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Improving Usability of Narrative Educational Software: An analysis of gender differences

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Abstract: ***This paper aims to explore the gender differences regarding the use of narrative educational software in learning English as a foreign language. This is in order to help improve the usability of narrative educational software. For this investigation, two different stages each with particular focus were conducted. In the first stage, a questionnaire was given to students taking into account gender differences to find the kind of story and characters they preferred. Then, narrative educational software based on both the most preferred character and narrative style was developed for the purpose of this study. In the other stage, a questionnaire was distributed to investigate the differences between boys and girls in term of their engagement. The results of this study indicate that the boys and girls had quite different preferences about the kind of characters and the kind of story which affect their engagement in the narrative educational software.***

Keywords: educational software, Design, Gender differences, narrative.

1. INTRODUCTION

New technologies constantly evolve new dimensions to daily life. They can be used to provide interactive educational environment through the use of educational software. However, the implementation of such interactive educational software requires an inclusive range of skills which include an understanding of the nature of students, software engineering, the current design basics and learning methodologies in education, and knowledge of the aesthetic design principles for the multimedia application interfaces. This will create an interactive educational environment that will ensure the students' engagement [1]. While the objective of educational software is to effectively enhance the knowledge of students, meeting their requirements and needs is becoming more important. More specifically, the differences between boys and girls would affect their engagement in narrative educational software.

This paper is a part of a research project aiming to explore factors influencing the educational software design in terms of students' engagement. More specifically, this paper discusses a survey study exploring the differences between boys and girls in sixth elementary grade regarding the use of narrative educational software in learning English as a foreign language in order to improve the usability of narrative educational software.

2. NARRATIVES AND EDUCATIONAL SOFTWARE

The development of educational software aims to engage students with the learning environment and keep their attention by providing fun [2]. Fun, particularly with children, is normally achieved through games. However, adopting Information technology into education has its own danger; that is, by being perceived as fun and entertainment, learning devaluates considerably [2]. According to Andrea et al. [3], Information technology can provide a considerable high-level of learning and it is helpful in the development of decisive thinking skills, analysis, and systematic inquisition. However, computers alone do not guarantee their usefulness. They should promote active engagement, group participation, and recurrent interaction and feedback. Since the critical feature of various learning environment centres on the role of teachers, educational software should "foster a move from teacher centred to learner centred pedagogies" [4] (p.2).

In addition, the story is considered as the most important learning and education means since it is an educational method loved by children and adults, and students at each age tend to learn and read certain stories [5]. The narrative approach to educational software might facilitate engagement. There are a number of reasons for choosing narratives as a primary ingredient of interactive systems. First, humans are created with narrative brains and secondly, storytelling invites curiosity and therefore increases knowledge absorption. The objective that educational software should provide an engaging environment is only possible through effective presentations, which are normally achieved through learner-centred teaching. Narratives provide the much needed "space for students" to impart their stories and develop an "overall meaning" from their educational encounters. Narratives link individual human actions and distinct events, and their relationships to one another. Achieving a specific goal and attaining a certain level of knowledge is indeed the most important objective of educational software and therefore development of interfaces with narrative controls is imperative and

priceless in any interactive systems [6, 7].

3. USABILITY OF NARRATIVES

It is noteworthy that one of the important considerations in designing any software is usability, particularly when designing the narrative educational software. The International Organization for Standardization's (ISO) definition of usability is "the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in particular environments" [8] (p.9). This is essential since a system that is very difficult to use may hamper the ability of a user to absorb material offered by the system. Usability, according to MacFarlane et al. [2], is an essential element in determining if an educational software design will help in the attainment of certain knowledge. Achieving a particular goal and attaining a certain level of knowledge is perhaps the most important objective of any educational software. Thus, the development of interfaces with narrative controls might be valuable. Narratives could be important in an interactive system because "humans have narrative brains" [9] (p.145). In addition, Steiner and Tomkins [10] believe that interactive systems offer new prospects for narrative presentations since users may take control of the different facets of the environment. This is unlike written or cinematic narratives where the author takes control instead of the users themselves.

As Kanjo and Astheimer [11] commented, "narration is an important part of play" since children are actively producing their own understanding of the things around them when they are getting involved in storytelling. They can also work out effective language and thinking skills predominantly when there are others like them who are working together in making the story. According to Boling [12] (p.193-194), students experience noticeable change and transformation when taught using storylines. Storylines provide an internal structure for presentation that allow learners to develop an "overall meaning" from their educational encounter. In this manner, narratives provide a significant organizing function for the students. Furthermore, it acts as a way of "making meaning" from the students' educational encounters and alters their perception of literacy lessons; for instance, narratives can "make meaning" in video and hypermedia based learning by serving as an organizing structure. In one study, according to Boling [12], students' responses to video clips suggest how viewing, discussing, and reflecting enhances learning. Conversely, students struggle when learning is not perfect and they are trying hard to make personal connections to what they see.

4. METHODOLOGY

The review of the current literature on gender difference, narrative, and educational software guided our research and the literature on methods available for an exploratory study. Given the exploratory nature of the study and since the questionnaires is an effective method to explore people's attitudes and opinions regarding particular issues [13], it was used in the two distinct stages of this research, each with a particular focus. In the first stage, a questionnaire was given to students taking into account gender differences to find the kind of story and characters they preferred. Then, narrative educational software based on both the preferred character and narrative style for boys was developed for the purpose of this study. In the second stage, two educational software programs, (i) based on narrative style, and (ii) based on traditional style, were used by both boys and girls. Then, a questionnaire was distributed to investigate the differences between boys and girls in term of their engagement.

With regard to location and participants, two elementary schools in Riyadh in the Kingdom of Saudi Arabia had been chosen. These schools were chosen because of the availability of a computer lab in the schools. Recently, Saudi Arabia, are doing their best to implement in their schools the teaching of English as a foreign language in addition to their mother tongue, so that citizens of the country can contact the world and be familiar with all the new events in the world. Accordingly, the Ministry of Education decided to teach English as a foreign language in elementary grades to begin from the sixth grade beginning from 2004.

In the first questionnaire, 46 boys and 20 girls were selected from the total number (136) of sixth grade students in both schools. For the second questionnaire, half of the sixth grade classes in boys' school and all classes in girls' school were chosen; 50 boys and 36 girls participated in this stage.

5. RESULTS

5.1 First phase

In this phase, a questionnaire was given to help determine the students' preferred characters and narrative style taking into account gender difference. The results are given in the following sections.

5.1.1 Distribution of the sample according to what kind of story do participants like

The purpose of this question was to find the kind of story that the boys and girls like more.

Table 1: Distribution of the sample according to what kind of story do participants like.

	Boys No.	Boys %	Girls No.	Girls %
Adventure	21	45.7	3	15.0
Historical	6	13.0	1	5.0
Family and friends	1	2.2	7	35.0
Funny	18	39.1	9	45.0
Total	46	100.0	20	100

Table 1 shows that 45.7% of boys students like adventure stories, 39.1% of them like funny stories, 13% liked historical stories and 2.2 % of them like family and friends stories. However, the table shows that 45% of the girls like funny stories, 35% of them like family and friends stories, 15% of them like adventure stories and 5% liked historical stories.

It also appears that the boys and girls differ in the types of stories they like, as shown in Table 1. Over 45% of the boys prefer adventure, compared with only 15% of the girls. For the girls, it was funny stories that rated most highly.

5.1.2 Distribution of the sample for the rankings of each character

The objective of this question was to find out the preferred character for students from 12 suggested characters. Boys and girls were given 12 characters and asked to give them in order of preference.

Table 2: Distribution of the sample for the rankings of each character

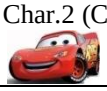
Characters	Gender	N	Mean	SD
Char.1(Bear) 	Boys	46	9.46	2.82
	Girls	20	5.05	3.19
Char.2 (Car) 	Boys	46	1.72	1.17
	Girls	20	5.00	3.34
Char.3 (Man) 	Boys	46	8.37	2.82
	Girls	20	6.65	3.53
Char.4 (Monster) 	Boys	46	3.46	2.86
	Girls	20	4.55	3.24
Char.5 (Pencil) 	Boys	46	6.02	2.53
	Girls	20	6.25	2.77
Char.6 (Camel) 	Boys	46	6.78	2.73
	Girls	20	9.25	2.49
Char.7 (Carrot) 	Boys	46	8.61	2.82
	Girls	20	9.35	2.37
Char.8 (Boy) 	Boys	46	6.72	3.43
	Girls	20	8.55	3.15
Char.9 (Train) 	Boys	46	8.17	3.06
	Girls	20	7.80	2.84
Char.10 (Detective) 	Boys	46	4.39	2.95
	Girls	20	4.15	3.25
Char.11 (Turtle) 	Boys	46	7.22	2.22
	Girls	20	5.70	3.08
Char.12 (Helicopter) 	Boys	46	7.09	2.37
	Girls	20	5.70	3.20

Table 2 shows the distribution of the sample for the 12 possible rankings of each character. Independent Samples t-test results in table 2 reveal that there is a significant difference between boys and girls with some characters. The girls rated the bear, the man, and the turtle significantly higher than the boys did. However, the boys rated the car, the camel, and the boy significantly higher than the girls did.

It was quite apparent from the results that the boys and girls had quite different preferences about the kind of characters they like in narratives. In addition, while both said they enjoyed funny stories, the boys had a greater preference than the girls did for adventure stories.

5.2 Second phase

In this phase, a second questionnaire was distributed to compare students' liking of the two educational software programs; one based on narrative style and the other based on traditional (non narrative) style taking into account gender differences. The order of showing the two softwares to the students was balanced. Half of the boys used the narrative software first then the traditional one. The other half used the opposite order. The same procedure has been done for the girls. This is to ensure that order of using the software did not influence results and it was apparent that the mean ratings for the narrative vs. traditional software did not differ depending on the order given. Therefore, in what follows, the order in which the software was used is ignored.

Analysis of the second questionnaire considering the gender is given as follows:

Table 3: Distribution of the boys scores to two program styles

Questions	Based on narrative style		Based on traditional style	
	Mean	S.D	Mean	S.D
How much do you like the software?	4.80	0.61	3.04	1.46
How much do you learn from it?	4.26	0.88	3.52	1.13
How often would you want to use software like this again?	4.78	0.51	3.16	1.66
Grand mean	4.61	0.51	3.24	1.11

Table 3 revealed that the mean of narrative style for boys' participants was higher than the traditional one in all the questions. However, table 4 revealed that the mean of narrative style for girls' participants was higher than the traditional one in the first and last questions while the second question was in favour to the traditional style.

Table 4: Distribution of the girls scores to two program styles

Questions	Based on narrative style		Based on traditional style	
	Mean	S.D	Mean	S.D
How much do you like the software?	3.89	1.35	3.28	1.21
How much do you learn from it?	3.36	1.25	3.83	0.94
How often would you want to use software like this again?	3.42	1.27	3.14	1.51
Grand mean	3.55	1.03	3.49	0.76

Independent Samples t test: Independent samples t test results in Table 5 revealed that there is a highly significant difference between narrative style and traditional style towards the boys students, where $t = 7.909$ and $p < 0.05$. The mean difference was in favour of "the narrative style", while there is no significant differences between them (narrative and traditional) towards the girls students, where $t = 0.651$ and $p > 0.05$.

Table 5: T-test to know the differences between means

Gender	Type of software	N	Mean	SD	t value	Sig.
Boys	Narrative style	50	4.61	0.51	7.909	0.000 **
	Traditional style	50	3.24	1.11		
Girls	Narrative style	36	3.56	1.03	0.651	0.52
	Traditional style	36	3.42	0.77		

According to the boys, there is a great difference between the traditional and narrative approaches. However, the girls did not prefer one. This is may be referred to the type of the program itself for boys are usually more interested in cars adventure than girls are.

6. CONCLUSION

This study explored the differences between boys and girls in sixth elementary grade regarding the use of narrative educational software in learning English as a foreign language. Analysis of the results showed that the boy students were affected more by the narrative educational software program than the girl students. The paper found that the character of the car which was used in the narrative educational software program was the most favourite one for the boys compared to the girls, who ranked it in third position. In addition, it found that the kind of story has similar effect, as more than 45% of the boys preferred the adventure style of narrative for the educational software program compared with only 15% of the girls. This does not mean that the girls did not accept the narrative educational software program. In fact, they preferred it to the traditional educational software program. Therefore, software designers must take into account what suits both boys and girls when designing the narrative educational software program in terms of characters and the type of story.

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