Exploring the Acceptance of Video Games in the Classroom by Secondary School Students

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Abstract: In this study, a path-model to examine and predict student acceptance of videogames, based on the technology acceptance model, is proposed, discussed and empirically tested. Special attention is given to the gender and experience issues. According to this model, the intention of students to use video games in the classroom is affected directly by a number of factors: the relative ease to use video games, the perceived possibilities of video games to create useful learning experiences, the perceived usefulness to gain better school results and by experience with video games in general. It is argued that gender does influence behavioral intention, although only indirectly through ease of use and experience. Survey results of 858 Flemish secondary school students revealed a good fit between the data and the proposed model.

Keywords: game-based learning, video games, secondary school students, educational beliefs, digital natives

Introduction

From a historical point of view, games have received a lot of attention because of their educational potential [24, 32]. In the last decennia, there is a renewed interest in the subject, as video games have become one of the most important entertainment media for youngsters. Research shows that video games can serve as teaching tools, as they enclose the best of different learning theories in their practice: they situate learning in a meaningful context, empower students to self-regulate their learning, confront learners with ill-structured problems, integrate multiple topics, promote inquiry-based and discovery learning to name a few [11, 23, 26, 33]. It is often suggested that video games are intrinsically motivating [11, 21], especially for “digital natives” [25]. Therefore, video games are likely to promote a more positive attitude towards learning [8]. However, there is little empirical proof for this hypothesis. In this study the focus lies on the perspectives of secondary school students. A path-model is proposed and evaluated for understanding and predicting student acceptance of video games.
1. Theoretical background

1.1 Why study student acceptance of video games?

There are two main reasons to study the acceptance of video games by secondary school students. The first reason is the important but often neglected role of students in the adoption process; the second is the uncritical acceptance of theory about the uniqueness of contemporary students. According to Prensky [25], compared to former generations, modern-day students have never known a world without ICT. These “digital natives” [25] – also referred to as “screenagers” [27] – are growing up with blogs, social networking programs and video games, thereby gaining specific technical skills, new ways of thinking, and different learning preferences. Hence, there is a need for educational reform. In this view video games can serve as contemporary teaching tools, more strongly appealing to the “net generation”. This claim is supported by the findings of Malone [21] and Lepper and Malone [20] proving that video games may be intrinsically motivating.

However, Bennett, Maton and Kervin [1] argue that the figures about the immersion of youngsters in technology might be overestimated. Additionally, they are not convinced that the way in which contemporary students think and digest information differs widely from what previous generations did. Therefore, video games should be approached with caution, as more evidence is needed to prove that game-based approaches can support effective learning. Experiments by Squire [28] and Egenfeldt-Nielsen [9] in secondary classrooms show that the motivational aspect of games in education is not self-evident. Both experience and gender appeared to be very important factors determining student enthusiasm and effectiveness in game-based learning. So instead of motivating all students, video games might alienate both inexperienced and female students [4, 7]. In a survey on 170 Maltese college students (16 to 18 years old) about the use of video games in the classroom, Bonanno and Kommers [3] empirically proved that both competence and gender play an important role in the acceptance of video games for educational purposes.

Until now, no research has been done using path-analysis. Moreover it is still uncertain whether the effect of gender on video game acceptance is mediated by experience, or whether experience and gender affect video game acceptance separately. The present study tries to tackle this issue, not only by exploring student acceptance of video games in the classroom, but also by using the technology acceptance model (TAM) as a guiding framework for testing indirect effects.

1.2 Technology Acceptance Model

The technology acceptance model (TAM – [6]) was built on the theory of reasoned action (TRA – [10]). According to TAM, intentions are the fundamental drivers of actual behavior in people. Focusing solely on the case of technology use, TAM identifies two user beliefs: perceived usefulness (U) and perceived ease of use (EoU), as the main determinants for individual behavioral intention (BI), with usefulness having a larger impact than ease of use. In line with the premise of technology (being useful by making things easier), TAM also posits that usefulness is influenced by ease of use. In 20 years, TAM has become one of the most widely used and empirically validated models within MIS research [16, 19]. Not only has it been applied to different technologies and has it been tested in various contexts [19], but comparison studies also endorse the supremacy of TAM over other acceptance models [22]. The model typically explains about 40% of the variance in usage intentions and behavior [31]. Hence, TAM is a very simple and
parsimonious model to predict and explain user acceptance of technology. However, TAM findings have not always been consistent [19]. One major problem is that the model does not account for individual, organizational, contextual, technological and task characteristics. Consequently, as Davis already suggested in 1989, the model has been extended with prior factors, either suggested by other theories or a different context [16]. Studies that included these factors not only contribute to the understanding of usefulness and ease of use, they also yield a larger variance [19].

1.3 TAM and video games

In the case of video games, TAM has not been used extensively. Despite this fact, large numbers in explained variance were yielded. Hsu and Lu [13] for example, were able to explain about 80% of the variance in game playing behavior with an extended TAM that incorporated social norm and flow experience. Not usefulness, but ease of use appeared to be the key determinant for predicting online game play. In a later study [14] the authors further adjusted TAM with perceived enjoyment, social norm and preference as determinants for explaining loyalty to online game communities. It was found that perceived cohesion also played an important role, though it only affects loyalty indirectly. Kwang and Kim [17] studied the acceptance of mobile games with a TAM model that was extended with visibility, self-expression, innovativeness and ease of use as determinants for usefulness, and innovativeness and facilitating conditions as important influences on ease of use. They found that usefulness and ease of use were key determinants to predict mobile game usage and acceptance. According to Ha, Yoon & Choi [12] perceived enjoyment is even a better predictor than usefulness in the case of mobile video game use. They also found that age can be the key moderator of game acceptance in a mobile broadband wireless access environment. However, the context of the present study is entirely different. Not only are video games conceived as learning tools instead of hedonic products, but the students under survey are from European origin as well.

2. Model development

In the traditional conceptualization of TAM, usefulness was defined as “the degree to which a person believes that using a particular system would enhance his or her job performance.” [6, p.320]. A close examination of the items measuring usefulness shows that “performance” is the key-word here. From an educational perspective, it might be argued that this conceptualization is less suitable for the learning context, since it is too narrowly focused on results – on product – while it is generally agreed upon that education means more than mere outcome. One has to take the learning process into consideration as well. Hence, in this study Davis’ usefulness is treated as “perceived usefulness – product” (U-product) and an additional construct, “perceived usefulness – process” (U-process) is created. According to TAM, usefulness has a stronger impact on behavioral intention than ease of use has. However, the degree to which someone perceives a certain information system as easy to use, influences how useful he or she thinks the system to be. Hence, the hypotheses under study are a logical extension to the traditional TAM hypotheses, due to the division of usefulness in two separate constructs: usefulness-product and usefulness-process.

Earlier research showed that experienced video gamers favor the use of video games in the classroom more than students who seldom play. This may result from the fact
that students who are familiar with video games are more skilful at using them and expect them to be just as easy to use in the classroom as well.

Another concern in the study of video games for learning purposes is that video game use in the classroom could alienate female students [2, 4, 7]. However, it is perfectly possible that the effect of gender is mediated by game experience at one hand, and by ease of use at the other hand. In this paper we argue that gender has no direct effect on the intention to use video games in the classroom; but rather affects behavioral intention indirectly through ease of use and experience.

Although behavioral intention – as a construct – has been criticized in the light of common method variance [29], it is treated as the dependent variable in this study, mainly for three reasons. Firstly, similar to Hu, Clark & Ma [15] we used behavioral intention from a pragmatic point of view. Since the use of video games in the classroom is still new and primarily the decision of the teacher, measuring actual use would not be correct. Moreover, Lau and Woods [18] found that behavioral intention is a good predictor for future use of learning objects (although, in the context of higher education). Secondly, behavioral intention is postulated by TAM as the main determinant of usage behavior, rather than actual use [5]. Thirdly, Mathieson stated that not measuring actual use is not a serious limitation to user acceptance research [22, p.231].

Thus, our model assumes that students only appreciate video games in the classroom if they expect them to enhance the learning process, or if they expect to perform better in school owing to the fact of being experienced with games and comfortable with their various applications. We further argue that gender has an influence on the intention to use games, though only indirectly through experience and ease of use. Figure 1 represents the hypothesized model.

**Figure 1 – Hypothesized model**

### 3. Method

In this study, 858 Flemish secondary school students (age 12-20) from over 20 schools were surveyed. Among the respondents, 48.1% was female (n = 413) and 51.9% was male (n = 445). In Flanders, secondary school is organized in 6 grades in which students have to choose between general, technical, professional or arts education. This was taken into account in the sampling procedure.

The survey instrument consisted of scales that were adapted to fit the educational context (ease of use; usefulness-product and behavioral intention – see [26]) and newly constructed scales (experience; usefulness-process). Students were asked for their opinion on a 5-point Lickert scale. A 7-item scale for measuring the learning process related usefulness of video games in an educational context was constructed, based on Egenfeldt-Nielsen’s [9] overview of commonly attributed positive learning effects of video games. Behavioral intention was measured with three items suitable for the situation
of secondary school students. Since secondary school students do not have the power to
decide whether video games are introduced in the classroom or not, a scale was
constructed that measured the students’ preference of game-based learning over traditional
learning. Game experience was measured with 5 newly constructed items.

Because of the use of new instruments, instrument validation was necessary. Firstly,
the instrument was reviewed by 2 methodologists and 2 students. Some adjustments were
made, but nevertheless the reactions to the instrument were predominantly positive.
Secondly, to address the reliability and validity of the different scales, reliability analysis
as well as exploratory factor analysis using principal components with varimax rotation
was conducted. Internal consistency was explored using Chronbach alpha estimates. All
constructs exceeded .85. After checking for suitability (KMO = 0.95; Chi² = 13558.90, df
= 231, p < .0001), factor analysis was conducted. It was found that all scales load high on
just one factor (Table 1).

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Note. Loadings lower than .4 are suppressed.

4. Results

Our model was tested with AMOS 17 (Fig. 2). Judging by the goodness-of-fit measures, it
is concluded that the data match the hypothesized model (Table 2). The results of the
analysis, which can be found in Table 3, show that all path coefficients under investigation
are significant.
The extent to which students perceive the introduction of video games as beneficiary for the outcome of their learning in a school context appears to be the strongest predictor for video game acceptance ($\beta = 0.44, p < .001$). Surprisingly, the effect of experience on behavioral intention—although still statistically significant—is a lot lower ($\beta = 0.13, p < .001$). The strongest effect was found between gender and experience ($\beta = 0.53, p < .001$). Overall, the hypothesized model accounted for 63% of the variance in the acceptance of video games in the classroom by secondary school students.

5. Conclusion and limitations

The purpose of this study was to propose a model that can explain and predict secondary school student acceptance of video games in the classroom. This model consists of four key predictors that directly affect the intention of students to use video games: the perceived ease of use, the usefulness of video games for enhancing the learning process, the perceived usefulness of video games for yielding better school results and the degree to which students show experience with video games.

This research paper brings empirical data to the very theory-driven domain of digital game based learning. The results of the analysis suggest that any educator willing to introduce video games into schools can best motivate their students by focusing on the
usefulness of games to gain a better performance, better grades and so on. Moreover, the paper brings some clarity to the gender versus experience debate, by showing that gender effects are almost completely mediated by experience. This indicates that educators should first try to familiarize their students with video games – for example in a media literacies class – before introducing them as learning tools. Last but not least, our paper sheds some light on the use of TAM to study the acceptance of video games for learning purposes by students in a school context.

There are a number of limitations to this study. Firstly, the research results presented are obtained from a single study. It is generally agreed upon that single studies should be cautious in generalizing research findings, since the results might be biased due to common method variance. Secondly, no confirmatory factor analysis was conducted to test the measurement model. Thirdly, in future studies regarding the acceptance of video games by secondary school students, it would be interesting to measure students perceived enjoyment as well, as Van der Heijden [30] suggests that enjoyment is a better predictor for behavioral intention and actual use in the case of hedonic information systems. Although video games are here conceptualized as teacher and learning tools, it is perfectly possible that students do not perceive this the same way.

References


