Measuring fun with adolescents: introducing the Spanish and Dutch adaptation of the FunQ

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Measuring Fun with Adolescents: Introducing the Spanish and Dutch Adaptation of the FunQ

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Abstract

It is increasingly understood how fun is an essential aspect in interaction for children in or beyond game play, as well as supporting learning and other activities involving children, e.g., for participatory design. While it is often proclaimed that such activities are fun for children participants, empirical evidence is hard to come by as measuring fun is not straightforward. Currently available assessment tools suitable for adolescents are scarce. FunQ is a recently developed measurement tool specifically designed for adolescents for the assessment of the experienced fun. Here we discuss ongoing work for adapting FunQ - to Spanish and Dutch. We report on the process followed to adapt the questionnaire; the reliability measures based on the initial results ($\omega_{\text{overall-SP}} = 0.876$ and $\omega_{\text{partial-SP}} = 0.859$; $\omega_{\text{overall-NL}} = 0.819$ and $\omega_{\text{partial-NL}} = 0.804$); and discuss our findings in reflection of the current state of the adaptation procedure.

Author Keywords

Experienced fun; FunQ; adolescents; Spanish adaptation; Dutch adaptation; information technology assessment

Figure 1. Interacting with technology during the augmented reality workshop. Photo credit: L. Romero and H. Coscollano.

Figure 2. Illustration of power/exponents during the math tournament. Photo credit: L. Romero and H. Coscollano.

CSS Concepts

• **General and reference ~ Cross computing tools and techniques;** *Evaluation; Reliability; Measurement; Validation; Design*

Introduction

Fun has importance in several fields of life. While it is a defining element in leisure and play, it is increasingly understood how fun is an essential component of interaction design, game play, and learning. Interaction design researchers have often considered fun or enjoyment as a key success criterion for their designs, not only while designing games but also for other interactive technologies especially when targeting children users [10].

However, there are too few measurement methods available for assessing the experienced fun and especially so for adolescents. One of those assessment tools is the FunQ [19], which has been specifically developed for adolescents to assess the fun experienced during an activity or by using a product. Here we introduce the Spanish and Dutch adaptation of this instrument aiming to provide a wider audience with a reliable, comprehensive yet parsimonious and user-friendly measurement tool.

In working with children, it is preferable to address them in their mother tongue, or at least in a language they are comfortable with. Therefore, it is important to develop measurement instruments for different languages or create multiple language adaptations of a reliable tool. This latter is not purely a matter of translation, as many concepts do not translate well, while, the translated items should reflect coherently the underlying theories. For this reason, it is important to

carefully assess the extent to which the adapted instrument measures the same concept as the original one.

Theoretical background

Fun and Enjoyment

Within the field of interaction design the term 'fun' is frequently handled as 'common sense' notion. However, we find it important to define our understanding. Dismore and Bailey [3] found as a result of a three-year-long study that the meaning attributed to the concept of 'fun' changes in merit as children approach teenage years. Adolescents (11-14) describe fun "in terms of learning challenge rather than in relation to the hedonic response to playing games" ([3] p. 499), which is typical for younger ages (e.g. age 7-11).

Besides, Tisza and Markopoulos [19] found that the academic literature frequently uses 'fun' and 'enjoyment' interchangeably, however, they propose to distinguish between the two. They argue that the term 'enjoyment' describes positive emotions, while based on their results they suggest that adolescents find something 'fun' when a) they feel in control and are intrinsically motivated for the engagement with the activity or product, b) they feel well and not feel bad, c) they lose the perception of time and space, d) they let go of social inhibitions, and e) the level of challenge meets their level of skills.

Existing Measurement Tools

For the evaluation of young children's preference or enjoyment of a product, the This or That [21], the Fun Semantic Differential Scales [20], the Fun Toolkit [13] and the Five degrees of happiness [6] tools are the most widely known and used ones. Without delving into

Figure 3. The interface of the interactive instructional videos [26]. © SkillsDojo Foundation

Figure 4. Introduction of the task during the interactive instructional videos [26]. © SkillsDojo Foundation

the details, it is summarized, that the aforementioned tools are designed for young children (2-13) and they are either intended for comparison or for the unidimensional assessment of enjoyment or fun.

For adults, the PENS [16], the GEQ [12], the EGameFlow [4] the UES(-SF) [11] and the PLEXQ [2] are the most widely known and used tools. Most of these instruments are validated, but only with adults. Despite measuring the player experience as a multidimensional construct, they do not focus sharply on the experienced fun, so their scope of application is limited (e.g. to games), and they do not help define this important concept. Crucially, the above-mentioned tools mainly measure how the activity/game/product was, and not how the participant felt while being engaged with it. This latter has special importance: children can identify themselves with statements easier - and hence, evaluate them more reliably - if they do not judge the product or activity but report on how they felt while being engaged with it [9].

FunQ

The FunQ [19] is a recently developed measurement tool for the assessment of the experienced fun. The authors devoted special attention to the methodology and design in order to comply with the specialties of adolescence (age 11-18). Based on a literature review and the provided statistical evidence of the psychometric properties they justify the factors that make up the experienced fun.

The FunQ consists of 18 items along 6 dimensions. The items are evaluated on a 5-point Likert-type scale. The *Autonomy* dimension measures whether the adolescent feels control over his/her participation and the activity

itself. The *Challenge* dimension monitors the experienced challenge. The *Delight* dimension assesses the positive emotions and related desires. The *Immersion* dimension measures the loss of time and space. The *Loss of Social Barriers* factor assesses social connectivity. And the *Stress* factor monitors negative emotions.

Methods

Adaptation Protocol

For both the Spanish and Dutch version we followed the cultural adaptation protocol of self-report measures [1]. Hence, we have undertaken the following steps: i) forward translation from English to Spanish and Dutch, ii) backward translation from Spanish and Dutch to English, iii) comparison of the original and the backward translated English text, assessing discrepancies, iv) pretesting the questionnaire. During phase iii) ensuring semantic-, idiomatic-, experiential-, and conceptual equivalence between the source and the target versions. In ambiguous cases, we tested multiple translations during the herein introduced process. The final step of the procedure (which is currently under progress) is the validation of the adapted versions of the questionnaire. Regarding the number of cases for the initial test of the translations we followed the suggestions of Beaton et al. [1] and opted for 30 responses per language.

Spanish Adaptation

For the Spanish version, we have undertaken the steps of the above-detailed protocol and collected questionnaire responses from first- and third-year high school students (age 12-16) after participation in an activity.

Factor	ω	Loading
<i>Autonomy</i>	0.555	0.534
<i>Challenge</i>	0.576	0.900
<i>Delight</i>	0.740	1.110
<i>Immersion</i>	0.698	0.862
<i>Loss of Social Barriers</i>	0.827	0.108
<i>Stress*</i>	0.856	0.495
Overall	0.876	-

* reversed factor

Table 1. Statistics of the Spanish adaptation. The internal consistency coefficients (ω) and the standardized factor loadings of the factors on *Experienced Fun*.

ACTIVITY 1 (YEAR 3) - AUGMENTED REALITY

Third-year high school students participated in a fun-oriented Augmented Reality (AR) workshop in a classroom-based setting. The aim of the activity was to introduce students to this recent technology trend as part of their ICT classes syllabus (Figure 1). Children worked in cooperative groups.

ACTIVITY 2 (YEAR 1) - PLAYFUL MATH TOURNAMENT

First-year high school students participated in a playful math tournament in a classroom-based setting. This activity took place periodically during several lessons throughout the academic year, as part of their Mathematics class syllabus. The aim of the tournament was to reinforce every child's perceived competence and feeling of achievement. In the context of the tournament different gamified and fun-oriented activities were developed (Figure 2). Children worked in cooperative groups.

Dutch Adaptation

The Dutch adaptation was created following the above-detailed protocol as well, and the questionnaire was administered with participants of a coding workshop. The workshop was offered as an extra-curricular activity, hence participation was voluntary. The workshop took place in a classroom-based setting, with seventh and eighth grade students (age 10-12) at a Dutch elementary school. The workshop aimed to introduce programming to children with micro:bits in a playful and fun way and was based on an interactive instructional video series of the SkillsDojo Foundation [17](Figure 3-4). Children were allowed to interact, cooperate and help each other.

Statistical Analyses and Measures

In order to assess the psychometric properties of the adapted versions, we applied confirmatory factor analysis (CFA) with second-order hierarchical latent variable modelling. The internal consistency is evaluated across the Omega (ω) coefficient, which we regarded above 0.6 acceptable. Standardized factor loadings above 0.3 were taken as substantial [5,18].

Software

For the data analysis the RStudio 1.1.453 [15] software, for modelling the lavaan package [14] and the semTools package [8] were used.

Results

Spanish Adaptation

DATA

The data collection took place in June 2019 at a secondary school in Madrid, Spain. The questionnaire was administered via an Internet-based survey tool with 30 children (16 boys, 11 girls, 3 prefer not to say, $\mu_{age}=14.27$, $SD_{age}=0.98$) after they participated in the activity. Given that the data were collected with the help of the online tool, the collected sample is complete, hence, no missing values are present.

ANALYSIS

To assess the validity of the Spanish adaptation of the FunQ we fitted the original model to the Spanish data set, including trials with items with multiple translation options. The internal consistency values and the relating standardized factor loadings are presented in Table 1. The internal consistency coefficients of the *Delight*, *Immersion*, *Loss of Social Barriers* and *Stress* dimensions meet the criterion level. The overall internal consistency at the first-order level is above the cut-off

Factor	ω	Loading
<i>Autonomy</i>	0.604	0.955
<i>Challenge</i>	0.618	0.741
<i>Delight</i>	0.802	1.052
<i>Immersion</i>	0.349	0.472
<i>Loss of Social Barriers</i>	0.350	0.679
<i>Stress*</i>	0.682	0.663
Overall	0.819	-

* reversed factor

Table 2. Statistics of the Dutch adaptation. The internal consistency coefficients (ω) and the standardized factor loadings of the factors on *Experienced Fun*.

value, hence, acceptable. Regarding the standardized factor loadings, the *Autonomy*, *Challenge*, *Delight*, *Immersion* and *Stress* dimensions surpassed the cut-off value. Assessing the internal consistency of the second-order factor *Experienced Fun* we conclude that the Omega values are all above the acceptance margin (see Table 3). This finding suggests that the Spanish adaptation measures with high reliability the *Experienced Fun*.

Dutch Adaptation

DATA

The data collection took place in June 2019 at a Dutch elementary school. The questionnaire was administered on paper after the children participated in an interactive coding workshop with micro:bits. In total, data were collected from 27 children (14 boys, 12 girls, 1 missing, $\mu_{\text{age}}=10.4$, $SD_{\text{age}}=0.7$). The proportion of the missing values for both the whole sample and questionnaire items is 1.36%. Since the missing data proportion was below 5% and no missing data pattern was found, it was assumed that the values are missing at random, therefore, full information likelihood (FIML) estimation was used.

ANALYSIS

The results concerning the internal consistency values and the relating standardized factor loadings are presented in Table 2. The internal consistency coefficient of the *Autonomy*, *Challenge*, *Delight*, and *Stress* dimensions, and the overall internal consistency at the first order level are acceptable. Regarding the standardized factor loadings we can conclude that they are all above the acceptance margin. In fact, the standardized factor loading of the *Delight* factor is above 1, which is unusual, however acceptable [7].

Assessing the internal consistency coefficients of the second-order factor *Experienced Fun* (Table 4.) we conclude that the Dutch adaptation of the FunQ measures reliably the underlying construct: the *Experienced Fun*.

Discussion

Evaluating the Spanish adaptation, we note that the internal consistency values of the *Autonomy* and *Challenge* dimensions are slightly lower than the acceptance margin. This might be due to various reasons: the sample size, sampling error, translational issue or adaptation issue (e.g. to cultural differences). Without failing to take into account these possible reasons, we addressed this issue with the class teachers. The activities in which first and third-year Spanish students participated took place in a formal educational environment. In other words, they occurred in a classroom setting and were part of the course syllabus. This could explain the lower than acceptable internal consistency value of the *Autonomy* dimension as we anticipate that not every child felt the same control over his/her participation in the activity. Besides, the activities were fun-oriented and designed to avoid pressure and tension, hence they did not aim to challenge students. That would be a reasonable explanation of the value of the *Challenge* dimension. In order to determine the precise reason, further data collection is required. If testing on another, bigger sample results still in lower than acceptable internal consistency values, then the concerning items shall be re-evaluated from the semantic-, idiomatic-, experiential-, and conceptual equivalence point of view between the source and the target versions.

	Experienced Fun
ω_1^*	0.759
ω_2^*	0.915
ω_3^*	0.859

Table 3. Statistics of the Spanish adaptation. The internal consistency coefficients of the second-order *Experienced Fun*.

	Experienced Fun
ω_1^*	0.745
ω_2^*	0.838
ω_3^*	0.804

Table 4. Statistics of the Dutch adaptation. The internal consistency coefficients of the second-order *Experienced Fun*.

* the proportion of the second-order factor explaining the total score

** the proportion of the second-order factor explaining the variance at the first-order factor level

*** the proportion of observed variance explained by the second-order factor after partialling the uniqueness from the first-order factor

As for the insufficient factor loading of the *Loss of Social Barriers* dimension on the *Experienced Fun*, given that the internal consistency value of the dimension is acceptable, we propose that this is due to a ceiling effect caused by a sampling bias. We also addressed this issue with the class teachers, and they confirmed that the data were recorded with children from extremely well-connected classes, where children have known each other for years, are very good friends and spend a lot of time together, so they have few social barriers to overcome in interacting with each other. We postulate that under this circumstance it would have been unusually difficult to statistically show improvement in their social connectivity during any kind of activity. Therefore, we propose that this issue should be monitored during the next phase of the adaptation procedure, and if the problem persists then other possible underlying factors should be examined.

Evaluating the Dutch adaptation of the FunQ, to start with we note that the questionnaire was administered with children under the intended target age due to availability issues. In our interpretation, this might be the cause for the insufficient internal consistency values of the *Immersion* and *Loss of Social Barriers* dimensions. As previous research and existing measurement tools for young children indicate, young children - before adolescence - experience fun mainly across its positive, hedonistic values [3,6,13], while during the teenage years other dimensions - which are well established with adults - appear [3]. Given that the internal consistency values of the Dutch adaptation at both the first- and second-order level suggests the good reliability of the tool, we propose that the aforementioned issues are related to sampling bias. Hence, to address this problem, during the next steps

of the adaptation and validation procedure the administration of the questionnaire with a bigger sample within the appropriate age-range is proposed. In case the issue resists, then the translation of the concerning items shall be re-evaluated from the semantic-, idiomatic-, experiential-, and conceptual equivalence point of view between the source and the target versions.

To conclude the evaluation of the Spanish and Dutch adaptation, while further work is still needed, based on the initial findings we expect that when completing the adaptation and validation process, all psychometric properties will meet the criterion levels for both adaptations. Hence, we put forward with reasonable confidence the Spanish and Dutch versions of the FunQ as a reliable and much needed addition to the current palette of assessment tools for the experienced fun among adolescents.

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