EXPERIENCES WITH IPADS IN PRIMARY SCHOOL

Experiencias con ipads en la escuela primaria

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Abstract:

Tablet computers gain enormous attention nowadays and become more and more part of our daily life. Due to this it is not astonishing that even the educational sector is thinking about the use of such wearable devices in the classroom. Our research study aims to give insights about real life experiences with iPads in Austrian primary schools. Therefore we describe the development of appropriate learning apps and their use in classrooms. Finally each technology-enhanced lesson is observed as well as evaluated afterwards with the help of the cut-off technique.

The research work carries out different circumstances the use of tablet computers has a positive influence on teaching and learning and gives practical hints how they should be used in classrooms.

Key words: Tablet, iPad, field study, cut-off technique, app, primary school

Resumen:

Los ordenadores-tablet están acaparando toda la atención en estos momentos y forman parte de nuestra vida cotidiana. Por ello, no es de extrañar que en el ámbito educativo se hayan arbitrado fórmulas para incorporarlos en las aulas. La presente investigación pretende mostrar las estrategias llevadas a cabo en determinadas experiencias con iPads en escuelas primarias austriacas. Por un lado, se describe el desarrollo de las aplicaciones (apps) educativas apropiadas para su empleo en aulas. Y por otro, cada lección apoyada en las tecnologías es analizada y evaluada desde una perspectiva técnica. Las aportaciones más representativas de la investigación evidencian las diversas fórmulas de utilización de este tipo de ordenadores para promover una influencia positiva en la enseñanza, también se apuntan recomendaciones prácticas sobre cómo deberían ser usados en aulas

Palabras clave: Tablet, iPad, campo de estudio, técnica desconectada, app, escuela primaria,

1. Introduction

Since it first appeared in the early 2000s, e-Learning has become a mass phenomenon. Educational institutes began to think about how teaching and learning processes can be enhanced or virtualized (Ebner et al, 2006). Just a few years later the so-called Web 2.0 (O'Reilly, 2007) changed the way Internet users deal with the World Wide Web. This influenced the educational sector as well; the term e-Learning 2.0 was coined by Downes (Downes, 2005; Ebner, 2007) in 2005. Since then the use of Weblogs (Farmer & Bartlett-Brag 2005), Wikis (Augar et al., 2006), Podcast (Towned, 2005) and social networks (Ebner & Maurer 2008) became more popular for educational purposes following different didactical approaches.

At the same time mobile devices, the so-called Personal Digital Assistants (PDAs), started being used in education (O'Malley et al., 2003). Projects such as mExplorer (Göth et al, 2004), Active Campus (Griswold et al., 2004), MOOP (Mattila and Fordell, 2005) and Livenotes (Iles et al., 2002) gave a first insight about how mobile learning can improve traditional classroom settings. In 2005 Kukulska-Hulme & Traxler pointed out that most of the ongoing projects are support projects; for example reading only text on a mobile screen, interactive forms like making films, recording voices and taking pictures rather than using mobile devices for new learning scenarios (Kukulska-Hulme & Traxler, 2005). Which was to be expected if we consider that in 2005 mobile phones were mostly used for writing simple texts, taking pictures with primitive cameras and featured no Internet connectivity. In 2007 the iPhone hit the market and with it the smartphones era began. Since then mobile learning is one of the most promising fields in Technology Enhanced Learning (Johnson et al., 2013). Nowadays in Middle Europe nearly every child from the age of 10 owns a personal smartphone with an Internet connection (Grimus & Ebner, 2014). Due to this fact mobile learning has become a more effective learning scenario characterized by the following three crucial factors:

- Communication: Mobile devices allow us to communicate regarding our learning content and processes at any time.
- Interaction: Mobile devices allow us to interact with the learning content at any time.
- Diversity: Mobile devices allow us to choose among various kinds of applications as well as learning contents.

In this publication we would like to report our experiences about mobile learning in schools. Our research study concentrates on the primary school with children from the age of 6 to10.

Considering the first results of a survey regarding the application of iPads in Schools with older children (Huber, 2012), we asked younger children how effective Tablets, e.g. iPads, are to them.

First of all we give a short insight into the app development at Graz University of Technology (TU Graz). Afterwards, we describe the research study as well as the used methodology. Finally we discuss the outcomes and provide hints for further studies.

2. Methodology

2.1 App development at Graz University of Technology

TU Graz offers two major courses about mobile application development, one for each of the two most popular mobile operating systems, namely iOS and Android. Every year about 150 students attend these courses and become app developers. Some of them also deal with mobile apps in projects or their final thesis. In these courses programming skills as well as an introduction to Human Computer Interaction, Usability methods and app design among others are gained (Ebner et al, 2010). In the meanwhile many different learning apps have been developed and were delivered to schools as a proof-of-concept (Huber, 2012; Frühwirth, 2013; Kienleitner, 2014; Lexow, 2014)

2.2 Research methodology

At TU Graz quite a few iPad apps were developed specifically for the use in primary school. The apps are described in more detail in the forthcoming sections. Although the developers take the HCI guidelines into consideration with a special eye on young learners as carried out by Huber & Ebner (2013), a field study is absolutely necessary to get an idea about whether the app can support learning or not.

The traditional paper-pencil feedback evaluation does not work with children from the age of 6 to10. Hence we decided to carry out a multi-level evaluation:

First of all the children in the classroom were monitored. A research assistant participated on site and observed how the app is used by teachers and children. The whole process is documented via photos, films and notes.

After each lesson, interviews were conducted with randomly selected children. As mentioned before it is not very easy to get a reasonable feedback from young children in a paper-pencil form or even in interviews. Nevertheless, in general children respond honestly if the interviews are conducted in a spontaneous manner. Nevertheless it is tricky to get into real communication, as they are typically shy and unsure with researcher's question. As a result the research group decided to use a group discussion and ranking technique for the interviews with children.

The group interviews and the ranking assignment were done in the following way. Beforehand five statements and five smileys were prepared for the children. The statements contained questions about several aspects of the app and also the overall impression of the children regarding the app. The five smileys were ranged from a crying face to a smiling one. After a working lesson with one app was over, a group of three to four children were asked to come out of the classroom to talk about their impressions. With other words we did not allude that we are doing a different form of an interview or evaluation. Statements and the smileys were just handed out to the group. Then they were encouraged to allocate each smiley to one statement. In the next step they sorted them to a freely chosen chronological order. It was important that every child agrees on the assigned relations in the group. As a result, they had to discuss about the app and how their sorting should finally look like within the group. Fischer (2007) mentioned that the ranking technique is highly interesting because it makes children to discuss about facts, bring them to reflect some circumstances and finally let them agree on one final decision. The research assistant observed the whole discussion and the

arguments of the children about their experiences with the used applications. It can be stated that with the help of the cut-off technique children did not felt observed and answered in a very un-stressful way.

Figure 1. Children being interviewed, assisted by cut-off technique

3. Research study

The following three applications were used by the children in the classroom. They are described as follows.

3.1 Lesetrainer

In comparison with the other apps used in this study, the Lesetrainer is not a game based learning app. It is rather an application for testing the reading competencies especially for school children.

The Lesetrainer provides a web-based platform for the administration purposes and three individual iPad apps for the pupils. On the web-based platform the teachers can register their classes and create an account for each pupil. They can create new reading tests or use the already created ones and prepare them for a class.

There are three different types of tests to select from. Thus there are three individual apps accordingly. All apps contain different forms of questions and different answering possibilities. For example the first type of reading test deals with correct reading competences. The app provides several statements that the children have to answer to, e.g. „the sky is green". The children have to answer whether the statements are correct or not. Figure 2 shows this example. The given answers and the consumed time can be monitored and compared to all other pupils by the teacher on the administration platform (see Figure 3).
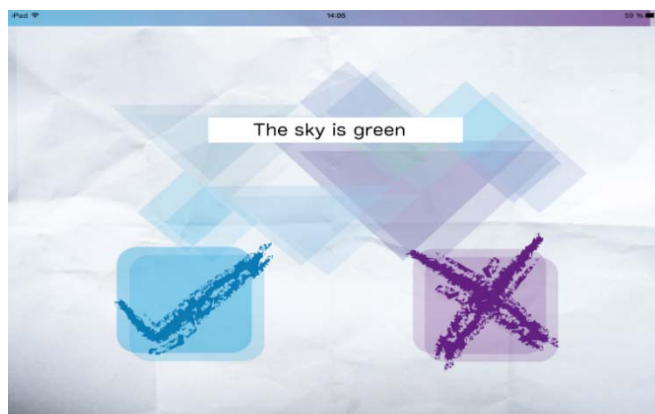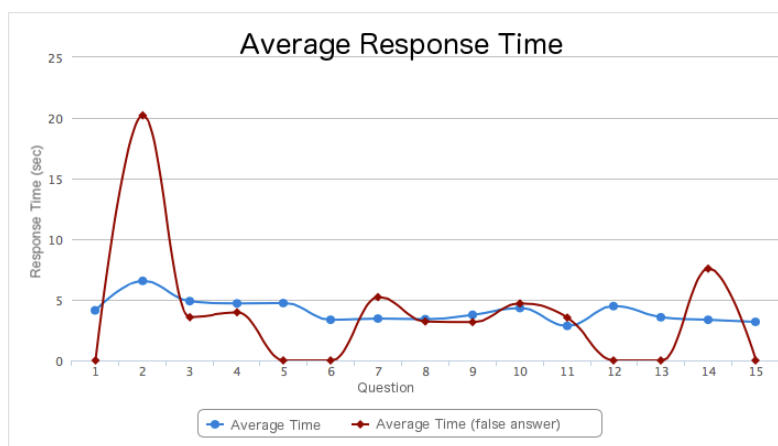
Figure 2. iPad app Lesetrainer

Figure 3. Statistics about the answers and the average time consumption provided by the administration platform of Lesetrainer application.

The field study was carried out on pupils of second and third grades at primary school. The pupils were about eight to nine years old. Twenty-one children joined the study in the second grade: twelve boys and nine girls. It was a very active class and the seat plan was pretty loose. They sat in front of big squared arranged tables. The pupils were familiar with the use of iPads. It was a so called „iPad class", which means that the iPads were integrated frequently to the lectures.

In the third grade twenty-five children joined the study: twelve boys and thirteen girls. The third grade was a little bit quieter than the second grade and the seat plan was a bit tighter compared to the class described before. They had a more classic style seat plan. They almost sat in rows one behind another. This class had no experiences with iPads in school lectures before.

The Lesetrainer was tested on two different days in both classes. The whole research study took two hours each day including the feedback part for both classes.

a) Day one- Second grade

Beforehand the two classes and the pupils had to be registered in the Lesetrainer administration platform. Afterwards assignments could be allocated to the classes and each single pupil. For each day three reading tests (one reading test for each app) were prepared for both classes.

In the beginning the pupils had to connect their iPads to the Internet, which was a tedious work. Unfortunately the Internet connection was not as good as expected. Some time later the children managed to connect their iPads to the Internet. After a short introduction and a demonstration of the app they were encouraged to use it on their own. They got their usernames and passwords to sign in and begin to answer to their prepared reading tests. Many pupils had problems with the login process at this step. Unfortunately some usernames contained special characters, which was difficult to find on the iPads. Other pupils had problems with entering the passwords. They could not see what they were typing in, because as usual the letters were marked by dots.

After a while, when the children managed to sign in, they could start and complete the reading test on their own. Some pupils didn't manage to sign in while the other pupils were already finished with the first reading test. Therefore we had to wait for them. Meanwhile the pupils who managed to do the first test got the instruction to the next app while the other pupils were assisted to sign in. Thus some pupils had to do the second app without introduction and without watching a prepared demonstration. Nearly all children knew how to sign in when we started with the third app. There was enough time to do a test run with the children beforehand.

b) Day one - third grade

The pupils of the third grade class hadn't any experiences with usage of iPads in school before. After our experiences from the lesson in the second grade, some pupils of the second grade were asked to assist the research assistant. They supported the children in the third grade with the login process and showed them how they can work with the apps on their iPads. The pupils in the third grade were provided with an introduction to the apps at first. Then they started the app and signed in with the help of their schoolmates. Nevertheless two pupils weren't able to sign in. In this class every app was explained to the children beforehand. Nearly all pupils could start the second reading test on their own.

c) Día two - second and third grade

The second field study was very similar to the first one. Unfortunately there were more problems with the Internet connection than the first field study. The classroom had to be changed to make the last reading test.

The pupils were provided with a short introduction to the apps again. No pupils were asked to help their classmates in time.

3.2 Buchstaben Post

Buchstaben Post is a game based learning app for school pupils to train their reading and spelling ability. One can play this app with up to three other children, hence four iPads can be used. The app works as follows: each child gets a question. For instance a question

like "you will find it in winter and it is white". The child is provided also with a number of letters. The given letters are usually not the one the child would need to solve the question. So the child has to ask the other players whether they have the required letters or not. The players can send her the missing letters just by swiping the letter to her iPad. The next round can be started after each child has solved her small puzzle. This application is a so called collaborative app. The pupils are supposed to work with and talk to each other while using the app. Specially they have to help each other to spell a word. Buchstaben Post provides also a web-based administration platform. The teachers can create an individual set of questions/words pairs for their classes on the administration platform.

Figura 4. Pantalla principal de Buchstaben Post – pregunta (3) y letras (1) además de la solución (2)

The study was carried out in a second grade class in another primary school. At the first glance the seat plan was a bit tighter than in the other. Pupils who played in the same group had to talk to each other. Therefore the directions of some chairs and tables had to be changed.

First of all the pupils were provided with a short introduction to the game. Then they were assigned into groups of up to four pupils. Finally the groups had to connect their devices. Nearly every group needed support to connect the devices at the first time. When the app started every group played in their own pace and also in their own way.

3.3 Guess Austria

Guess Austria is another game based learning app for school children that was developed by TU Graz (Lexow & Ebner, 2014). The process of the game is similar to the TV entertainment show „Millionenshow" in Austria. After starting the app a question and four different answers are presented, in this particular case about the country Austria. Only one answer is correct. The answers can be given through the correct external plastic cards. There is one plastic card for each of the four possible answers. Answers can be given by putting the appropriate corresponding card (1 to 4) on the tablet as shown in Figure 5. There is a time limit to give the answer. After a question is answered, the actual point level and the correct answer are shown on the iPad. Up to four players can play the game at the same time. In the beginning each package of four colored cards will be assigned to the players. Every player is

provided with four plastic cards one for each corresponding answer. In this way it is possible to hide the answer from the other players.

Figura 5. El jugador rojo introduce la respuesta correcta

For this field study, four kids from a second grade at primary school were asked to play the learning game. The children in this class were not familiar to the usage of iPads in the school. As usual the pupils were provided with an introduction to the game beforehand. In contrast to the other apps they did not use the app on their own. They were guided by the app developer. After the introduction the pupils had to choose one package of the colored cards. At first the pupils signed in with their nickname and gave a first test answer with their own plastic cards. Then they started the game. Unfortunately the time limit was too short for the pupils. Therefore the time counter had to be stopped manually until the pupils read the question completely.

4. Results

In this chapter the results from our observations as well as the feedback from the children are summarized.

4.1 Lesetrainer

The testing situation in the second class was unfortunately not ideal. Due to the troubles with the Internet connection, the children got very nervous. They had problems with their usernames or passwords, mostly because they contained an underscore. It confused the pupils because they did not know how to find it on the iPad. Furthermore the hidden password (marked by dots) caused typing errors. Because of the growing nervousness they made a lot of mistakes at this point.

Afterwards a rising disturbance in the class was observed because some pupils did not manage to sign in while the other pupils were already finished with the first test. Therefore the pupils who managed to do the first test were provided with the instruction to the next app while the other pupils were assisted to sign in. These pupils had to do the second app without any introduction and test run. They didn't know what form of questions they got and they didn't know how to answer to them. At first they were unsure about what they should

do. However, as this app had no time limit, they could manage to work with the app taking more time.

In the final interview the children mentioned that they liked the reading test on the iPad much better than on a paper. It was funny to make a test on the iPad. They also said that they would like to have the possibility to answer more questions about the text they have read. A few pupils expected a result in the end. They were a bit disappointed because they wanted to know which answers were correct. The pupils said that the first app was the easiest one to use. They immediately knew what to do. The second app was more difficult for them to use. They had to think about what they were supposed to do. One of three pupils had not enough time to answer the questions from the first app.

In the third grade it turned out that the pupils could start and work with the apps much easier because of the support of the second grade pupils. There was no problem and the pupils were not as nervous as the second grade, before they began to make the test.

The third grade children discuss in the final interview that they would like to answer more questions and that the test was too short. Therefore they liked using the app and answering to the questions very much. One pupil said that she wants to buy the app for her own iPad at home. This group did not notice the time limit in the first app. Consequently they were not stressed while answering to the questions.

The second testing day did not start very smoothly. Because of the weak Internet connection many pupils tried to sign in repeatedly, but it did not work. This time the pupils knew where to find the underscore on iPad. They could find and activate the option to see the password while typing it. Therefore they could type in their username and password correctly.

In the final interviews the most pupils mentioned that the sign in process was very tedious on that day. They were very happy that they could start the app after they were signed in. Nearly every child had enough time to give their answers this time.

4.2 Buchstaben Post

Nearly all groups needed help to connect their iPads at the first time. After they could start with the game, many different groups of pupils were formed.

For example there was a group of girls. At first they did not know what they should do to gain the correct missing letters for the answer on their own screen. Additionally they were shy and did not collaborate and talk to the other players very often. They needed assistance to get things started.

On the other hand there was a group of boys. They invented a kind of competition. The fastest pupil of this group sent all his letters to another player to irritate him.

In a mixed group there were some pupils who did not ask their classmates to send them the missing letters. Instead, they fetched the letters themselves by touching the iPad of their classmates.

In another group, a pupil did not read the question. She tried out all possible word she could build using the existing letters on her iPad.

4.3 Guess Austria

It was very important for the use of the app Guess Austria that every player gives an answer with the plastic card before the game starts. Otherwise the players would not be able to give an answer. It is challenging at the beginning to put the plastic cards correctly on the right place on the iPad.

In the first group of players there were three girls and one boy. In this group it was not important for the pupils to hide the answers from the other players. Sometimes they were even saying the answers loudly so that every player could here it. Some pupils put their cards on the table so that everybody could see which answer they chose.

In the second group there were two boys and two girls. Similarly to the first group they put the cards on the table so that everybody could see their answers. The secrecy did not have priority at first. In the end we recognized only one player who prevented the others from revealing the answer.

Some other pupils could not wait to give the answer and had to be stopped, because every player has his own timeframe to give the answer. Only one pupil in these two groups did not manage to give the answer correctly with her card. She was so enthusiastic that she did not notice that she holds the card the other way round.

In the final interview round the pupils said that the time was too short for them to give an answer. Also the handling of the external plastic cards was not as easy as expected. Nevertheless they liked the game and they had the feeling that they learned something new by playing it. Even when they didn't know the correct answer, they had funny by trying to take a guess. In all, the feedback from all pupils and their teacher was very positive.

5. Discussion

En esta In this section we would like to bring the results of the research study to a Meta view. How can the collected experiences help to improve teaching and learning in classrooms with the help of mobile applications? Following crucial factors can be listed from the outcomes of the study made with different apps and in different schools for the target group of primary school children:

1. Be aware of the existing infrastructure: Most important thing we learned out of the field study of the Lesetrainer was to test the Internet connection. The successful use of Internet-based applications in a school class depends crucially on the Internet connection quality. It is of high significance to assure that the existing infrastructure meets the requirements.
2. Login procedure can be stressful: Our research study clearly pointed out that special characters in passwords as well as the hidden password feature on the device lead to a very stressful situation. Children become nervous and also perform in the test not expectedly. Therefore we strongly suggest to use no special character in passwords, especially in restricted time situations where many learners at the same time have to login. Furthermore allow to login with a blank password. After the very first trial one can switch back to more secure passwords.

3. Make children get familiar with the app: A further outcome of the study is that the children must get familiar with the app. Do not demonstrate the app but let the children just test it out. After a first run any app was completely clear to them.
4. Collaboration needs assistance: The observations during the test of the collaborative app pointed out that children need assistance. Some pupils are very shy and did not collaborate while others are competitive or impatient. Collaboration is not a matter of an app but also of guidance.
5. Assist the creativity of children: It is very funny to observe what children are doing with more open minded apps like the collaboration or the game based learning one. For example children put their external cards open for anyone on their table whether the game looses its intention. In other words they make a kind of collaborative game out of the app.
6. Prepare immediate feedback: Children want to know if they are right or wrong. Thus the app should give feedback whether they have done the exercise correctly.
7. Competition is not a priority: All observations pointed out that competition among the pupils has no priority. Apps for this target group should strongly assist collaboration and teamwork instead of high scores or similar competition oriented scenarios.

The mentioned seven points must be seen as important for different stakeholders. Teachers should be bear in mind when they are working with new apps in the classroom that it is for example important to make children familiar with the app. On the other side programmers have to think about that immediate feedback is absolutely necessary. Network administrators have to ensure that the infrastructure is up and running. So it can be concluded that it is not an easy task to bring apps to the classroom and that there are more than usual technical and didactical preconditions. The findings of this study are directly related to classroom teaching. We strongly suggest to bear them in mind before starting the use of apps in classroom.

6. Conclusion

In this research study we shared our experiences with the use of apps as well as iPads in the classroom in primary schools. Three complete different applications on three different schools were tested. In all field studies we documented the outcomes by observations as well as follow-up interviews, using the cut-off technique. It can be summarized that we strongly recommend this strategy due to the fact that children discussed a lot about their feelings about the app. Even more it is hardly to follow them and their thoughts.

Finally the outcomes are summarized as suggestions. We would like to bring in mind these suggestions to anyone who is going to develop a mobile learning app for usage in classrooms. The research study enhances the HCI guidelines for children (Huber & Ebner, 2013) in a meaningful way.

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