

Information dossier on pre-test data analysis

Summary

Introduction

The eConfidence Project is structured to study the use of Serious Games in training processes and their potential to change behaviours and attitudes of young people. A model of video game design oriented to behavioural change has been established, and two games based on two topics of high relevance in training of teenagers, namely bullying and safe use of internet, have been developed.

The games we have designed must be assessed in order to determine their effectiveness in the development of training competencies, specifically to stimulate good behaviours related to the issues teenagers have to deal with (bullying and digital safety). With this aim, we have planned a pilot study that includes the implementation of a pre-test questionnaire. With this survey, we can measure the variables related to the characteristics of the youth that we are interested in knowing and modifying, and then, after conducting the gaming sessions (experimental group), measure them again through a post-test questionnaire and analyse the changes that have taken place in our sample of children.

Pre-test Application

This study has been conducted in 10 different public, and private schools, five of them from Spain, and the other five from English-Speaking countries (three in Malta, one in UK and one in Ireland). The pupils have been divided randomly into three groups: two experimental and one control group. The pre-test questionnaire has been carried out in November 2017 in the Spanish schools and during November, December 2017 and January 2018, in the English-speaking schools.

During the pre-test questionnaire, we have not make a difference among those students on the experimental and control groups, performing all pupils the surveys at the same time (the same will be done with the implementation of the post-test). The average time taken for the application of the questionnaire has been one hour.

The pre-test questionnaires were filled using the Xtend platform, created and managed by EVERIS, who ensured the user's data confidentiality in order to provide anonymity.

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Studied variables and data analysis

The variables analysed in the pre-test have been classified into five sections. The first one refers to the personal data of students that serve as description of the sample. The second part comprises the knowledge and target behaviours, regarding the use of the Internet and bullying. The third one includes variables on Theory of Planned Behaviour (TPB): attitudes, perceived behaviour control and self-efficacy, subject norms and behaviour intention. The fourth part refers to personal variables: social skills, assertiveness, empathy, and friendship. The last one collects the experience using videogames.

These variables have been selected for their importance and influence in the development of positive or negative behaviours on the subjects studied: bullying and the safe use of the internet. Several studies (Girard, Ecalte, & Magnan, 2013; Friendly Screens, 2017) point out the importance of attitudes and knowledge of Internet risks by young people to promote the proper use of the Internet and prevent conflicts and threats on the Internet. On the other hand, it has been confirmed that the skills of assertiveness and empathy are important resources to prevent bullying (DeSmet, Bastiaensens, Van Cleemput, Poels, Vandebosch, Cardon, & De Bourdeaudhuij, 2016; Lee, Jin, Park, & Kang, 2009; Modecki, Minchin, Harbaugh, Guerra & Runions, 2014; Padgett & Notar, 2013).

DESCRIPTION OF THE SAMPLE

The application of the pre-test has been carried out in 10 educational centres, 5 Spanish and 5 English-speaking schools. Out of planned 360 students, 349 students participated in the pre-test. In Spanish schools, 36 students participated in each school, of which 12 have been assigned to the control group and 24 to the experimental groups. The last ones will be distributed later in 2 experimental groups, each of which will work with a different video game. In English speaking sample from 32 to 36 students participated in each school, distributed in three groups (two experimental and one control) consisting of 9 to 12 students. Students in each experimental group will play a different video game.

For each sample will be presented the distribution of the pupils regarding the gender, their mother tongue, their parents' education status (taking into account the mother education status and the father education status), their parents' working status (also, considering the mother working status and the father education status on a separately), the school achievement or GPA in previous school year, and the age of the students participating in the study. This personal data can have influence on our main topics, that is to say, on bullying and safe use of the Internet, and for this reason we need to analyse these issues. For example, the gender of the students plays an important role in bullying (Arroyave, 2012; Garaigordobil & Oñederra, 2009; Glew, Fan,

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Katon, Rivara & Kernic, 2005; Popp, Peguero, Day & Kahle, 2014; Scheithauer, Hayer, Petermann & Jugert, 2006). Also, school achievement or academic performance can have a link with bullying in different ways (Arroyave, 2012; Glew, Fan, Katon, Rivara & Kernic, 2005; Lacey & Cornell, 2013; Juvonen, Wang & Espinoza, 2011; Ponzo, 2013; Popp, Peguero, Day & Kahle, 2014; Strøm, Thoresen, Wentzel-Larsen & Dyb, 2013). Furthermore, the study of the familiar context is also important regarding bullying and violence in schools (Valdés, Carlos & Torres, 2012) and the use of the Internet (Sánchez-Valle, De-Frutos-Torres & Vázquez-Barrio, 2017).

The distribution of the sample according to gender is balanced, finding 52% of boys in Spanish and 43% in English speaking sample. 98% of children in Spanish schools have Spanish as their mother tongue, 48% have mothers with higher education, and 80% are working. The fathers of the students mostly have university degree, and 80% are also working. In English speaking sample 56% students have Maltese as their mother tongue and 39% have English as their mother tongue. Regarding parents' educational status, 31% mothers and 22.5% fathers of students in English speaking sample have university degree, although more quarter of students did not know educational status of their parents. Most of mothers (75%) and fathers (92%) are employed. The academic performance of Spanish children in previous years has been good or very good, most of the grades are level B (46%), and A (27%), although a high number of students did not provide this information. The grading systems in three English speaking countries are quite different and it was not possible to translate the grades in same categories.

MEASUREMENT INSTRUMENTS

According to the goals of the project and considering safe use of the internet and bullying contexts in which the serious games will act, several variables and corresponding instruments are described in Information dossier of measurement instruments. In the pre-test and post-test, we will focus on knowledge, behaviour, and variables derived from the Theory of planned behaviour (TPB: attitudes, perceived behavioural control, subjective norms and behavioural intentions) related to safe internet use and bullying, as well as on personal variables (social skills, assertiveness, empathy, and friendship). All TPB and personal variables will be assessed by using self-reported instruments that will be applied online. During gaming sessions, different behavioural indicators will be recorded (e.g. user choices in game scenarios), in order to track behaviour changes in safe use of the internet and bullying behaviour.

Table 1. Variables and measurement instruments

VARIABLE	ITEMS/SCALES
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INSTRUMENTS FOR MEASURING KNOWLEDGE AND BEHAVIOUR	
1. Knowledge about safe use of internet	Scale constructed by USAL
2. Safe use of internet	Scale constructed by USAL
3. Knowledge about bullying	Scale constructed by FHSS
4. Bullying	Items from the revised Olweus Bully/Victim Questionnaire
INSTRUMENTS FOR MEASURING VARIABLES FROM THEORY OF PLANED BEHAVIOUR (TPB) FOR SAFE USE OF INTERNET AND BULLYING	
6. Attitudes	Scales constructed by USAL and FHSS.
7. Perceived behavioural control	Scales constructed by USAL and FHSS.
7. Self-efficacy	Scales constructed by USAL and FHSS.
8. Subjective norms	Scales constructed by USAL and FHSS.
9. Behavioural intention	Scales constructed by USAL and FHSS.
INSTRUMENTS FOR MEASURING PERSONAL VARIABLES	
10. Assertiveness	Adaptation of Children's Assertive Behaviour Scale (CABS, Michelson & Wood, 1982)
11. Empathy	Subscale of Bryant's Empathy Index for Children and Adolescents (Bryant, 1982)
12. Friendship	Several questions about friendship, e.g. Do you have best friend at school? (Bierman & McCauley, 1987)
13. Social skills	Subscale of The Matson Evaluation of Social Skills with Youngsters (MESSY, Matson et al., 1983)

A complete description of the variables and instruments can be found in D2.2 *Information dossier on measurement instruments for the pilot test.*

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ANALYSES RESULTS

According to the normality tests and contrast of hypothesis between the experimental and control groups, a non-normal sample distribution is observed for all the variables (using the Kolmogorov-Smirnov and Shapiro-Wilk statistics). The analyses carried out show that the differences between experimental and control group in the Spanish sample are not statistically significant in any variable (using the U statistic of Mann-Whitney and W of Wilcoxon). This is a very positive result since it shows that the groups are equivalent which means fulfilling a necessary condition to carry out the pre-test research design post-test with control group proposed in our project. However, taking into account that these results were obtained by treating two experimental groups as one, additional analyses comparing two experimental groups should be conducted. In English speaking sample significant differences between three groups (control and two experimental) were found in several variables (e.g. some TPB variables) which should be taken into account when making the conclusions about the effects of serious games.

The descriptive data analysis of measured KPIs showed:

- Related to the safe use of the internet, the results reveal a remarkable knowledge on the part of the students, right attitudes to make safe use of the network and high scores on behavioural intention, control, self-efficacy and subjective norm. This indicates a high probability (from the child's point of view) that children would act correctly, perceive that it will be easy for them to behave safely, have confidence in their ability to act as they want, and feel of social pressure to use the internet safely. In these variables, the score of 11 points is exceeded on a scale with a maximum score of 16 in both samples.
- In relation to the knowledge that students have about bullying, it can be said that students recognize situations of bullying, they are able to feel compassion for victims and react appropriately to these situations. In all cases, the scores obtained are high, exceeding 13 points, with a maximum score of 16 in both samples.
- Regarding target behaviours (bullying victimization, bullying behaviour, reactions in bullying situations, attitudes towards bullying, attitudes towards protecting the victim and planned victim protection) the results obtained show that cases of children that are victims of bullying situations are rare (average score of 7.15 in Spanish and 8.66 in English speaking sample, on a scale where a score of 5 shows the absence of bullying and the maximum score is 25). The data indicate that bullying behaviours are very uncommon in the educational contexts, and most children do not observe negative behaviours. However, the reactions to bullying situations are not always appropriate, just a 53% of Spanish and 63% of English speaking students would try to help the victim, and 23% in both

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samples wouldn't do anything, but they think they ought to support the victims. We can also verify that some students have a very negative attitude towards bullying, showing minimal average scores. The attitudes toward protecting the victim are considering like good, beneficial, useful, powerful and wise, but not very safe in both samples. Lastly, the analysis of planned victim protection shows a high score in behavioural intention (the highest score) in both samples. In Spanish sample it is followed by subjective norm, self-efficacy, and control (lowest score), recognizing that it won't be easy to act correctly despite for the good intentions, while in English sample results on three scales are similar.

- The analysis of personal variables of a social nature such as assertiveness, empathy, social skills, and friendship, show that students tend to respond assertively to conflicts, and they rarely act passively or aggressively, although in English speaking samples students have somewhat higher tendency to act passively. Students in both samples also manifest a high degree of empathy, social skills, and friendship, since most of them have a lot of friends at school (91% of the sample have 4 or 5 in Spanish schools, and 80% have more than 5 in English speaking schools) and they do not feel isolated (or alone) when playing.

The information given by the students about their experience using computers and video games, allows us to state that most of the children (74% in Spanish and 83% in English speaking sample) have been using computers for more than three years, and just a few of them (12% in Spanish and 11% in English speaking sample) have never played video games. On the other hand, concerning to the participation in prevention programs, the frequency analysis indicates that 58% of children in Spanish and 49% of children in English speaking sample have participated in safe use of the internet programs, and 63% (Spanish) and 53% (English speaking) have participated in bullying programs.

The comparison of results between Spanish and English speaking sample showed differences in several key performance indicators (e.g. knowledge about bullying and safe use of the internet, victimization and bullying behaviour, empathy and social skills...). These differences could stem from cultural differences in two samples and suggest that samples could not be treated as one sample when analysing the effects of eConfidence pilot-project on students' outcomes.

CONCLUSION

The application of the pre-test questionnaire, as the first step in the development of the pilot study, allowed us to know the characteristics of the subjects that make up the sample, to analyse the reliability of the

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instruments used to measure the variables studied, and to verify that the control and experimental groups are equivalent in terms of the selected variables.

The studied variables refer to the knowledge, behaviours, and attitudes that students have regarding the issues that interest us, bullying and the safe use of the internet. Problems that are intended to influence the students through the use of the video games designed by eConfidence project to foster the positive relationship among adolescents, and between them and the proper use of the internet.

Personal information has also been collected, such as gender, mother tongue, country, educational and employment status of parents, experience using ICT, time spent playing video games, school grades, and participation in school prevention programs related to the games topics. The students have been asked about their social characteristics too: social skills, assertiveness, empathy, and friendship; as well as their experience in the use of digital resources and video games, considering that all these variables can influence the knowledge, behaviours, and attitudes of the students about bullying and safe use of the internet.

The results in both samples (Spanish and English speaking) show that students, in general, have knowledge about the two topics addressed and also good social behaviour. The cases of bullying are exceptional, since schools have been working on these issues for some years through various projects to prevent bullying and make safe use of the internet.

This reality lead us to suggest that the students could have felt like they were carrying out an *exam* instead of a test. This way, they may have chosen the “correct” answers instead of those that actually included their real feelings or opinions.

In order to solve that doubt, in the post-test questionnaire we will ask all the students if they think they changed their behaviour as a result of the gaming experience, and we will collect data during gaming sessions which will allow us to analyse whether students change their behaviour as a result of their gaming experience (learning analytics).

Thus, once the experimentation stage (use of the games) is developed and the post-test information is collected, behaviour change analysis can be performed on those students who show less knowledge and less appropriate behaviours, while also an eventual bias in the pre-test is analysed.

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