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EFFECT OF GENDER ON THE ACQUISITION OF GERMAN LANGUAGE SKILLS THROUGH THE EDUCATIONAL SERIOUS GAME IN A NON-FORMAL EDUCATION SETTING[i]

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Abstract:
This study aimed to evaluate the effect of gender on the acquisition of German language skills through the Educational Serious Game in a non-formal education setting. A total of 23 students from different state universities, aged between 21 and 24, participated in an Educational Serious Game session through a game called Deutsche Straße. The students were divided into groups of 4 players for each game session, which lasted between 30 minutes and an hour. The questionnaire "Deutsh Straße Quiz" is used to assess the learning of German words in the form of a multiple-choice question MCQ consisting of 107 items, which was administered before and after each session. A second satisfaction questionnaire that measures the feeling of competence (Dumont *et al.*, 2000). The results showed a significant difference between the two sexes in the level of the acquisition of language skills in the German language through the Educational Serious Game is in favor of female students compared to male students. These results suggest the use of appropriate pedagogical methods that promote gender diversity to deal with gender stereotypes related to games in the university environment in the logic that the game takes place by participants of both sexes simultaneously, and this can generate more motivation. Subsequently, the acquisition of language skills is more equitable.

[i] EINFLUSS DES GESCHLECHTS AUF DEN ERWERB VONDEUTSCHKENNTNISSE DURCH DIE PÄDAGOGISCHE SERIOUS GAME IN EINEM NICHT-FORMALEN BILDUNGSUMFELD
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Keywords: stereotyped game, educational serious game, language skills, non-formal education

Abstrakt:
Ziel dieser Studie war es, den Einfluss des Geschlechts auf den Erwerb von Deutschkenntnissen durch das Educational Serious Game in einem non-formalen Bildungsumfeld zu evaluieren. Insgesamt 23 Studenten verschiedener staatlicher Universitäten im Alter zwischen 21 und 24 Jahren nahmen an einer Educational Serious Game-Sitzung über ein Spiel namens Deutsche Straße teil. Die Schüler wurden für jede Spielsitzung, die zwischen 30 Minuten und einer Stunde dauerte, in Gruppen von 4 Spielern eingeteilt. Der Fragebogen "Deutsh Straße Quiz" dient der Erfassung des Erlernens deutscher Wörter in Form einer Multiple-Choice-Frage MCQ bestehend aus 107 Items, die vor und nach jeder Sitzung durchgeführt wurde. Ein zweiter Zufriedenheitsfragebogen, der das Gefühl von Kompetenz misst (Dumont et al., 2000). Die Ergebnisse zeigten einen signifikanten Unterschied zwischen den beiden Geschlechtern im Niveau des Erwerbs von Sprachkenntnissen in der deutschen Sprache durch das Educational Serious Game zugunsten von Schülerinnen im Vergleich zu männlichen Schülern. Diese Ergebnisse legen den Einsatz geeigneter pädagogischer Methoden nahe, die die Geschlechtervielfalt fördern, um mit Geschlechterstereotypen umzugehen bezogen auf Spiele im universitären Umfeld in der Logik, dass das Spiel von Teilnehmenden beiderlei Geschlechts gleichzeitig stattfindet, und dies kann mehr Motivation erzeugen. In der Folge ist der Erwerb von Sprachkenntnissen gerechter.

Schlüsselwörter: stereotypes Spiel, pädagogisches Serious Game, Sprachkenntnisse, non-formale Bildung

1. Introduction

The notion of gender is a socio-cultural construction of masculine and feminine roles. This construction is related to the social conception, which differs according to time, environment, culture, etc.). It still differs in several areas, including education and sport, which are still known as gender stereotypes. The notion of gender stereotype is not far from the concept of gaming, where there are games for men and games for women, which is called the stereotype related to gaming.

According to Leyens *et al.* (1996), stereotypes are *"shared beliefs about personal characteristics, usually personality traits, but often also behaviors, of a group of people*." Indeed, an educational serious game has a close dynamic relationship with the social environment, where it encourages interaction between these students and considers learning to be always developing (Boch*et al.,* 2015). For Alvarez and Djaouti (2008), the Serious Game is generally used to transmit messages and to allow the exchange of goods. The objective of our research is to evaluate the effect of gender on the acquisition of

German language skills through the Educational Serious Game in a non-formal education setting.

2. Materials and methods

2.1 Participants

A total of 23 students between the ages of 20 and 27 were recruited to participate in the study. Among the participants were 13 girls and 10 boys from different Tunisian public universities (Table 1). Students voluntarily participate in a non-formal setting, i.e. outside the formal classroom. This Serious Game is called "Deutsche Straße". The students were divided into groups of 4 players for each game session, which lasts between 15 and 30 minutes for each group. This Educational Serious Game is provided by a commission composed of: one referee, a referee committee chairman, quiz or quiz correctors and a general coordinator.

Table 1: Characteristics of the participants

Participants (n)		112
Age (years)		23,2
Gender	M	13
	F	10

2.2 Procedure

The Self-Efficacy Measure Scale is a 10-item psychometric scale that is designed to assess positive beliefs to cope with a variety of difficult demands in life. A French adaptation of the general scale of self-efficacy is reproduced by Dumont *et al.* (2000). This questionnaire is validated in the academic world by Saleh (2016). The 10 items are accompanied by a Likert-type scale by which the individual was asked to express his or her degree of agreement or disagreement with a statement OR the respondent completed the self-assessment of mastery of these skills, which consists of estimating his or her level of effectiveness on a scale of 1 to 4 (see Table 1) Before starting the experiment. All participants were given an introduction to the objective of the game, game rules and different perspectives.

Table 2: Presentation of the self-employed and the general self-efficacy scale

The independent variable	**The troubleshooting variable**	**Number of items**	**N**	**Answers**
Gender	The feeling of competence	10	1	Not true at all
			2	Hardly true
			3	Moderately true
			4	Totally True

As for the game, it is made up of a street that represents the different embassies and organizations, the different traffic laws and a geographical map that encompasses the different German federal states. According to the following graph:

Figure 1: Game content "Deutsche Straße": example street

During it, each participant can earn and lose points; from these points, he can buy a federal state card. The participant who collects the maximum amount of money from the federal states is considered a winner. The game ends when a participant collects the maximum number of states (Chart 2).

Figure 2: Contents of the red and yellow card

Based on the game, we built a quiz questionnaire that included different German words for the different components of the game. This tool rotates on 3 axes:

- Factor 1: Street content,
- Factor 2: Game map content,
- Factor 3: Map content.

Each factor has several sub-factors.

To assess the mastery of the German words entered in the game, the respondent takes the self-assessment, which consists of choosing between 3 answers a, b and c on a multiple-choice question that represents the words entered in the game. This

questionnaire is composed of 3 factors, represents the 3 components of the game, and each skill has statements according to the table below. The questionnaire items are classified in the questionnaire in the following order:

Table 2: Order of Items in the Scale

N°	Factors	Number of Items	Total
Game Content	Street Content	28	107
	Game Card Contents	56	
	Contents of the maps	23	

The questionnaires will be distributed in January 2024 in the various universities of the University of Sfax. The questionnaires were distributed to the students during the free time of class. In addition, we have explained a few items to help respondents choose the answer that is right for them. The answers are in the form of a multiple-choice questionnaire (MCQ) followed by 3 proposed answers, i.e. are trichotomous items.

2.3 Statistical analysis

According to Gérard (2003), the learning effect can be calculated by calculating the "average relative gain" index. The treatment of this index for each objective makes it possible to have a fairly accurate estimate of the pedagogical effectiveness of the training. According to Gérard (2003), the average relative gain is calculated by the following formula:

(After Score - Before Score) / (Maximum Score - Before Score) × 100

A positive learning effect can be considered when this relative gain is greater than 40%.

Gerrard (2003) states, "*Its advantage over standard deviation is that it gives a percentage that allows the reference to the mean to be removed*." According to Ouellet (1985). "*The advantage of this index is that it gives an idea of the degree of agreement between the respondents*." According to Gerrard (2003), "*Comparison of heterogeneity rates shows that training has reduced the disparity that existed at the outset*." This means that the learning had an 'equity' effect, in that the skills gaps between participants narrowed, and the training, therefore, contributed to a greater 'sharing' of skills.

Statistical analysis is carried out on a microcomputer using Excel software for response processing. In the statistical analysis, all students with previous knowledge of the German language were eliminated. All statistics are considered significant for a probability threshold of less than α=0.05.

3. Results

Table 3: Effect of gender on the acquisition of German language skills through the Educational Serious Game in a non-formal education setting

Language skills				
Gender	**Male students**		**Female students**	
Period	**Before the Game**	**After The Game**	**Before the Game**	**After The Game**
Avg	0,65	0,78	0,71	0,83
Ecar Type	0,32	0,11	0,11	0,09
CV	0,49	0,14	0,16	0,11
Standard error	0,13	0,05	0,03	0,03
GRB	0,13		0,13	
GRM	37,78		43,36	

First, according to the results mentioned above regarding the degree of acquisition of German language skills through the Serious Game for male students, it can be seen that the rate of heterogeneity (coefficient of variation) decreased after the game h2=14% compared to the baseline levels h1 = 49%, but this rate remains above 15 (less than 15%). This explains why the game reduced the gap that existed before the game, which explains why the learning had an "equity" effect. In other words, the differences in the levels of skills of the students participating in the research are reduced, and the game has subsequently participated in a greater "sharing" of skills. According to the results, we can still see that there is a positive learning effect (average relative gain) on the acquisition of language skills in the German language with a relative gain GRM= 37.78 but this rate remains insufficient for the acquisition of a skill (less than 40%). This indicates that the male students participating in the game do not feel that they have actually made any progress during the game with regard to "language proficiency."

Then, according to the results mentioned above, the degree of acquisition of language skills in the German language through the Serious Game for female students. It can be seen that the rate of heterogeneity (coefficient of variation) decreased after the game H2 = 16% compared to baseline levels H1 = 11% (less than 15%). This explains why the game reduced the gap that existed before the game, which explains why the learning had an "equity" effect. In other words, the differences in the levels of skills of the students participating in the research are reduced, and the game has subsequently participated in a greater "sharing" of skills. According to the results, we can still see that there is a positive learning effect (average relative gain) on the feeling of self-efficacy with a relative gain GRM= 43.36% (greater than 40%). This indicates that the female students participating in the game feel that they have actually made progress during the game with regard to "language skills acquisition".

Finally, according to the results mentioned above, it can be seen that the acquisition of language skills in the German language through the Educational Serious Game is in favor of female students with an average relative gain of GRM= 43.36% compared to students studying masculine with average relative gain with GRM=37.78.

Table 4: Gender effect on feelings of competence in educational serious games

Sense of competence				
Gender	**Male students**		**Female students**	
Period	**Before the Game**	**After The Game**	**Before the Game**	**After The Game**
Avg	2,97	3,48	2,41	3,02
Ecar Type	0,23	0,38	0,35	0,26
CV	0,08	0,11	0,15	0,09
Standard error	0,10	0,15	0,11	0,08
GRB	0,52		0,61	
GRM	50,00		38,29	

First, according to the above-mentioned results regarding the feeling of competence with regard to educational serious games for male students, it can be seen that the rate of heterogeneity (coefficient of variation) decreased after the game h2 = 11% compared to the starting levels h1 = 8%, (less than 15%). This explains why the game reduced the gap that existed before the game, which explains why the learning had an "equity" effect. In other words, the differences in the levels of the skills of the students participating in the research are not reduced. Subsequently, the game has not participated in a greater "sharing" of skills. According to the results, we can still see that there is a positive learning effect (average relative gain) on students' sense of competence with regard to the Educational Serious Game with a relative gain GRM= 50% (greater than 40%). This indicates that student participants in the game feel that they have actually made progress during the game in terms of "the students' sense of competence opposite the Educational Serious Game". This indicates that student participants in the game feel that they have actually made progress during the game in terms of "the students' sense of competence opposite the Educational Serious Game".

Then, according to the above-mentioned results regarding the feeling of competence with regard to educational serious games for female students, it can be seen that the rate of heterogeneity (coefficient of variation) decreased after the game h2 = 9% compared to the baseline levels h1 = 15%, (equal to 15%). This explains why the game reduced the gap that existed before the game, which explains why the learning had an "equity" effect. In other words, the differences in the levels of skills of the students participating in the research are reduced, and the game has subsequently participated in a greater "sharing" of skills. According to the results, we can still see that there is a positive learning effect (average relative gain) on the feeling of self-efficacy with a relative gain GRM= 38.29% (less than 40%). This indicates that the student participants in the game do not feel that they have actually made any progress during the game in terms of the student's sense of competence, opposite the Educational Serious Game.

Finally, then, from the results mentioned above, it can be seen that there is a difference between the feeling of competence is in favor of male students, with an average relative gain of GRM= 43.04%, compared to female students, with an average relative gain with GRM = 38.29.

4. Discussion and Conclusion

The serious game as a model is an innovative model in the field of non-formal education. The objective of our research is to evaluate the effect of gender on the acquisition of German language skills through the Educational Serious Game in a non-formal education setting.

The results show that the acquisition of language skills in the German language through the Educational Serious Game is in favor of female students compared to male students. This result can be explained by the principle of stereotypes that are part of our cultural heritage where there are games classified in such a way that they are intended for girls and others for boys; especially Tunisian traditional games or games that require physical strength are intended for boys while games that require intellectual strength are intended for girls such as the famous intellectual game "Bent – Walad". This is consistent with studies by Justus Liebig University Giessen (2021), which show that "*Stereotypes and prejudices are part of our cultural heritage. They are transmitted by our culture in the same way as the norms, habits and ways of doing things that we share with others*".

The results again show that there is a significant difference between the feeling of competence is in favor of male students compared to female students. This result can be explained by several socio-cultural factors generally, boys are more sensitive to the psychological aspect of the challenge in all areas of sport and play compared to girls. This is in line with studies by (Malone, 1981), which show that the challenges offered to the player in the Serious Game contribute to intrinsically motivating him and encouraging him to set goals throughout the game and subsequently increase his self-efficacy (Malone, 1981). In addition, according to Charlotte Duperray (2009), previous studies show that stereotypes have a cognitive and social dimension that reflects the existing relationships between different social groups and are structured in a society. These results suggest the use of appropriate pedagogical methods that promote gender diversity to deal with gender stereotypes related to games in the university environment in the logic that the game takes place by participants of both sexes at the same time, and this can generate more motivation and, subsequently, the acquisition of language skills is more equitable.

Conflict of Interest Statement
The authors declare no conflicts of interest.

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