use electronic whiteboard that inspires students and teachers to turn lessons into interactive experience. The board is installed with the InterWrite software and has a pen that also functions as a mouse. If somebody prefers blackboard to whiteboard, one can change the surface color of the board in interactive mode and can work on the table as if it would be a blackboard with a chalk.

Wireless technology and multimedia

The classroom of the future promotes not only a sense of well-being and produces a home-like atmosphere and its interior is technically well equipped and designed for effective learning as well. Mobility was among the main factors to choose the technical tools. Mobility means on one hand wireless technology, on the other hand mobile electrical tools. Multimedia laptops with wifi are mobile solutions for teachers and students. The wireless network allows students to have access to computing networks and the Internet. The access to online resources encourages students' critical thinking and problem solving ability, discussion and collaboration while using real world data and primary source resources to make the content authentic. With the help of the Radmin softver the teacher is able to follow the students' work on there computers, the teacher can see what they do, which site they are looking for on the Internet, etc. Moreover the teacher can send individual messages to each students and can decide if he or she allows to the student to answer this remark. The teacher can decide which student's or students' (up to 4) screen(s) should appear on the board.

The video projector is hanging from the ceiling and enables to project the interactive lesson onto the board, or can be connected through a computer with the whiteboard. One of the main point in choosing the projector was that type recommends minimum XVGA resolution and a minimum of 2000 lumens and can work in wireless mode as well (about the advantage of it see later).

Besides wireless technology, the touch surfaces of the write PCs (tablet PC and ultra mobile PCs) bring more interactivity into the classroom's work and redefine the ways of teaching and learning. Teachers are able to walk around the classroom while they are writing on the tablet PC, which screen appears promptly on the board.

The electronic voting system makes fast feedback possible and puts the evaluation on a higher level. The InterWrite PRS encourage class discussion, instantly grade and record students answers, give fast feedback, as mentioned previously. They engage every student in the discussion, allow open ended, multiple choice and yes or no questions.

Using wireless internet and web cameras students learn how to do online video, which enhance communication. In this way, they can share projects and lesson plans, send video emails, and they can also collaborate with each other.

First, wireless technology seemed to be a quite good foundation and technology, but in practice, it does not work as well as we previously thought. This technology is not as developed as the amount of potentials it could have. It means for example that it can take several minutes still the computers get some IP address from the projector. The reaction-time is getting longer by wireless mode than in normal mode. It is impossible to show some film or video in wireless mode, because the projector's wireless module cannot transfer as many data as would be needed.

Digital cameras record Microteaching sessions and different project works with the new ICT tools. This camera can be used by students to realize some project, some new ideas, which can be used in K12 education. After recording the ideas, they can be produced by Movie Maker.

In summary, students in teacher education get the best feedback on their teaching and have access to learning tools that put the most important skills in the 21st century within reach. Students may learn and practice in different multimedia learning environments, and learn and teach different teaching methods (e.g. e-problem-based learning, collaborative learning). Flexible furniture and technology also create a perfect environment for students to obtain the skills they will need in real-life knowledge-based digital world. As to conclude, the classroom of the future gives effective tools for students and teachers, and prepares students to enter and successfully compete in the ever-expanding high-tech global marketplace.

Acknowledgments

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