

Multimedia Scenario in a Primary School

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Multimedia as an educational technology tool is used throughout the educational system. In this article we present a research project where multimedia scenario was used to initiate a discussion about Internet use among students and teachers at a primary school. Multimedia scenario is the use of large screen multimedia to initiate and facilitate discussion in a group of learners. Multimedia scenario is part of a teaching methodology called PIER (Problem based learning, Interactive multimedia, Experiential learning, and Role playing). We describe how two groups of students and teachers—facilitated by a multimedia scenario—discussed Internet ethics and information filtering in a school context. The groups were observed during the use, and the article concludes that multimedia scenario and the PIER methodology has potential as learning activity in the primary school context.

PIER is an educational methodology based on the following: Problem-based learning (PBL), interactive multimedia (IMM), experiential learning and role-playing. The learning activity is divided into four phases. The first phase is accomplished by using an interactive multimedia scenario to present a problem by making the participants experience the problem or a problematic situation relevant to the group.

The objective of the research presented in this article was to evaluate the first phase of PIER in a school setting. To achieve this an understanding of the current situation in school concerning the use of IT was needed in order to intervene in a real situation.

Previously, we had successfully conducted evaluations with interactive multimedia scenarios and PIER in higher education (Scheepers & Nulden, 2000), and also in corporate competence development (Nulden, 2002). The use of PIER in a primary school setting had not been conducted, and it was relevant to investigate if the PIER approach could be used to initiate learning with children. Therefore the research question raised in this article was:

Is the PIER approach useful in primary school to support the interaction between students and the teacher?

The remainder of the article is divided in the following sections: First, we discuss the research approach taken in this article. Second, we give a theoretical background followed by the PIER approach. Next, we present the result from the field study and the evaluation of the multimedia scenario in a primary school, followed by a discussion. Finally, we end the article with conclusions and further research.

RESEARCH APPROACH

The research approach in this project is “The New Informatics,” which is “...a theory and design-oriented study of information technology use, an artificial science with the intertwined complex of people and information technology as its subject matter” (Dahlbom, 1996). We are interested in the use of technology because we are interested in changing and improving that use. The aim is to improve the educational practice concerning IT use.

Educational research is a thorough and systematic attempt to bring about a better understanding of the educational process, with the purpose of improving it’s efficiency. The aim for the researcher is to describe how learning occurs and to design different educational activities that can influence the quality of learning (Entwistle, 1984).

In this article, the term “design” is used to describe the activity of analyzing the needs, or the possibilities, for the implementation of form and functionality (Dahlbom & Mathiassen, 1993). Current research approaches applied to contribute to both the development of technology, such as educational technology, and the design of its use is guided by variations of the scientific methods: ethnography and action research. Ethnography aims at describing the culture of a specific domain by observing and participating in this culture (Van Maanen, 1988). Often, but not necessarily, ethnographic studies involve longer periods of study to assure the researcher of a deep understanding of the culture. However, ethnographic research in short time periods is also viable, a “quick and dirty ethnography” (Hughes, King, Rodden, & Andersen, 1994).

The purpose of action research is to solve a problem here and now (Patton, 1990). Action research has two aims: (a) to contribute to solving practical problems and (b) some specific research goal, such as the development of an approach, a method, or a conceptual framework. A key assumption in action research is that science can be used by people themselves, in collaboration with researchers, to solve their problems of practice. The combination and focus of the two are delicate. "Those involved [in action research] are either doing research with little action, or action with little research" (Foster, 1972, p. 529). The standard for judging action research is the evaluation made by research participants and researchers of the solution generated.

In doing informatics research in education, the previous approaches—ethnography and action research—are suggested as fruitful in reaching the aim of designing information technology use in education. The researchers' relation to the educational activity is determining the approach. Basically there are two alternatives. For doing research as an observer and not participating as a teacher in the educational activity, an ethnographic research approach is suggested. This allows the researcher to observe and understand. Teachers conducting research in their own courses are not able to be outside observers in the same sense, for obvious reasons. In researching your own practice, an action research approach is suggested.

The overall research approach proposed is action oriented since the aim is to experiment with education through intervention and to evaluate and reflect on the effects of the intervention. Inspired by pedagogical ideas and the possibilities to enhance them with information technology, this article focuses on the design of prototype applications and their use in educational activities.

The importance of experimentation and providing examples of information technology use in education is advocated by, for instance, Leidner and Jarvenpaa. "Computer based teaching methods might be encouraged as a means of enhancing classroom learning, although it may require trial-and-error or experimentation to determine the most effective uses of the technology" (1993, p.51). The evaluation of the effects on different aspects of education is, therefore, less emphasized than it would be in other educational research. The reason for this is that there is a need for concrete examples of how information technology can be used in different educational activities. Of course, there is also a need for extensive evaluation of the effects, but it is probably more urgent to experiment with a variety of ideas to open up for a dialogue among teachers concerning the use of information technology.

The viability of action research in an education context is discussed by Gibbs (1995), who suggested that: "using research and research tools to

intervene, often successfully, in their own courses [...] is the kind of research which gets results” (p. 27). The idea of trying out ideas and solving problems in the teacher’s own practice—and systematically evaluating and documenting the work and communicating it to other teachers through the standard channels, such as, academic journals, conferences and seminars—should get higher status. One problem is that a relatively low proportion of academics reads the research journals on teaching in their discipline (Laurillard, 1993, p. 191). One other problem is that the most common type of article in these journals concerns a discussion of curriculum content: what should be taught and why. The optimum curriculum sequence is a popular topic for research articles, but very little research reports on how students find different learning activities.

The design and use of information technology in educational activities must be pedagogically well-grounded. Information technology, as such, will not solve the problems of education. From an informatics perspective, it is possible to take information technology as a point of departure. However, the design of educational information technology should always be validated by appropriate pedagogical models.

THEORETICAL BACKGROUND

People can find it difficult to learn from their experience through a messy struggle with real challenges. Thus, action learning is meant to be a relatively safe laboratory for learning and helping people to learn from risk-taking and errors (Marsick & O’Neil, 1999). The focus of action learning is on individuals who play an enhanced role in directing their own learning and, as such, achieve more control of their own destinies. Action learning is “an approach to the development of people in organizations which takes the task as the vehicle for learning. It is based on the premise that there is no learning without action and no sober and deliberate action without learning” (Pedler, 1997).

Most practitioners of action learning draw eclectically from a variety of philosophies (Marsick & O’Neil, 1999). In this research, our approach to action learning builds on problem based learning (PBL), interactive multimedia, experiential learning, and role-playing as the theoretical and practical background to propose the PIER approach. Each of these four is described.

Problem-Based Learning

PBL builds on a fundamentally different understanding of learning than traditional teaching and is a significant challenge to orthodox beliefs about education and learning (Margretson, 1991). PBL is "...a way of constructing and teaching courses using problems as the stimulus and focus for student activity. It is not simply the addition of problem-solving activities to otherwise discipline centered curricula, but a way of conceiving of the curriculum which is centered around key problems in professional practice.... Problem based learning starts with problems rather than with the exposition of disciplinary knowledge" (Boud & Feletti, 1992).

The starting point in PBL is a real-world phenomenon or problem of which the student wishes to learn more. The problem, or rather the problematic situation, is identified, designed, and presented to the students, who define what the actual problem is. The responsibility of the educator is to present the problem in a stimulating way. In PBL, this is done through what we call a "vignette." This can be anything between a single paragraph, some graphics, a comic strip, or a 20 page case study. It can also be a brief lecture where the problem is introduced to the students. The purpose of the vignette is to get the group started. The group then rather freely organizes their learning process to understand and discuss solutions to the problem.

Interactive Multimedia

A great deal of attention has been focused on interactive multimedia (IMM) in the educational domain. Commonly, IMM uses hypermedia to permit links among pieces of information such as text, sound, and graphics, and enables the learner to "explore ideas and pursue thought in a free and non-linear fashion" (Bieber & Kimbrough, 1992). IMM use has undergone a revolution during the last several years, from simple drill-oriented programs, to advanced simulations where students receive support for understanding complex matters.

IMM has been used to add dimensions, from capturing the learners' imaginations, to various learning activities. For instance, paper-based case studies have been transformed into interactive case study simulations for individuals (Kendall, Kendall, Baskerville, & Barnes, 1996; Farrimond, 1997). IMM applications have been used to enable individual learners to practice in a safe environment; for instance, a salesperson can practice how to deal with difficult customers (Shank, 1997).

There are three trends with IMM currently. First, the main channel for distribution of IMM is becoming the World Wide Web (WWW or Web) rather than the CD-ROM. Second, there is a shift from multimedia for individual learners towards multimedia application for teams or groups of learners. Third, the interactivity that is getting the most attention is the interaction among the participants in the group working with the IMM, not the limited individual-computer interactivity.

Experiential Learning

Experiential learning refers to an encounter that the learner experiences. From this encounter, learning is initiated. In experiential learning "... the learner is directly in touch with the realities being studied ... [Experiential learning] involves direct encounter with the phenomenon being studied rather than merely thinking about the encounter or only considering the possibility of doing something with it" (Kolb, 1984).

Experiential learning is participative, interactive, and applied. It means experiencing, first hand, the environment and to be confronted with processes that are uncertain. Experiential learning involves the whole person, and learning takes place on the cognitive, affective, and behavioral dimension (Gentry, 1990). The epistemology of experiential learning can be summarized as a problem-solving focus with the aim of raising awareness and developing capacity to change tacit practice (Marsick & O'Neil, 1999). Simulations of different types are the most applied way to conduct learning activities focusing on experience. Different types of interactive multimedia have often been used to support these activities (Graf & Kellog, 1990).

Role-Playing

Role plays can be described as dramas in which a number of participants are asked to portray a particular character, but no lines are provided, as for actors (Steinert, 1993). An area where role plays are frequently used is medical education, where the objective is to simulate and practice patient-doctor situations. Role-playing helps the students to view situations from alternative perspectives. In a higher education context, role-playing is used to prepare the students for their future profession. Besides medical education, other common areas are training in law, law enforcement, military service, and management.

The role play can also be used as a technique to approach issues otherwise difficult to discuss. In a role play where controversial issues are discussed, the participants can, in their role, elaborate their true perceptions, without exposing themselves. When acting in a role, individuals need to re-think their perceptions and understandings. Role plays can, in other situations, be used to support the exchange of experience among participants. The purpose and structure of a role play can be to initiate discussions on issues directly related to a certain group of professionals, such as, project management.

THE PIER APPROACH

The four points of departure briefly discussed in the previous section serve as the foundation for the PIER approach, which is described in this section.

PIER consists of four activities:

1. Activity 1 - concrete experience through role-playing with a multimedia scenario;
2. Activity 2 - a period of individual reflection;
3. Activity 3 - seminar where the scenario is discussed; and
4. Activity 4 - ongoing and organized learning processes.

It should be emphasized that reflection is an important aspect of all activities in PIER. Three types of reflections are covered in PIER. First, there is reflection-in-action (Schön, 1983), reflection that is made during the enactment of the scenario. Reflection on what happened during Activity 1, i.e. reflection-on-action, is done during Activity 2 and is discussed at the seminar in Activity 3. Reflection-for-action, or thoughts about how to use the knowledge gained by the experience in a future situation are initiated during Activity 3 (Cowan, 1998).

Activity 1 should be considered mainly as a starting point for the other three activities in the PIER approach. Consequently, the PIER approach, as a whole, must be thought of as the start of an extensive learning process.

Activity 1

Activity 1, a group of five to eight learners, called a base-group (adopted from PBL terminology), are engaged in a role-playing activity supported

and guided by an interactive multimedia scenario and a facilitator (Figure 1). The activity lasts for 2-3 hours, and during this time, the learners experience a problematic situation, which is relevant and realistic, and discuss problematic issues.

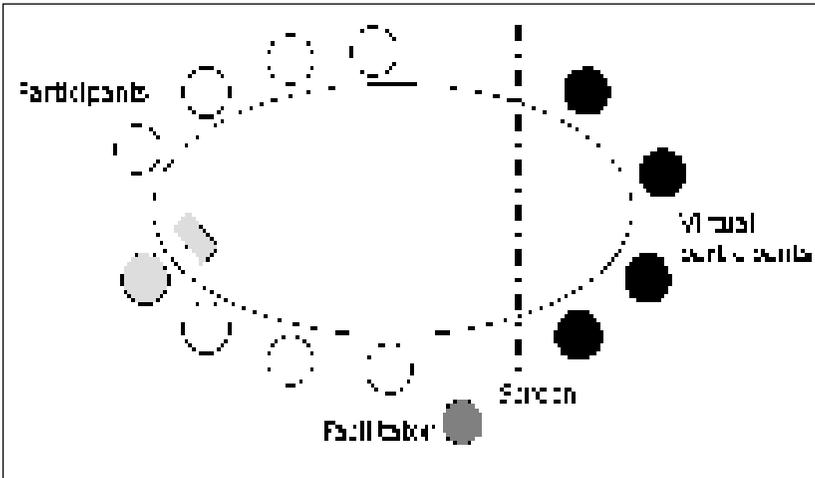


Figure 1. The setting for activity one

Figure 1 illustrates an overview of the physical setting. The white circles represent the participants seated around the table. The light gray circle is the participant who controls the navigation through the scenario, according to the base-group's wishes, with a mouse and a keyboard. Navigation is intended to be simple and consists of clicking on hotspots and writing text into forms. At the end of the table, an interactive multimedia scenario is displayed on a large screen. In the scenario, there are virtual participants, represented by black circles (Figure 1), who contribute to the role play in various ways. They are part of the imagined reality and can be a videoclip, soundclip or a piece of text. They could, for instance, be members of the group, managers, or others interacting with the base-group. The facilitator has an opportunity to act as one of the virtual participants when it is necessary to intervene in the ongoing group process. The dark gray circle represents the facilitator, who assumes a peripheral role. The facilitator intervenes in the group process only when necessary, for instance, when progress is too slow or the navigation alternatives are not obvious.

The scenario lets the learners become part of a fictitious—but not improbable—world. They are given brief role descriptions and act according to the role, but mainly rely on personal experiences and preferences when

participating in discussions. The discussions are the essence of the learning activity, and although the participants interact with the scenario, the main interaction is within the base-group. They face different situations where they are required to make decisions, and in order to make decisions, they discuss, negotiate, and exchange conceptions.

Some of the decisions lead to different paths through the scenario. There are a limited number of paths and there is no turning back. Multimedia scenario is not a realistic simulation that allows non-linear navigation. Instead the realism is embedded in how characteristic the confronted situations are of the real world in other words, if the participants recognize similarities with their own situation and the alternatives are believable. By decreasing the complexity regarding the available paths, the learners are steered into predetermined scenes and, thus, the scenario ensures that the intended problematic situations are experienced. However, it is difficult to keep the scenario alternatives limited, and at the same time, maintain the realism; it is a matter of creating a credible story.

We have used web technology to develop the scenes in the scenario. The scenario structure reflects the passing of time, as the group navigates through the scenario, time passes and new events occur. The scenario structure is static in the sense that the narrative is presented as it is stored in the computer, as opposed to being dynamically created by a human facilitator.

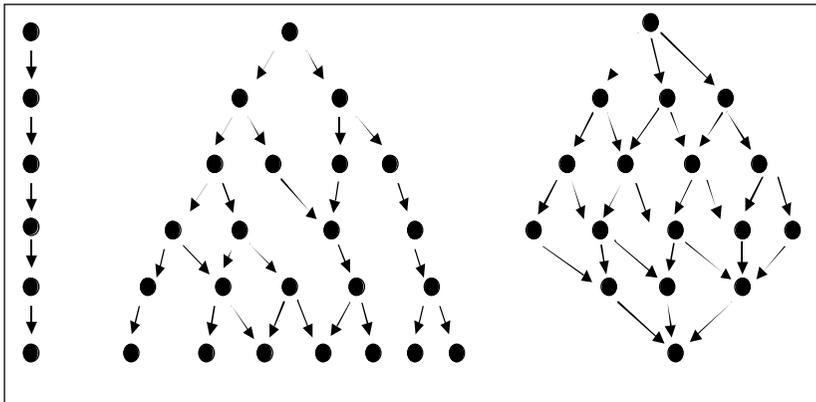


Figure 2. Interactive case (left) and two types of case-based simulation

The scenario can have different overall structures as shown in Figure 2. In the interactive case, navigation and presentation of information is in a linear fashion, while in the two types of case-based simulations, the base-group

freely navigates their way, relatively speaking, through the case. The case-based simulations differ in the way that one has an open ending of the scenario, and the other has a closed ending.

The terminology of scenarios in PIER is pragmatically adapted from film theory. Like a theatrical performance, a scenario can be divided into acts. Each act consists of one or several scenes, and each scene consists of one or several web pages with embedded objects. Examples of objects are text, graphics, sound, and video. Acts, but also scenes, are delimited from each other either by the focus, such as, the issues presented, or by time, such as, a series of events or different phases of a process.

The facilitator ensures that the base-group participants reach the end of the scenario and leave the session with the problematic situation on their mind. The ending scene of the scenario is meant to be a cliffhanger since our intention is to leave the base-group with unanswered questions and feelings to reflect upon during Activity 2. Instead of having an ending that provides closure, we want them to leave Activity 1 asking themselves; "What happened?"

The scenario is self-instructive in that the participants can navigate the scenario with ease, and the need for extensive computer skills is not needed. Furthermore, there is neither a single correct interpretation nor an answer to be given to the facilitator. From the information that is gathered through the scenario, the students form their own ideas and thoughts, which they share with each other through discussions.

Another advantage is that the only software needed to run the scenario is a web browser and Quick Time to play the movies. To reuse this kind of learning activity is simple, and according to this aspect, PIER has great potential in a school setting.

Activity 2

Activity 2 is individual reflection for about a week. During this period, each of the participants will have a chance to individually reflect on what happened in the scenario. They will hopefully relate their experiences from the scenario to their daily work, whether it is professional practice or an educational program. It is tempting to support the reflection by handing out material such as relevant questions or pointers. However, we believe this would interfere with the participants' individual sense-making of the experience, and to some extent, turn the activity into a traditional, teacher-oriented activity. To further avoid interference, Activity 1 ends sharply without any following discussion and explanation.

Activity 3

After a week of reflection, the facilitator meets the base-group during a seminar of 2-3 hours. The purpose is to discuss the experiences the participants encountered during their work with the scenario in Activity 1 and explicitly relate the experiences to those from daily work. An important part of discussing their experience in Activity 1 is the intention to debrief the participants, to make sure they understand that they are not to blame for mistakes and failures in the scenario. The purpose is also to discuss possible ways to approach the issues covered in the scenario. Some time should also be dedicated to a discussion of further activities to be carried out as a part of Activity 4, since this continuation should build on the participants' own ambitions and ideas (Nulden, Hardless, & Nilsson, 2000).

Activity 4

The fourth activity is probably the most important since a central part of PIER is to prepare the participants for dealing with similar situations as covered in Activity 1. Whereas Activities 1-3 should be understood as a starting point, Activity 4 is meant to be an ongoing and organized learning process. Examples of learning activities could be a series of traditional seminars and lectures, new scenarios, or a net-based continuation.

Related Research - Previous Evaluations of PIER

The PIER approach has been applied in other learning contexts. In this section, we will bring forward some findings in earlier research conducted with the PIER approach related to this research.

System development education at universities in Sweden and South Africa. PIER has been applied as a simulation in which failure and escalation in system development projects are introduced to higher education computer information system students. This research aimed at searching for models that allow genuine interaction in learning activities (Scheepers & Nulden, 2000). There were 21 informatics students participating at a university in South Africa and 10 students at a university in Sweden. Feedback from them was captured through a questionnaire that was handed out afterwards. They were positive to this kind of learning activity. It was also found that the combined use of a multimedia scenario and PIER was effective for learning about information system project failure and escalation.

Copernicus- Experiencing a Failing Project as Industrial Competence Development. The setting for this research was corporate, involving a large organization. The purpose was to facilitate experience sharing, discussion, and reflections with the intention to increase communication among project workers, and in a broader perspective, improve project management practices. This research project lasted for about six months and involved four researchers. First, they conducted interviews to create an understanding of the underlying organizational culture and to collect stories and anecdotes to be used in writing the stories. The actual design and implementation of the scenario was a joint effort between researchers and members of the organization.

There were 80 employees participating in the learning activity. The first phase of PIER was located at the research institute, whereas the seminar (third phase of PIER) was held at the corporation. The conclusions drawn from this research is that multimedia scenario and PIER methodology add to existing competence development efforts.

FIELD STUDY AND DESIGN OF MULTIMEDIA SCENARIO

This section first describes the field study conducted to get an understanding of the current use of IT in a school in Sweden. It aimed at identifying a problem or a need for enhancement in their use of IT. Second, the section describes the design of a multimedia scenario which was designed to deal with the identified problem from the field study.

The Field Study

The school where the field study was conducted is a first to sixth-grade school with approximately 140 pupils and 10 teachers. The two first grades are integrated, and are divided into two classes with first and second graders in the same class. The same accounts for third and fourth grade. But the fifth and sixth grades are not integrated. The computers at the school range from new to very old ones. The older computers are mainly used for fill-in exercises in math and Swedish. The applications available for those computers are text-based and are more a substitute for using paper and pencil. The school has four new computers with a printer each, and two of the computers have access to the Internet. A wish for more computers with access to the Internet was expressed by one of the teachers, but the cost for additional modems is too high. According to the assistant principle, "we don't have this kind of money." Consequently, they have one new computer

each in grades three to six. Only the new computers have the capacity to run programs that are more advanced. An example of an advanced program that is used is Matador. This program aims to make the students use different methods for solving various math problems. It uses graphics to visualize the problems. "The program gives students the opportunity to learn the classroom material in a more meaningful way," one teacher said. Science and Swedish were two other subjects for which the computers were used. The applications used in those classes were also specialized for that particular subject. For example, in Swedish class they have Svestav, which is used to enhance and train spelling skills. In math they also have Urkul, which is software for learning the clock.

For 18 months, the school has adopted the concept of IT agents. This concept was a central decision from the district to enhance IT use in the schools by using students as IT agents. At this school, two students in each class are appointed IT agents. They remain agents throughout the years they attend this school. These students were not appointed IT agents due to their previous computer literacy. These students are not necessarily "the best" at computers in their classes. The IT agents have received a basic course, conducted by the person responsible for IT at the school, who is also a teacher. This course included how to use Windows and the different applications previously mentioned. IT agents serve as extra resources in the classroom to support their classmates. For 18 months, this concept has been shown to be a successful approach, taking a burden from the teachers and making the pupils more aware of the possibilities and difficulties concerned with computers and their use in classrooms.

We asked the students if they use the Internet in their schoolwork. They answered that they seldom do, but they wanted to do this more. They told us they mostly use Matador. This seemed to be a very popular program among the students. However, one fifth-grader frowned when Matador came up as a topic when we were talking. "I have a lot more exciting programs at home," he said. He was not impressed, but when asked if he could choose between doing math using his exercise book—which is what he was actually doing—or using Matador on the computer, he answered without hesitation, "Matador, of course." During this class, only the new computer was used. The old computers, which were placed within the classroom, were not used, but we were assured that they were sometimes used.

Soon after, the bell rang and we all left the classroom. The teacher locked the door to the classroom. The main reason for this was to get the students out in the fresh air, but there was also another reason. Some students had visited X-rated sites on the Internet. Two students were caught in the act. The computer's log file had been analyzed, and it was apparent this

had been done on several occasions. Because of this, students are not allowed to use the computers with access to the Internet without an adult nearby. We were told, "There are programs available that work like filters, but they can be very concrete when filtering. Using them can result in every page with, for example, the word sex being blocked out." In Swedish, the word "sex" is also the word for the number "six," which complicates the matter. Therefore, this solution seemed not to be an option. Instead, several teachers wished the students to be more aware of the criticism of the sources and ethics on the Internet.

Analyzing the Field Study

Summing up the field study, it was not hard to see what was functioning well and what was not. Due to the constrained resources, there was not much to be done about the fact that they need more computers, software, and network access. The school is understaffed, but this is a national problem in Sweden. In spite of these scarce resources, the attitude towards using educational IT is positive, and they make the most of what they have. Many thanks go to those responsible for IT and the assistant principal at this school.

The problem the teachers felt was most urgent was to get the students to be more critical about sources and more aware of the ethical issues concerning the Internet. The pupils wished to be able to use the Internet more in their schoolwork. Therefore, a multimedia scenario that illustrated the problems of these issues was designed.

Designing the Multimedia Scenario

There is software to limit access and distribution of improper information on the Internet. However, this is not a solution to the problem. On the contrary, this would take responsibility away from the students and might even work as a stimulant for trespassing. The responsibility lies in the hands of the user, and the judgment should be instilled in the person instead of the computer. The use of the Internet in education can actually reinforce, or in other words, be used as a tool to enhance within the students—and of course the teachers, as well—the ability to be more critical towards the sources of information, in general. The aim in designing the multimedia scenario was: (a) to present the problems in a manner that would make the participants experience some of the problems attached to the issue in focus;

and (b) make the participants discuss different aspects and reflect upon the experiences. The level of the scenario was to suit both children and adults. We also had an idea of exchanging the roles between teachers and students—teachers play roles as students and vice versa—to make the participants view the aspects from each others' perspectives.

A short summary of the story implemented in the multimedia scenario follows:

In the initial scenes, the participants are introduced to the fictitious school they attend or work at to give them a background from which to act. They get some information about the school, for example, where and at what time of year the story takes place. After that, the role play characters are handed out on paper to each participant. There is a different character for each person, and the group is given time for each member to prepare for his/her role.

The next scene is in the classroom. The principal knocks on the door and has a message for the representatives of the student council and some of the teachers—these characters are the ones that just were handed out to the participants. The message is that they are to meet in the conference room right after the lesson. Figure 3 is the scenario structure, which gives an overview of how the scenes are linked together.

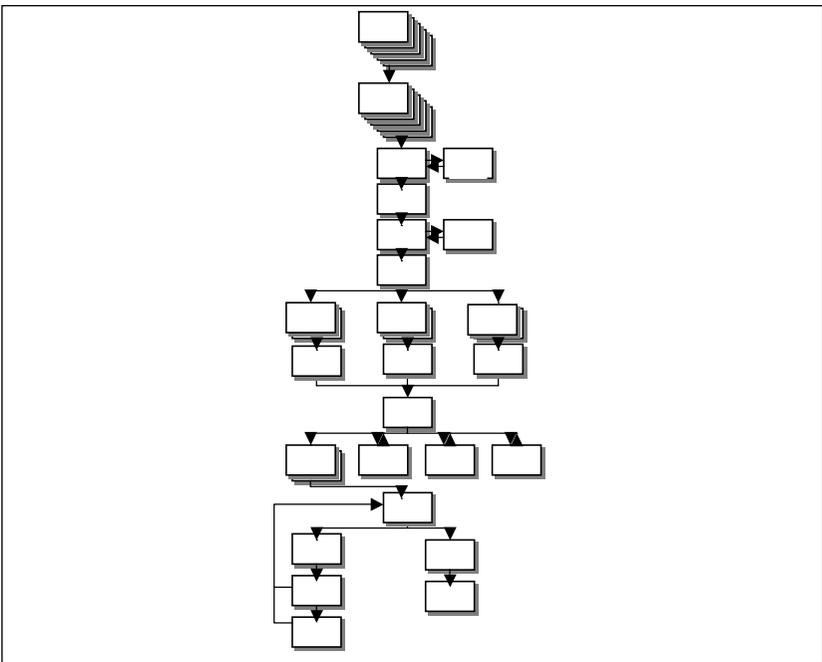


Figure 3. The overall structure of the scenario

When they all are gathered in the conference room, they first have to introduce themselves to each other. There is also a virtual student present who also introduces herself. The principal then continues to tell them that a problem has arisen at the school. Some students have misused the computers and visited improper sites on the Internet, and they have to do something. The virtual participant also talks about how she, by mistake, ended up on an X-rated site. The principal has already decided that Internet software filters will be purchased to prevent the Internet's improper use. The principal, therefore, leaves it to the group to choose from three alternatives. There are different kinds of software available and they work in different ways. One filter excludes pictures and movies that contain too many pixels that agree with the color of naked skin. Another software excludes sites that contain words that are improper. The third alternative blocks out specific Internet servers that are, in some way, publishing improper information.

After the participants have made a choice, they are dismissed and they return to their classrooms. Times passes and the software is installed. According to what kind of software the participants chose, different problems arise soon after, and the principal calls for another meeting.

This time, the principal wants the participants to complete a questionnaire, watch some movies, and discuss the issues of ethics and criticism of sources of information. First, they have to complete the questionnaire individually (the questionnaire is actually a piece of paper handed out by the facilitator to be completed by the participants). When they are ready, they are to reach consensus on the questions by filling out the same questionnaire in the scenario.

This time, the participants have to unite on the questions posed. After that, they choose whether they want to watch movies or move to the discussion. The first movie describes the enormous amount of information available on the Internet and ways to get the "good parts" out of it. The other movie is about the importance of knowing who is behind a site and the purpose of that site. The next scenes show a number of statements the principal wants the participants to discuss. When the discussion has come to an end, the principal tells the participants that they are to meet next week to further discuss this matter. Then the multimedia scenario ends.

RUNNING MULTIMEDIA SCENARIO IN PRIMARY EDUCATION

In this section, we summarize the results from using the multimedia scenario in a primary school. The focus is on the participants' interactions

with each other and with the multimedia scenario. The results also focus on the extent to which the scenario supported and encouraged discussion, and reflection about ethics and criticism of information sources. Again, only the first phase of the PIER methodology was evaluated in this research.

The activity took place in a small classroom where a table was set up in front of a white wall (Figure 1). This wall was used as a projection screen for the multimedia scenario. The participants were seated around the table, and one of the students was given the responsibility to navigate through the scenario a portable computer used to project the multimedia scenario.

The participants were divided into two groups of five people. In each group, there were four students and one teacher. It was the same teacher that (the one responsible for IT) participated both times. The students were the third- to sixth- grade appointed IT agents. This activity was carried out during the daytime and the students were excused from their regular classes. The time planned for the multimedia scenario session was about an hour. The participants did not know in advance exactly what they were going to do. They only knew that this was an activity exclusive for the IT agents and had something to do with IT.

First Group

The students in this group were two boys and two girls. Their age range was 11-12 years. One of the authors acted as facilitator and explained to the group what to expect from the scenario. What they were expected to do the next hour was to navigate by pressing the “next” button and to choose pictures that worked like links. There were decisions to be made by the IT agents. It was emphasized that this was a way to talk about the subject at hand. Role-playing was introduced, and the role descriptions would be handed out to them shortly after the start of the multimedia scenario.

In the initial part of the scenario, the participants all turned to the facilitator when they felt they were ready for each scene. Although we carefully explained to the participants before starting how the scenario worked—what they were to expect and what they were supposed to do—they were still eager to get the facilitator’s approval in every move they made to make sure they did it right. Further, they were all silent until the roles were distributed. The teacher and one student got the roles of students, and the other three students were given roles as adults. They started to read, and after a couple of minutes, one girl exclaimed, “Do I have to memorize all this?” She was frustrated with the information given to her, and she was told that

they did not have to memorize their characters, that they were free to use the information given to them if they wanted, and that there was no obligation to play a role. The other students did not say much but it was obvious that they felt lost with this part.

When they reached the site where they were to choose one of three filters they chose very quickly the first alternative—the one that excluded pictures and movies with “too much naked skin.” They all agreed that would be the best solution to the school’s problem with students visiting improper sites on the Internet.

The next major event in the multimedia scenario was the next meeting. The participants were given a paper questionnaire to complete individually. This was done without anyone asking questions. When they were ready, they continued to the next scene where they were to reach a consensus and complete the same questionnaire on the screen. To do this, they first had to come to an agreement on each question. At first, the students were very quiet, and for a time it looked that this would never work. Slowly, however, they began to talk, but very quietly—it was sometimes hard to hear what they were saying. Their opinions varied a great deal and they had difficulty in agreeing on the posed questions. Some of the students did not want to compromise when the opinions varied too much. The teacher was very active in this discussion, as she wanted the students that did not want to compromise to convince the others why their point of view was better. Eventually, they came to an agreement on all of the questions. During this scene, some of the students expressed that they had some difficulties in understanding some of the questions in the questionnaire.

The next discussion was largely colored by the earlier experiences of the participants. When discussing truthfulness of some sites on the Internet, one girl said, “If a home-page on the Internet says that Brad Pitt is a queer, then it is not true!” Another boy used the example of a company that was selling trucks when talking about the purposes of different sites. He himself had visited such a site. Another example of a topic that reflected their prior experience with the Internet was the risk of giving phone numbers away at chat sites. During this discussion, one participating boy left; he was needed for music practice. During this learning activity, there were a couple of interruptions by both students and teachers that fetched books or other things from the room.

Afterwards, when asking the students if they had played their roles, they answered that they had not. The participating teacher had played her role as a student, but from time to time, she was herself. The school bell rang just as the first group was ready. The discussion in Activity 3 of the PIER methodology after that, ended up very weak. The participating students were,

in their minds, already out in the schoolyard. The duration of this seminar was about an hour and 15 minutes.

The teacher who had participated was interviewed about the role-playing part of the multimedia scenario. The teacher believed the students did not understand the intention of the role-playing and it only confused them. Therefore, we decided not to hand out the role descriptions to the second group.

Second Group

The second group consisted of one teacher, two girls, and two boys. The age range of the students was 9-10 years. The multimedia scenario and the setting were identical except for the exclusion of the role-playing dimension as previously mentioned.

This group started out navigating the scenario without paying any attention to the facilitator, in contrast to the first group. When they reached the scene where they were to choose a certain filter for the Internet, they chose the third alternative after a minor discussion. The participants continued to click themselves through, and when they reached the scene with the questionnaire, they started to read the questions on the paper we had handed out. Almost immediately, they remarked that they had a problem understanding two of the questions. Not surprisingly, it was the same questions the first group had problems understanding. However, one of the students instantly explained the question in a most convincing and easy way. After a short while, they continued to complete the questionnaire on the computer screen. This group did not have the same problem agreeing on the questions as the first group had. The participants continued to click through the next scenes and watched the two movies without making any comments on the content. When they reached the scene where they were to comment on a set of statements, they started to discuss immediately.

One girl asked about a scene she did not understand in the scenario. It was the scene where the role-characters were supposed to be handed out. It became apparent that all of the students were very curious and wanted to know more about this part. Therefore, we told them about role-playing, as it was meant to be used in this scenario. We also handed out the sheets of paper on which were written the role characters. After a couple of minutes, one boy read out loud, "You are married and have four children." He laughed and we all joined him. He obvious thought this was funny. We got the impression that it was very difficult for him to imagine, being a 10-year-old kid.

The discussion continued to focus on what kind of roles they would like to play. The students all agreed that the character had to be a smart and groovy person, and as one boy said, "...and have a nice car." When we asked if there was something they wanted to say about the scenario a third-grade boy answered, "I thought it was good to know all this!" It took this group approximately an hour to go through the scenario.

DISCUSSION

In this section, the two groups and their use of the previously described multimedia scenarios are discussed. We will discuss the usefulness of Activity 1 in the PIER approach as it was performed in this thesis. The focus is on the participants' interaction with each other, and with the multimedia scenario. The focus is also on the extent to which the scenario supported and encouraged discussion and reflection about ethics and criticism of sources of information in regards to collaborative learning. The discussion is structured around the aspects of PBL, experiential learning, and role-playing that are the central pedagogical concepts of PIER.

Problem-Based Learning

In this research, problem-based learning is a collaborative learning activity. The participants' previous experiences and knowledge colored the discussions and they were eager to share this with each other. For example, one student said he had a problem understanding a question when another student instantly explained the question in a most convincing and easy way. They all contributed in the discussions; these contributions showed they had different understandings of the issues discussed. The purpose of letting the participants unite on the questions posed in the questionnaire was to get the students to defend and reason out their standpoints in different issues.

One boy who said he had very little experience with Internet was, in fact, able to contribute to the discussions as much as the others. In this case, the issues of criticism of sources and ethics are applicable in our daily lives, as we are confronted with information in various situations and not only on the Internet. He continued to say that the Internet can even be a useful tool for the students to learn about ethics and criticism of sources.

In the aspect of PBL, the role of the facilitator was important. The first group sought guidance and help throughout the scenario. They assumed that

the facilitator was the teacher and was there to teach them. The students were not used to this kind of pedagogical approach.

Experiential Learning

In the aspect of experiential learning, the scenario was not as strong as expected. The activity was carried out in a room next to the 5th - and 6th - grade classrooms. The lack of other available rooms made it unavoidable. Both teachers and other students that needed something from the room constantly interrupted the scenario. One participating boy in the first group was needed for music practice, so he left during the last part of the scenario. All this interruption made the participating students unable to fully concentrate on what was happening in the scenario and, therefore, much of the story-telling part of the scenario was fragmented and lost its purpose. The purpose was to get the students involved in the action and get a feeling for the experience. The importance of having a calm, quiet environment must be emphasized in a learning situation of this kind.

One can also question the scenario, itself. It might be argued that it was not “good enough” at getting the participants the feeling of the experience. The design of a scenario demands a great deal of creativity rather than routine, as it is suitable for controversial subjects. The same accounts for the duration of the scenario. It might not be sufficient for only one hour. On the other hand, we strongly believe that a three-hour session would be too long for the students in primary education in regard to keeping their interest and engagement throughout the scenario. The reason for a shorter scenario was the amount of time available, for both the teacher and students. Summing up the impressions from the two groups in the learning activity, it is believed the participants had time to get a good enough understanding of the problem to get them involved in active discussions.

Role-Playing

The aim of role-playing was to make the participants view situations from new angles. However, it was obviously too difficult for them to relate to the concept with changed roles—the teacher being a student and vice versa. If role-playing is to be used and serve its purpose, the students must be more closely related to the characters in order to “live the part” more easily. As with the first group who participated in the learning activity, the

role-playing interfered too. Earlier research results, which focused on the role-playing and how it affected group interaction, showed that it made the participants more open-minded and the discussions less prestigious (Nulden, Hardless, & Nilsson, 2002; Scheepers & Nulden, (2000). Bear in mind, those participants were exclusively adults.

Limitations, Reflections, and Lessons Learned

The time was very limited due to organizational constraints within the school and what is referred to as “quick and dirty ethnography” (Hughes et al., 1994). The teachers’ and students’ time is scarce and, therefore, we did not want to—or more accurately—could not interfere too much in their work. In spite of the limited time spent at this school, we believe this was enough time to gain an overall understanding of how educational IT is used, as well as some of the problems this school encountered with educational IT.

In this project, several lessons were learned. First, we would have interviewed more students in the field study. We also would have interviewed the students individually after their participation in the use of the multimedia scenario to get a richer picture of their view. We got the impression that they were not likely to speak as freely in a group as they would have individually. Second, as only one of the authors acted as facilitator it was obvious that observing and acting as a facilitator at the same time was difficult. It was difficult to keep full attention on both things simultaneously. Therefore, a video camera instead of a sound recorder should have been used during the multimedia scenario. Some of the relevant interaction between the participants could have been missed when only the sound was recorded. Furthermore, two of the questions in the questionnaire were difficult for some of the students to understand. We should have been more careful with the formulation of the questions, or written them in a manner that a nine-year-old would understand.

Another limitation was that only one teacher participated. More careful planning might have avoided this, however the emphasis is on “might.” The teacher was participating during her free time and the other teachers were all busy teaching.

The design of a multimedia scenario is very time consuming as it consists of different types of multimedia such as, movies, sounds, and pictures that have to be produced. Moreover, creating a plot that is interesting and rewarding, in the sense of illustrating the relevant and important aspects of the problem in focus, is very important. The aim is to engage and attract the

participants to create the feeling of a mutual experience of the problem in focus. To achieve this takes considerable time. As in this case, the need for an overall understanding of the issues—ethics and criticism of sources—was just the beginning of the design.

CONCLUSIONS AND FURTHER RESEARCH

In this article we have described the design, implementation, and evaluation of a multimedia scenario to enhance the experience that initiates learning. The multimedia scenario was used to initiate and facilitate discussion among students and teachers about Internet use in primary schools. The research question elaborated in this article was:

Is the PIER approach useful in primary school in supporting the interaction between students and the teacher?

The evaluation suggested that this type of learning activity can work in a primary school setting. This particular scenario was designed to make the participants discuss and reflect on the issues of ethics and being critical of sources of information on the Internet from their prior knowledge and experiences. PIER showed potential in supporting collaborative learning. We believe this kind of learning activity, can serve as a source of inspiration for teachers. Beside the need for teachers to know how to integrate educational IT into the curriculum, there is also a need for them to know a variety of techniques for implementing that integration effectively. We also believe that PIER can be a source of inspiration for teachers to use collaborative learning, PBL, or experiential learning as a pedagogical approach in a learning environment and not using IT to do so. In that sense IT, that is, the PIER approach, can enhance education just the same as using the new pedagogical approaches.

PIER, and more specifically multimedia scenarios, has the potential to visualize the issues so the students can more easily relate to them. To engage the students in discussions is, after all, the most critical part of the scenario.

Further research includes the following: Since only the first phase of the PIER methodology was used in this research, the rest of the cycle of PIER should be applied and studied to fully evaluate the approach in a primary school setting.

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