

inclusion of visual reinforcement of interface for tests that may be confused just listening to them.

Computer

Interface

The computer is certainly the device that gives users more interaction options. The interface desired by the computer includes the interactive part and the television broadcast at the same time.

The distribution of the screen should be stable and consistent, so that one side always appears the interactive part and on the other side the game show broadcasting.

Interaction Suitable

The problems of interaction that appear on other platforms virtually disappear with the computer. There are two elements that cause this to happen: mouse and keyboard. Both are tools that give the resources to successfully interact with any type of test included in the game show.

Touch PDA or Smart Phone

Interface

The screen size of PDAs, iPhone, Nintendo DS and similar devices is much greater than that of conventional phones. This factor significantly affects the display of the interface and allows that it may be more complex. Users, in cases of interaction with a TV game show, have included items that did not want the mobile phone interface such as punctuation, which would be fixed in a corner or rankings data.

Interaction Suitable

Tactile interaction is the most important distinguishing feature of this type of device. This factor determines the approach of interaction that was defined for mobile phones, since in any case be raised by the use of buttons in response. Tactile devices in the selection of an item screen (how to choose the correct answer) may be pressing on the screen. This advantage presents a comparative offense for users who would play through a buttons mobile phone.

Television

Although the TV does not have a high level of interaction, it has an interface very generous in space, and in this case it can represent both the interactive information (time, position, rank, etc.) and the game show emission.

Interface

Television is the device more intuitive for users because the default is to associate a broadcast TV quiz to it.

In this case the distribution of the interface follows the same model has been proposed with the computer, half the screen to broadcast the program and the other half by the game interaction allowed through the television device is very limited due to the only tool users have is the remote control. Users are more inclined to navigate with arrows than with numbers, since they considered as more intuitive. Users consider that navigation with numbers was a complicated interaction.

3 PHASE 2

The following describes the study of a prototype design created from the requirements of potential users obtained in the phase 1.

The assessment was raised from the analysis of three user profiles [3]:

- 4 users who have participated in live contest and also have been involved in the first phase of the project; prototype definition.
- 4 users who never have participated in live contest, but also have participated in the first phase of prototype definition.
- 8 potential users who haven't participated in the first phase of the project.

Before starting the test, a pilot study was carried out to evaluate the methodology design. The pilot tests were applied to 4 potential users in order to implement improvements in the final procedure.

Prototype description: The prototype is based on creating a television channel which displays a live quiz contest. Synchronously the following devices are connected: a computer, a mobile phone (touch and by keyboard) and the television itself. Users use the four interfaces in relation to the game show; they play against the rest of the users and also the TV show contestant with real calculation of scores.

3.1 Methodology

The test is divided on three parts:

Introduction: Welcome to the test, description of the prototype explanation of the live contest.

First part: It takes place in a domestic immersion room in which each of the users test each device individually and play together in a live contest with the incentive of win or loses points in real time competing with each other and against the TV contestant [5].

After using each device is given a questionnaire with different items evaluation of their experience to each user [6].

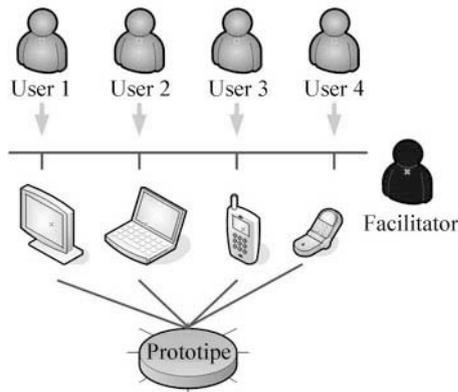


Fig. 1. Development scheme of the first phase. A facilitator manages the session, 4 users test each device individually, competing with each other and to win the user's television.

Second part: Implementation of a BLA interview (Bipolar Laddering) [1] where positive and negative elements of each device are obtained and scored from 1 to 10, justifying each of them individually and collectively [7].

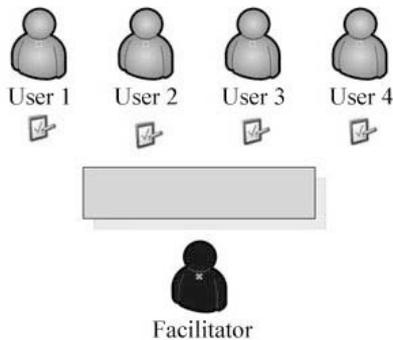


Fig. 2. Development scheme of the second phase. A facilitator manages the session, 4 users participate in the assessment after using the prototype.

3. 2 Test Results

The results shown below show the data obtained in the user experience study about the use of the prototype.

3.2.1 First Part

The results of the questionnaires show quantitatively the immediate perception of the device by user based on the experience they had. Users were asked by the evaluation of different aspects of the interface and their interaction with.

The results are separated between users involved at the definition phase and users who only have participated in the prototype testing phase. The results below show experts participants and inexperienced together since have not been perceived relevant differences between them.

Results: The blue line reflects data from users who participated at the definition phase and the red line which only participated in the evaluation of the prototype.

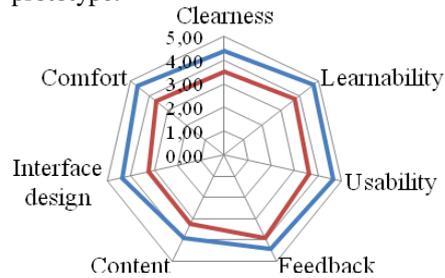


Fig. 3. Evaluation of Television application.

The graph clearly shows that there is little difference between the ratings. The users who have only rated the prototype are those who scored more negatively. Stands out as most valued the feedback from the device and at worst the interface design.

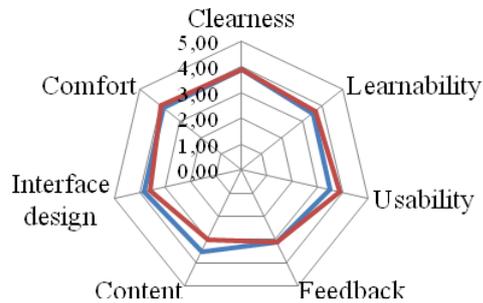


Fig. 4. Evaluation of keyboard mobile application.

The shown graph is clearly similar in both user profiles and the scores are almost the same. The highest rated element is the Usability and the worst score is for the Feedback.

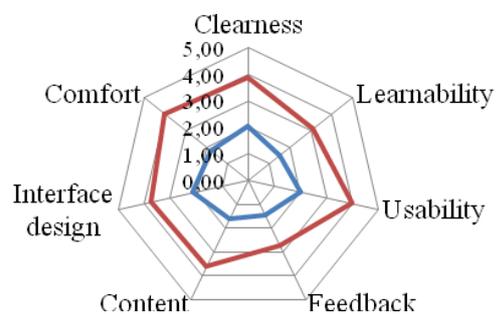


Fig. 5. Evaluation of touch mobile phone.

The graph clearly shows a positive perception for users who have not participated in the prototype requirements phase and clearly negative for users who did participate in defining the prototype. This factor is caused by the difference between the prototype and the expectations expected by users.

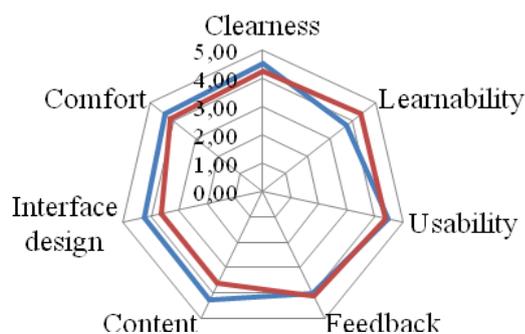


Fig. 6. Evaluation of computer application.

The scores are very similar in both groups only highlighting a difference between learnability, content and interface design.

Data emerging from users who participated at the definition phase and those who have only participated in the assessment of the prototype are very similar for television, keyboard mobile and computer, but have been demanding in the assessment of the mobile device touch.

3.2.2 Second phase

Following are the results of BLA method [2], the most interesting elements are the ones listed below. The data processing has been performed by unifying the results of users that had participated at the first phase and those who only participated in the prototype testing.

In data processing:

- Data is segmented according to the device.
- Results are classified between common positive (strong points) elements, (mentioned by more than one user), particular positive elements (has mentioned only by one user), negative (weak points) common elements and negative particular elements.
- Mention index: percentage of users who have mentioned the same element regarding to the total sample.

Tables shown below indicate the common elements for each device.

Table 1. Common positive elements: Television.

Element	Mention index	Average rating
Interface usability	50,00%	8,8
Comfort	18,75%	9
Immersion feeling, realism	56,25%	9
Clearness	18,75%	10
Screen size	12,50%	10
Familiarity	25,00%	8,7
Synchronization with the TV show	12,50%	10

The most frequently mentioned items were the immersion and user interface with an average score of about 9 out of 10. It is precisely the key elements

for the user to feel a participant in the contest on an equal footing with television contestant.

Table 2. Negative common elements: Television

Element	Mention index	Average rating
Cannot see part of the screen	25,00%	6,5
Overlapping panels	18,75%	7
Can only play one of the spectators	12,50%	3,5
Lack of information on the keys	31,25%	4,4
Use of the remote control	12,50%	4,5
Accuracy when click (remote)	12,50%	4

The most negative elements have been the lack of information of keys (remote control) and the loss of part of visualization of the contest caused by the inclusion of the application in the bottom of the screen. The given points are easy to fix at a future design of the application and have not relevant average scores.

Table 3. Positive common elements: keyboard mobile application.

Element	Mention index	Average rating
Portable	62,50%	8,4
Screen Size	12,50%	7
Sound included	18,75%	6,6
Ease of use	25,00%	7,7
Ease of response	25,00%	8,2
Clear display	25,00%	8,2
Manageable	12,50%	8

The most important positive element is that it is portable, users can be connected anywhere and anytime.

Table 4. Negative common elements: keyboard mobile application.

Element	Mention index	Average rating
Keyboard	43,75%	3,7
Outdated	31,25%	2,4
Response Time	12,50%	3,5
Interface colors	12,50%	3,5
Mistrust of the service	12,50%	5,5
Age groups of users	12,50%	5,5
Price	18,75%	4
Not displaying the question	12,50%	5
Chronometer	12,50%	3

More detaches negative elements are the use of the keyboard and mobile format, as the key mobile is out of date. Nevertheless, valuations are moderate.

Table 5. Common positive elements: touch mobile phone.

Element	Mention index	Average rating
Ease of use	93,75%	8,6
Portable	37,50%	8,5
Aesthetic clarity, big screen	62,50%	7,5

Among the positive highlights the ease of use as being a touch phone is clearly understand what key you should press to answer questions. The clarity aesthetic is another strong point since it complies with the TV interface.

Table 6. Negative common elements: touch mobile phone.

Element	Mention index	Average rating
Gap with the system	37,50%	0,8
It's complicated with audio only	12,50%	3,5
Keyboard	25,00%	4,7
Mistrust of the service	18,75%	5
Oriented to young users	12,50%	5,5
Expensive service	18,75%	4
Few information about how to play	25,00%	4
Uncomfortable when user have to tap	12,50%	5,5

The most critical negative element is the gap with the system. This element has the highest rate mention and a very negative score. It is clear that if the system lags the user would respond later and user can lose regarding the other players.

Table 7. Positive Common elements: Computer.

Element	Mention index	Average rating
Visibility of the live program	43,75%	9,2
Easy and manageable	75,00%	8,8
Interaction	25,00%	9,5
Screen	25,00%	7,7
Interface	18,75%	8,6
Participatory	12,50%	9,5
Feedback	12,50%	8
Easy to access through the website	12,50%	9,5
Familiarity	12,50%	8

The most positive element of the computer is the ease and manageability of the application. Is a type of fixture clearly known by users with a high willingness to be used.

Table 8. Negative common elements: Computer.

Element	Mention index	Average rating
Availability and delay	31,25%	2,80
Presentation	12,50%	2,50
Synchronization with the program	12,50%	6,50
Lack of information on how to play	18,75%	4,00
Screen Size	12,50%	6,00

The outstanding common negative element is the availability and offset with a very low score. This item also appears in mobile phone applications as in case of mismatch between them would always advantage the contestants would play with the TV application and contest live show participants.

4 CONCLUSIONS

The following points summarize the factors of motivation and acceptance more relevant for the users in case they were able to interact synchronously with a television quiz show

The Live Emission Factor Is Clearly a Motivator

The fact of interacting with a program being broadcast at that time throughout Catalonia is a great motivator for users, in fact this is a basic condition, and so most users will not participate in case the game was not synchronized by the emission.

Is Needed to Use Existing Platforms

Users do not want a new device to play the contest. The implementation of the contest, whatever it is, must be using a device that the user already used previously.

Response Time Factor

One of the principles that have been established for this type of game is that the response time has to score, e.g. the score obtained for both the correct answer as to respond quickly. This score shared between accuracy and time has to be applied in order to avoid the user frustration in short term, removing him right away or giving the impression that it is difficult to win.

Is Needed a Dynamic Interaction

Users do not want to write. This is a premise of interaction that has been almost unanimously, the final application should be quick and easy interactive, if the user has to write, it lows their motivation. This principle is given even by the interaction with the computer, so that is a factor to be considered while designing the final application.

Voice Interaction

The voice interaction seems to be convenient for this type of application. The answer by voice would avoid many problems such as writing, overloading the interface errors or pressing a button. Similarly, although users had the option of voice response also would want the ability to interact digitally, since it is

not always convenient to have to speak loudly to play the contest.

From the user experience and subjective assessments can conclude the following items to be considered for the creation of live contest involving users through multi-devices:

- Television is the main platform to participate at the contest for its familiarity, immersion and naturalness.
- The computer is a secondary platform for participation that would play a major role management, profiling and community.
- The mobile phone is not perceived as a tool for participation, but by its nature can be a supplementary reference tool.
- The customization elements are perceived as motivators. Groups allow users to create units with each other to jointly participate in the contest and promote spontaneous situations to create virtual spaces for competition among different users.

The data obtained in this study may be applicable to any notion of TV quiz show; the willingness of users to play is not related to a particular contest but about how to participate in them.

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