Gender preferences for multimedia interfaces

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Abstract This study examined the gender differences in the preferences to varying designs of multimedia learning interfaces. In the study it was assumed that design characteristics add to the interest in learning and a taxonomy of design of efficient user interfaces for both boys and girls was developed. The research included 90 children from three kindergarten classes who used interactive multimedia stories. The research subjects responded to questions which elicited their level of satisfaction with the various interfaces. The research findings indicate that there is a significant difference in the level of satisfaction between boys and girls depending on the design of the learning interfaces. This paper reports on the findings which were statistically significant.

Keywords: Gender; Interface; Multimedia; Pre-school; Qualitative; Satisfaction

Introduction

The aim of the research was to examine kindergarteners gender differences of multimedia learning interfaces and try to isolate multimedia interface characteristics that interest girls more than boys and vice versa. This is in order to make computerised learning more efficient for both sexes.

The user interface is what connects the computer with the user; it is the means of interaction between the two (Lucas, 1991). Users do not only learn about the content of the program but they also learn how to deal with the synthetic programmed environment. The ease of use and the uniformity of the interface may make possible a higher level of concentration on the material being studied (Edwards & Holland, 1992) and so it has important implications. The design of the interface must provide a clear, consistent and attractive communications since the quality of the interface contributes towards the ability of the user to perform well (Lucas, 1991). The style of display has a great influence on the learning process (Levin, 1997). Weiss (1994) sees multimedia interface as made up of a number of separate units:

- *The display interface* — which regulates the way in which the user sees the

information.
- *The conversation interface* — which regulates the manner of the system's communications with the user and the user with the system.
- *The navigation interface* — which regulates the way in which the user moves from one part to another part.
- *The control interface* — which regulates the way in which the user controls the different activities, by means of icons and windows.

The visual design of the interface affects the impression that the user has of the interface, the understanding of the interface and the desire to use it (Mayes, 1992). This research is based upon the premise that a friendly interface, using clear signs, must be designed in order to extract the educational potential of computers in education (Crook, 1991).

In order to simplify and classify the elements of the interface, two concepts from the world of cinema were used:
- *mise-en-scene*, which deals with pagination of single scenes;
- *montage*, which deals with the combination of scenes and the transition from one scene to the next (Hodges & Sasnett, 1993).

This research examined how the different components of the interface created a positive emotional reaction to the media or, in other words, intrinsic satisfaction (Holland *et al.*, 1987).

The method

A stratified sample of 90 children (44 girls and 46 boys from three kindergarten classes) was selected by the regional inspector to take part in the study. The preference of multimedia interfaces was measured by the criteria of intrinsic satisfaction — positive emotional reaction connected to the actual activity. Every group was exposed to interactive multimedia stories for improving reading skills. These educational programs enable the child to be active in the reading process whilst being exposed to different communication modes: visual, aural and dynamic (Chu, 1995). These electronic stories enabled young children to experience the reading of a story in an unconventional way where the reader only has to click on the mouse in order to communicate with the book.

The experiment showed that young children have great interest in reading computer stories as they find computer books enjoyable and able to be active in their own way. Children can click at the pace suitable to them and in the place that interests them and respond in a spontaneous and dynamic manner while reading. Each child can read the story alone and can act in his own way making the reading experience personal, easy, enjoyable and more interesting (Chu, 1995).

Three educational computer programs[*] were chosen from different publishers. They had different designs in terms of the dominant colours, the quality of the animation and of the sound, the variety of possibilities spread before the child, and the level of interactivity of the program

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[*] The programs were: The *Adventures of Nikko*, published by C.E.T. - Centre for Educational Technology; The *Tortoise and the Hare*, the Hebrew version was published by Mirage Multimedia Ltd.; and *Itamar the Dreams Hunter*, published by Compedia Ltd.

Each subject, assigned randomly, tried one learning program; each story was introduced to the same number of boys and girls to keep the programs balanced among gender. Immediately after the activity they were asked to answer questions which examined the level of the intrinsic satisfaction of the various interfaces (Weiss, 1994).

The questions related to four aspects: *display* interface (seeing the information), *conversation* interface (communications between user and system), *navigation* interface (movement from place to place) and *control* interface (use of icons). In total, there were 41 statements in the questionnaire, adapted for the children involved from that developed by Shneiderman (1992). The children were asked to agreed/disagree with the statements on a 10-point scale.

The statements in the questionnaire were clarified to the children in simple wordings and terms during conversation with them and it was clear whether each child understood the statement or not. Due to the young age of the research subjects they used the Pollimeter Ruler (Lampert, 1981), with a scale of two colours, black and white, in order to express their opinion about the series of statements in the questionnaire.

Lampert's Pollimeter is an instrument for measuring behaviour, based on visual moving elements, that enable almost anyone to present their opinion, on a continuous scale without difficulty. The Pollimeter comprises of two basic units: a housing unit having a rectangular opening, and a coloured ruler that moves in the housing. The research subject moves the ruler to indicate his opinion by dividing the area seen in the window between two colours where black represents disagreement and white agreement. The children could also elect different shades of black and white if they were not sure whether the answer to the statement was black (no) or white (yes). The shades elected by the children were exhibited on the scale on the respondent's side while the scale of numbers (seen only by the researcher) was on the interviewer's side (Fig. 1).
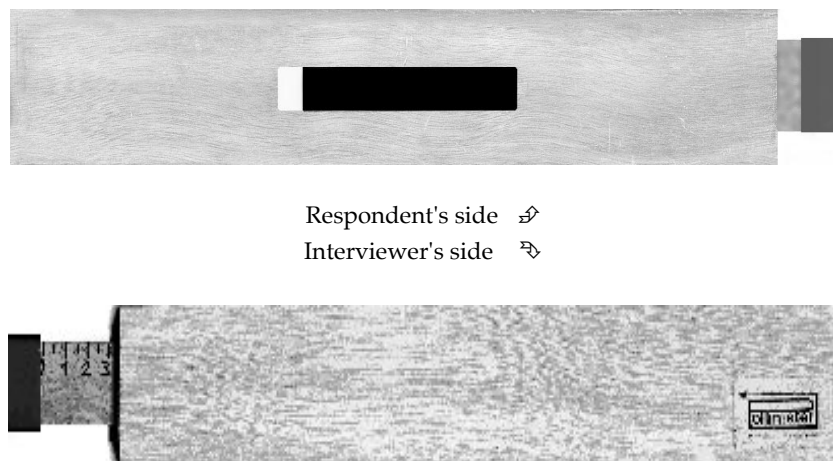

Respondent's side   ☞
Interviewer's side   ☜

Fig. 1. The Pollimeter Ruler

The Attitude Pollimeter has many advantages as its simple structure makes it possible for even very young subjects to express their opinion without

difficulty. It does not depend on the verbal ability of the user, but there is the one limitation that it can be used only in a personal interview (Lampert, 1979; 1981).

Results

Some of the findings in this study supported others that are in the literature and some are being reported here for the first time. There are clear differences between boys and girls on the level of satisfaction of the various interfaces depending on the learning interface design.

In analysing the gender differences to preferred interfaces, a χ^2 test was carried out on the children's responses on the scale from 0 to 10. Table 1 includes all the questions asked but only the frequencies and percentages of choice, at the highest level (that is, full agreement) are presented for those statements that were significant in terms of the gender difference. This was done in order to focus on the responses that were unequivocally expressed by the children. From Table 1, it seems that, compared to girls, boys significantly preferred:
- to know how to continue with the game;
- to know how to go backwards in the game;
- do not like a slow pace for a game, but prefer that the whole screen changes at once, and not section by section;
- that they have a variety of choices on the screen;
- square buttons);
- that there are arrow buttons.

It seems that most of the items that were found to be significant relate to the navigational statements; a clear preference for good navigational support is desired by boys compared with girls.

In an additional test, which examined the frequency of preference on the highest level (level 10 = yes) between the different statements, differences were found in the frequency of the order of interface preferences with boys and with girls. An examination of these findings indicates that:
- as a first priority, boys preferred learning interfaces that deal with navigation and control (seven out of 10), namely the reference is to buttons and control of the game;
- as a first priority, girls preferred learning interfaces dealing with display (six out of 10), where the reference is to colour and appearance;
- as a first priority, both sexes preferred coloured buttons;
- boys gave a low priority to getting help from the computer;
- girls gave a low priority to control of the navigational buttons.

Discussion

The research assumption was that differences would be found between boys and girls, in the order of preference of multimedia learning interfaces.

The findings, some of which are statistically significant indicated, according to the frequency of preference, different grading of taxonomy of learning interfaces. Girls emphasised writing, colours, drawings, help and a

Table 1. Frequency and percentages of choice of interface items according to gender

	Boys		Girls		Chi-Squared
	($n = 46$)	%	($n = 44$)	%	
Navigation statements					
I have to know how to carry on with the game	**32**	**70%**	**20**	**34%**	**18.98***
I need it to be easy for me to go backwards					
in a game	**17**	**37%**	**11**	**25%**	**21.52****
I have to see the navigational buttons all the time					
I like surprises after every click					
I like quick transitions					
I like a slow pace for a game	**21**	**46%**	**12**	**27%**	**21.54****
I like it when the whole screen changes at once	**31**	**67%**	**14**	**32%**	**22.15****
I like it when only parts of the screen change	**17**	**37%**	**9**	**20%**	**16.33***
I am surprised every time animation appears					
I like it when there is animation at the whole					
of the screen					
I like it when there is animation at the top					
of the screen					
I like it when there is animation at the bottom					
of the screen					
Presentation statements					
I like it when music accompanies the whole game					
I like it when a commentator's voice explains to me how to play					
I like seeing a lot of short films					
I like seeing long films					
I like seeing a lot of drawings on the screen					
I like seeing a lot of colour on the screen					
The colours blue and grey are pleasant					
I like it when there is a lot of green					
Moving drawn images attract me to play					
I like a lot of yellow/red					
Control statements					
I like big buttons					
I like coloured buttons					
I like round buttons					
I like square buttons	**19**	**41%**	**12**	**27%**	**18.45***
It is convenient for me when there are					
arrow buttons	**22**	**48%**	**20**	**45%**	**19.22***
I like drawings that are buttons					
I like a screen without any buttons at all					
I like it when there is a button for exiting the game					
I like it when the cursor changes it's shape all the time					
It is convenient for me when the buttons are arranged					
at the bottom					
It is convenient for me when the buttons are arranged					
at the top					
It is convenient for me when the buttons are arranged					
on the side					
I like it when the buttons change shapes at every stage					
It confuses me when there are a lot of buttons					
Conversation statements					
I like hearing the voice talking when I want to					
It is good that I can change my mind and make					
another move as I wish					
I like it that when I make a mistake the computer					
helps me to understand					
I like it when there is a large choice	**25**	**54%**	**22**	**50%**	**21.09***
I like it when I am told to write things					
during a game					

Keys: *$p < 0.05$ **$p < 0.01$

calm-moderate game; boys on the other hand emphasised control over the computer, sharp moves and many movements on the screen. These findings sharpen the impact of the learning program and the specific interface, whilst the manner of presenting the information and the ease of dialogue between the user and the system affect the user's desire to use it.

In this research, concerning the preferences for learning interface design, an initial attempt was made to throw light on the objects of kindergarteners' interest, in order to enable the education system to focus on these. The theories of gender differences in education try to analyse how and why differences between the genders are formed (Wringly, 1992). It is natural that the order of importance of things will be different between boys and girls, as a result of their being different biologically and from the point of view of stereotype behaviour (Colley *et al.*, 1995). In part of the findings, boys and girls looked at an item in the same way and ascribed the same level of importance to a certain item. However, there are statements that were given a high rating, which were more common with boys, and statements that were more common with girls.

In the conversation interface, which regulated the method of communication of the system with the user, the girls gave great importance to receiving help from the computer when needed (25 out of 44), his phenomena is supported by other studies. Johanson (1985) and Colley *et al.* (1995), found that girls, more than boys, displayed computer anxiety and were worried about working with a computer without instruction. It was also found that the desire to write, whilst learning, is rated with a higher frequency with girls compared to boys, who rate the subject of writing in the last place, as was found in the studies of Plamondon (1994) and Durandell *et al.* (1995). On the other hand the boys rated, with the highest frequency, their ability to control the system (27 out of 46), like hearing the commentator's voice at their request, or choosing the desired activity from a variety of possibilities. It must be noted that usually educational computer programs are not designed with an approach for girls. Most games are built with the emphasis on 'control', 'choice' and fast 'navigation', which maybe the reason they appeal to boys more than to girls.

Jakobsdottir *et al.* (1994) indicates that differences between boys and girls manifest in creativity and in their preference of graphic elements. It was found that girls are more sensitive to colour than boys whereas boys are more aware of movement than girls. In this research a high frequency of preference was found in the display interface that controls the presentation of information. For boys the frequency of preference for *moving* illustrated images increased (36 out of 46), whilst with girls the frequency of preference increased for *many* illustrations on the screen (34 out of 44).

On the subject of preference for colours a high frequency for preferring the red and yellow colours was found (25 vs. 19), whilst many studies show that the colour red/yellow is a dominant colour for females whilst for males it was found that the dominant colour is green/blue (Fischer, 1988). The boys in this study displayed a higher preference frequency than girls for green (21 vs. to 13) and a higher preference frequency for blue. It is therefore reasonable to assume that boys and girls value colour differently, due both

to the genetic element that affects their emotional perception of the colours, and the cultural influence and high sensitivity of girls to colour as a part of the female stereotype (Fischer, 1988).

For the navigational interface, which regulated the movement between screens and in one screen, several significant differences between the sexes as to the order of preference were found. Boys rated the need to know how to continue in the game (32 vs. 20) as most important. It was also found that boys rated in third place, the statement "I like it when the whole screen changes at once" (31 vs. 14). In addition, it was found that boys expressed greater importance than girls to the swiftness of the game. No significance was found in preference of interface for girls, but, compared to boys, a higher preference significance was found for placing animation at the to (29 vs. 24). According to the division of preference frequencies, it is seen that the girls are more attracted to the visual aspects (*mise en scene*) whilst boys are more attracted to movement (*montage*).

In the control interface, which regulated the button icons, significance was found for the boys' preference for arrow buttons and also square buttons. As for the girls, no significant preference differences were found. Boys placed more importance than girls on the button to exit from the game (30 vs. 18) and on the position of the buttons; however, girls showed a higher preference frequency for coloured buttons (35 vs. 32). No support was found in the literature on the design of buttons, perhaps because the subject is new and at it's initial stage.

Summary and recommendations

The study carried out by Colly *et al*. (1995) on the differences between the genders in the use of computers, indicates that girls, compared to boys, are in an inferior position concerning their image of control of technologies and do not reach their full potential. In this way human capital, which is in half of the learning population, is wasted. The visual design of the multimedia interface, the manner of presenting the information and the ease of dialogue between the user and the system, affect the user, both in terms of understanding the material and the desire to use it.

In this research, an attempt was made to examine the preference differences for multimedia interfaces between boys and girls. This initial examination suggests that it would be valuable to develop a model of styles of design for learning interfaces in order to reach a gender-free learning environment. However, since no empirical studies were found in this specific area, it is recommended that further research is carried out with the aim to establish, substantiate and extend the findings of the current research.

Great importance can be seen in the implications of these findings in the development of computer-based learning programs and their use in the education system.

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