Computers & Education 76 (2014) 119–130

Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

The added value of a gaming context and intelligent adaptation for a mobile learning application for vocabulary learning

Jacobijn Sandberg [a,*], Marinus Maris [a,1], Pepijn Hoogendoorn [b,2]

[a] University of Amsterdam, Informatics Institute, 1098 EH Amsterdam, Noord-Holland, The Netherlands
[b] Earlybird, Westersingel 109, 3015 LD Rotterdam, The Netherlands

ARTICLE INFO

Article history:
Received 1 August 2013
Received in revised form
3 March 2014
Accepted 4 March 2014
Available online 19 March 2014

Keywords:
Mobile learning
Serious gaming
Language learning
Multimedia

ABSTRACT

Two groups participated in a study on the added value of a gaming context and intelligent adaptation for a mobile learning application. The control group worked at home for a fortnight with the original Mobile English Learning application (MEL-original) developed in a previous project. The experimental group worked at home for a fortnight with MEL-enhanced, the original application embedded in an adventure game and augmented with intelligent adaptation. Two learning themes were used: Zoo animals and Neighbourhood. Both groups attended lessons at school on Zoo Animals and Neighbourhood during the same periods they were allowed to work with the application at home. A pre- and post-test were conducted to establish the initial vocabulary knowledge and the knowledge acquired during the learning phase. The main results indicated that the students in the experimental condition (MEL-enhanced) outperformed the children from the control group (MEL-original), although the former group did not spend more time with the learning material than the latter, and that the students in the experimental group valued MEL-enhanced more than the children from the control group valued MEL-original.
© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

Mobile devices allow learners the freedom to learn where and whenever they want (Sharples, 2000; Sharples, Taylor, & Vavoula, 2007). In addition, the learning content can be adapted to the location of the learner, enriching the learner experience. In a previous project, Mobile English Learning, MEL-1 (Sandberg, Maris, & de Geus, 2011), we investigated whether a mobile English learning application could supplement and support English learning at school. The participants in the study were group 5[3] children enrolled in a primary school that offers English as a learning subject from group 1 upwards to group 8.[4] The application offered multimedia learning material on zoo animals. The learning domain consisted of English words related to different characteristics of zoo animals (habitat, behaviour, class, physical appearance). The results showed that the students who were allowed to take the mobile application home for a fortnight (home group) outperformed students who either only worked with the learning material for a fixed period of time at school, or worked with the learning material at school and with the mobile application during a trip to the zoo. When taking the additional time the home group spent with the mobile application into account, it became clear that their outperformance could be ascribed to the additional time spent. Additionally, we noticed that over a fortnight, the time played per day diminished gradually. We hypothesised that the diminishing motivation might be due to a lack of engagement and flow. To sustain motivation, we adapted MEL-original in two ways:

1. By using artificial intelligence techniques to adapt the navigation of the child through the learning content to his or her particular level of knowledge and skill, and

* Corresponding author. Tel.: +31 20 5256797.
E-mail addresses: j.a.c.sandberg@uva.nl (J. Sandberg), marinus.maris@gmail.com (M. Maris), p.hoogendoorn@earlybirdie.nl (P. Hoogendoorn).
[1] Tel.: +31 20 5256797.
[2] Tel.: +31 10 4637733.
[3] 'Group 5' refers to the fifth year of the Dutch school system, when children are aged 8–9.
[4] This encompasses all of Dutch primary school: age 4 to age 12.

http://dx.doi.org/10.1016/j.compedu.2014.03.006
0360-1315/© 2014 Elsevier Ltd. All rights reserved.

2. By embedding the learning application in a gaming context, providing an interesting context and awarding the children for their learning efforts.

Adaptation should keep the learner in a preferred state, neither bored, nor overwhelmed. The material offered should match the level of the learner. Embedding the learning context in a more elaborate gaming context, with an appealing narrative and a quest for the learner, should keep the learner interested in playing the game.

The present study (MEL2) explores the added value of intelligent adaptation combined with game elements. The next section presents the theoretical background and related work.

2. Theoretical background and related work

2.1. Evidence for the effectiveness of serious games

The field of serious gaming is concerned with games that serve some other primary purpose than mere entertainment (Stapleton, 2004; Susi, Johannesson, & Backlund, 2007). Although there exist different definitions, in the context of our study we adhere to the one provided by Abt: "We are concerned with *serious games* in the sense that these games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement." (Abt, 1987, p. 9).

Public education currently faces the challenge of incorporating the digital competence of youngsters into the school curriculum and integrating formal schooling, which takes place at school, with more informal ways of learning (Mitchell & Saville-Smith, 2004; Sefton-Green, 2004) outside schools. Serious games could offer support in dealing with these two challenges. Children of the present day are raised in an environment with advanced technologies (smart phones, virtual gaming environments, tablets, social networks).

In the recent past several reviews on the effectiveness of games for learning and serious games have appeared (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012; Felicia, 2011; Girard, Ecalle, & Magnan, 2012; Wouters, van Nimwegen, van Oostendorp, & van der Spek, 2013). None of these provide conclusive results. It is apparent that some studies report positive results whereas others do not. Wouters et al. (2013) claim that there is evidence for a learning effect (games outperforming traditional methods) but not for a motivational effect. Steinkuehler and Squire (2014) state that the major problem of the interpretation of these various meta-studies lies in the fact that the study descriptions are under specified and that the successfulness of a game is closely linked to the exact conditions under which the game is played.

However, there is a methodological problem too. Most studies reported did not incorporate a control group or when a control group was present it received no training at all. Girard et al. (2012, p. 9) state: "In our opinion, the best way to assess and prove the effect of any type of training is to compare it with at least a group that receives no training and a group trained using a different type of training material." Connolly et al. (2012) claim that there is a lack of true experiments with random allocation of subjects to conditions. Ennemoser (2009) claims that though in many cases significant effects are established, the question of what causes the effect is seldom answered satisfactory. He calls for more rigour in experimentation and more elaborate theoretical models of how cause and effect during gameplay are related.

2.2. Game characteristics

Different authors attempt to define the most salient game characteristics. Malone and Lepper (1987), for example, argues that challenge, fantasy, complexity and control are the core features of a learning game. Crookall, Oxford, and Saunders (1987) mention rules, strategy, goals and competition. Garris, Ahlers, and Driskell (2002) present an overview of the most common characteristics mentioned by different authors, which include fantasy, rules and goals, sensory stimuli, challenge, mystery and control. Hence, from the literature, we can compile the following list of typical game characteristics:

1. 'Fantasy' is related to the concepts of immersion and engagement. A well-developed fantasy context seduces the learner to fully engage in and go along with the fantasy (e.g. role playing or a mystical environment).
2. 'Rules and goals' are related to challenge and underlying learning objectives. Pursuing and achieving goals at increasingly higher levels challenge the learner. The rules of the game may support the learning objective: formal rules underlying a game can be acquired in an implicit manner, learning by doing, shaping the learner's knowledge acquisition through patterns of positive and negative feedback.
3. 'Sensory stimuli' are needed to fully engage the learner. Visual and auditory stimuli serve to create a feeling of presence in the game environment.
4. 'Challenge' refers to the level of difficulty of the goals set for the learner. Too difficult creates frustration (Koster, 2005) whereas too easy creates boredom. Introducing game levels is one way to stepwise increase the difficulty of the game. The design of the game concept of flow is linked to intrinsic motivation: you keep at the activity just for the sake of it. Flow is claimed to be one of the fundamental reasons that people play videogames (Murphy, 2012). He links flow to the Laws of Learning to explain why learning games may improve understanding and retention. Continuous cycles of feedback which is necessary to induce and maintain flow, are associated with the feedback aspects of the Law of Exercise. The positive emotions associated with flow are associated with the Law of Effect. The intense experiences of being in a state of flow are directly associated with the Law of Intensity.
5. 'Control' addresses the learner's influence on the flow of the game. Both Garris et al. (2002) and Cordova and Lepper (1996) report a strong correlation between a feeling of being in control and motivation.
6. 'Mystery' refers to introducing uncertainty and surprise to a game (Garris et al., 2002). When something unexplained happens people are inclined to become curious and eager to find an explanation. Mystery and fantasy are interwoven through an unfolding storyline or narrative. Leaving gaps in a storyline elicits cognitive curiosity.
7. 'Rewards' in games are often scoring points, being able to buy items, winning medals, etc. Reward systems are more geared towards extrinsic motivation than towards intrinsic motivation (Cordova & Lepper, 1996; Kenny & Gunter, 2007; Schwabe & Göth, 2005).

Download English Version:

https://daneshyari.com/en/article/6835217

Download Persian Version:

https://daneshyari.com/article/6835217

Daneshyari.com