The impact of Virtual Reality on the awareness of teenagers to social and emotional experiences of immigrant classmates

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Abstract The current study examined the use of VR (Virtual Reality) and its affect on the degree of awareness of 178 seventh and eighth graders to the emotional and social experiences of a new immigrant during his or her first months in the adoptive country. Students native to the adoptive country were divided into two groups: an experimental group, which tried out VR worlds designed to simulate the emotional and social feelings and experiences of a new immigrant teen, and a control group which viewed a movie on the same subject. In addition, we have examined another group of teen immigrants who provided us with a benchmark of the degree of awareness to be measured. Their responses were compared to those of native teenagers of the adoptive country. All the subjects responded to an awareness questionnaire before and after the experiment (Sever 1977), and had a personal interview before and after the experiment as well. The results indicate that the experience of a VR simulated emotional and social experiences of a recent immigrant teen has intensified the emotional and social awareness of the experiment group while the movie intensified the social feelings only in the control group.

Keywords Virtual Reality · Immigrants · Social experiences · Emotional experiences

1 Introduction

Immigration can be an enriching social and cultural factor for both the immigrates and the citizens of the new country. Immigration has the potential of bringing different cultures together, bringing different ways of life closer, and contributing to a multicultural society. This process, however, is a complex one, and is fraught with suffering. The immigrant must

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cut himself off, and not in a piecemeal way, from his former way of life, from his family, from his customs, and from the cultural systems to which he was accustomed in his native land, in order to be able to blend into the social reality of his new country with all its own customs, values, culture, and language. This adaptation is shot through with difficulties and obstacles, even if the immigrant is from the same ethnic, religious, and cultural group as are the veteran citizens of his new land (Mirsky 1990). The four main difficulties experienced by immigrants who have been identified in the literature include the language difficulty, the social difficulty, the Emotional and the mental difficulty. Following are the four main difficulties.

1.1 The language difficulty

Language is a socio-cultural product that helps determine an individual's worldview of himself. Language is highly resistant to changes, and is obligatory in integrating into the new environment. For the most part, an immigrant doesn't have fluency in the language of his or her new country. Lack of fluency in the language causes a worsening of feelings of loneliness, together with strong feelings of alienation and a loss of ability to express feelings as she/he could in his or her mother tongue (L. Grinberg and R. Grinberg 1989). All one's feelings, experiences, and childhood memories are tied to one's native language. As a result, it has a retarding influence on the process of merging and integrating into the new culture. The more the new immigrant succeeds in acquiring his new language, the stronger the retarding and limiting effect of the mother tongue will have on her becoming part of the new culture (Gougeon 1993, Rosenbaum-Tamari and Damian 2004).

1.2 The social difficulty

The characteristics of the new culture can make it easier or more difficult for the integration process. A pluralistic society which changes rapidly and which has many and different norms makes the integrating process easier (Schaber 1999). Nonetheless, it seems that the heterogeneity of many immigrant-integrating societies makes adaptation more difficult, as they have no clear norm towards which to aspire. Fiorko (1992) reports that in Israel, for example, many immigrants arriving there have the misconceived expectation that in their new land they will be like everyone else. They believe that they will be liberated from the condition of being different and alien, which was their lot in their native land. Early identification with the hoped-for reality stems from expectations, and not from personal experience. For that reason, Fiorko found that in many cases, contact with Israeli society is disappointing and is sometimes accompanied by expressions of hostility.

1.3 Emotional and mental difficulty

In many cases the immigrants experience emotional and mental difficulties. Immigration is an event replete with challenges, during which a complex emotional process takes place. This process temporarily upsets the immigrant's emotional balance. The immigrant has parted from familiar people, places, and habits. He must learn a new language, must become acquainted with new behavioral patterns, must find himself a job, must build a new life, and must help his children cope with and get used to many issues involved in the significant change which has occurred in his life. Researchers perceive the process of adapting to a new society as a process bound up with external and internal pressures which are liable to lead to physical and emotional difficulties (Slonim-Nevo and Abdelghani

1999). The two central foci of difficulty in immigration are the loss of what was left behind, and the insult to self image. During integration, there is a slow and painful process of healing, which centers on reconciling oneself with loss and rehabilitating one's self image and one's estimation of self worth (Mirsky 1990).

1.4 Immigration for teenager

Language, social, and emotional difficulties can be expected to accompany every immigrant. There is yet another difficulty involved when dealing with teenagers who are forced to cope with the process of adapting themselves to a new society. The present study focuses on this group, whose age is considered critical and significant in personal development in all cultures. The young person is expected to be able to function at the end of the adolescence years as an adult in society. He is expected to have a coherent personality and a valued identity. Having said this, the teen immigrant is defined as being on the sidelines of society; as one who is positioned between the adult's and children's worlds (Aviram 1991). The prolonged duration of the teenage immigrant on the sidelines is a personal malfunction of the teenager as well as that of the integrating society. The teen immigrant experiences a double frustration, as a result both of being neither child nor adult and of not being part of the culture. According to many studies (Jayasuriya et al. 1992), the teen immigrant is liable to have a more difficult time of going through the crisis of immigration than an adult immigrant. This is because the changes which take place in his external environment, which stem from immigration, come in addition to internal, physiological, and psychological which the teen is undergoing as a function of his age-related development.

Research has found that the immigration of teenagers is accompanied by significant psychological distress. It seems thus that the ages between 11 and 22 years are not optimal for immigration (Jayasuriya et al. 1992). This distress appears as a result of the loss of the same-age reference group, which robs the teenager from sources of support and stability which assist him in completing the process of psychological separation from his parents. It is also the result of the exchange of parental and child roles, which comes when children become "parents to their parents" (Arredondo 1981, Ishiyama 1989). The gap between the values of the society at large, as opposed to those of the immigrant's family is liable to create double loyalties on the part of the teen immigrant, to drag him into conflicts with his parents, and to cause him temporarily to lose the support of his age group (Ben-David 1995, Sharline and Moin 1999). Over the years, a great deal of research was carried out in Israel, as a typical country of immigrants, which studied the difficulties of teenage immigrants. Generally speaking, it was found that teenage immigrants report more fear of isolation and of an uncertain future than do older immigrants. They experience anger in the loss of significant ties with their land of origin. They also tend to close themselves off, at least temporarily, in the company of other immigrants of their age (Mirsky and Prawer 1992, Shraga and Slonim–Nevo 1993). At the same time, very little research has been done regarding the awareness of the hosting society to the immigrant's emotional difficulties. This study aimed, therefore, at studying the development of the awareness to the emotional and social difficulties which the teenage immigrant experiences.

In general, awareness is defined as a condition in which a person can, to a certain degree, adopt the subjective condition of the other for himself. Dewey (1958) emphasizes the communicational component which exists in awareness. According to Dewey, people who communicate with one another share, even for a moment, part of the other's point of view. For that reason, awareness must be measured by the level of communication which exists between two people.

In a comprehensive review of the literature we were unable to find any other intervention program focused on the awareness of the immigrants' difficulties on the part of students studying with immigrants, despite the great importance of the issue. Therefore, the goal of this study was to develop a program of intervention using Virtual Reality technology, and to examine its effectiveness in increasing the native-born teenager's awareness to the social and emotional difficulties experienced by the new immigrant during the first part of his life in a new country.

A number of studies have attempted to examine the correlation between VR technology and social processes, but to the best of our knowledge this is the first attempt to study VR technology and its ability to enhance emotion such as those associated with immigration. We hypothesized that with the help of VR technology it would be possible to engage the participants to better understand the feelings of other people (Osberg 1993). We based this assumption on a variety of studies such as the study by Lanier and Biocca (1992) which maintains that by using VR technology it is possible to examine the concept of personal identification by installing people into a different environment and making them feel that they have a different identity-true or made up. Our assumption was based on another study which examined different aspects of social behavior among members of a group in a virtual environment, as opposed to similar environment in the real world (Slater et al. 2000). The researchers, in that study, discovered that parallel social conditions were created, such as the feeling of embarrassment. This was despite the individuals' appearing, one to the other, like simple virtual graphic images.

Therefore, in the present study we simulated with VR technology, through its immersive capabilities, the emotional and social conditions of a teen immigrant and brought native teens to be present in these conditions. Our aim was to test whether VR can enhance the degree of emotional and social awareness through a simulated immersive presence experience. The primary characteristic of a VR world, with its accompanying input and output peripherals, is its ability to simulate presence in a synthetic world. That "presence" experience is achieved through a degree of immersion that the field of view (FOV) and number of polygons are creating within the Head Mounted Display (HMD).

2 Procedure

One hundred seventy-eight seventh and eighth graders participated in this study. They were between the ages of 12 and 14 years. One hundred four students were born in the native country, while 64 were new immigrants. The students were divided into three groups: an experimental group of native teens ($N=48$), a control group of native teens ($N=66$), and a group of immigrants which provided us with a benchmark for the scale of emotional and social awareness that a teen immigrant is experiencing ($N=64$).

Each participant in the experimental group experienced the VR worlds (described below) for approximately 25 min. The control group watched the video film titled: "A Trip on Wheels," (described below), which describes the difficulties of new immigrants. The immigrants group was not put into any experimental condition, and was used only for producing a benchmark measuring awareness. Table 1 shows the distribution of the research participants.

In this study we used a number of research tools: A film, an awareness questionnaire, a personal interview and a four 3D virtual worlds. The following is a short description of each tool.

Table 1 Distribution of participants

Variables	Natives experimental	Native control	Immigrants	Total
Boys	32	33	28	93
Girls	16	33	36	85
Total	48	66	64	178

3 Film

"A Trip on Wheels" is a film produced by The Israeli Film Service. It has 12 chapters which describe teenage immigrants between the ages of 16 and 19, older immigrants, and native-born youngsters who go off on a challenging bicycle trip. During the trip, which lasts 12 days, the young people raise questions and struggle with the issues of immigration, absorption, and integration with the veteran society. For the purposes of this research, only the first chapter of this series was screened to the control group. It lasts 20 min and presents the first meeting of the young immigrants with their native-born counterparts, and gives expression to the feelings and experiences of the new immigrants.

3.1 Awareness questionnaire

The Awareness questionnaire was developed in the Institute for the Advancement of Education (Sever 1997) at the Hebrew University in Israel, and has been used in a number of studies (Tatar and Horenczyk 1996). Its reliability was found to be Cronbach Alpha 0.82 (Lerner 2002).

Three of the five sections of the questionnaire were used since they were the most relevant to this study. The first two sections of the questionnaire were made up of 13 statements which express the expectations one might have from a friend, for example:

- "I would expect that my friend would..." or
- "What do I think that a new immigrant student would expect from his friend who is a native-born?"

Each student was asked to relate twice to the series of questions; first, from his own point of view (what are his expectations of his friend) and second, from the point of view of a native-born student.

The third section of the questionnaire was made up of 28 statements made by teenagers, such as:

- I very much miss my home and my friends in the country from which I came.
- The teachers speak slowly in class, and take into account that it's hard for me to understand.
- I'm embarrassed to invite friends to my house.

The statements were divided into three dimensions: the social dimension, the personal dimension, and that of the school atmosphere.

In all parts of the questionnaire the respondents were asked to choose one of four possible answers on a scale of 1—quite correct, to 4—not correct.

These parts of the questionnaire were used in Lerner's study (2002), and were validated in reference to two other instruments: with accordance to Weinberger's Social Ratio

(in Lerner 2002), it was found to have a reliability of 0.82 (Cronbach Alpha). With accordance to Back and Guplill's Self-rating (in Lerner 2002), it was found to have a reliability of 0.96 (Cronbach Alpha).

3.2 Personal interview

A personal interview was conducted with each native-born participant before the experiment in order to determine the student's level of awareness to the experiences and feelings of an immigrant teenager. This interview was also administered to the teen immigrant for the purpose of obtaining a benchmark for measuring awareness to emotional and social difficulties. The goal of the personal interview was also to enable the native-born participant to discuss his/her feelings as s/he was about to take part in the experiment. The interview after the experiment was again conducted on an individual basis with each native-born participant in order to see if there had been a change in the student's degree of awareness of the feelings of the immigrant teenager.

3.3 Immersive 3D virtual worlds

We developed four virtual worlds which reflected the emotional and social difficulties experienced by the immigrant student, as delineated in the literature we've reviewed. Those worlds touched on four areas and therefore four VR worlds were developed accordingly: language difficulties, orientation in an unfamiliar area, social interaction and cultural differences which focused on stereotypes. The following is a description of two of these worlds.

Each virtual world had a built-in task which the participant had to perform within a limited amount of time—about 3 min. Afterward, he had to proceed immediately to the next virtual world. In the world in which language difficulties were simulated, for example (see Fig. 1), the subject saw a busy corner, with cars traveling in all directions, and people crisscrossing the intersection. The street signs were printed in a language with which he was unfamiliar. The participant was given the following task: To arrive at a party which was taking place in a club in one Corner Street. The teen was allowed to receive help from signs or from people. Pressing on any one of the images produced a garbled voice. Approaching a sign enlarged the letters, but they remained unintelligible. This virtual world was limited to 2 min.

Fig. 1 A Snap-shot from the virtual world simulating language difficulties

Another world, for example, simulated negative social interactions (see Fig. 2). In this world, the student enters a library, and sees other students in a busy room attending to their affairs. The participant was given the task of preparing a list of the students using the library. Each time that the student approaches one of the virtual students, she/he is met with an uncooperative behavior. None of the students in the library helps seems willing to provide any assistance or even his or her name.

This Virtual World is based on studies which show that despite, for example, a relatively high level of learning abilities of immigrant teenagers they encounter many difficulties in informal integration into the society of their age peers, and many other difficulties in forging friendship ties. It was found therefore, (Tatar et al. 1994) that most of the friends of immigrant students are primarily immigrants, and that many of them feel that the native-born students ignore them. Similarly, their difficulties to adapt socially do not fade away, even after an extended stay in the new country.

During the experiment, the participants were given explanations and instructions on how to act in each virtual world, both verbally and in writing. The tasks were created, however, in such a way that the subjects would have difficulty in carrying them out. This was meant to make the feeling which accompanies the immigrant that much more tangible.

The virtual worlds were validated in a process of expert-validation by four experts specializing in immigration issues. We used the virtual worlds only after the experts agreed among them that they made the teenager's emotional and social experience authentically tangible.

4 Results

This study examined whether an experiment carried out with VR technology simulating social and emotional experiences which are the lot of a teenage immigrant would improve the degree of awareness to those experiences on the part of native-born students, as opposed to the effect of watching a film. In order to examine this hypothesis we administered the Sever's (1997) awareness questionnaire (see detail above), and we performed a two-directional difference test with repeated Manova Measure for each of the two groups—the experimental group (VR) and the control group (the film). The immigrants' group wasn't included in the analysis, because it didn't undergo an intervention of any sort, and filled out the questionnaire only one time. The findings may be seen in Table 2.

Fig. 2 A Snap-shot from the virtual world simulating social interaction

Table 2 The degree of change in the level of awareness to immigrant students' emotional and social difficulties

	Experimental group—VR (N=48)				Control group—Film (N=66)				Time	Interaction F_1
	Before		After		Before		After			
	Average	S. deviation	Average	S. deviation	Average	S. deviation	Average	S. deviation		
Social	2.42	0.64	2.54	0.53	2.41	0.58	2.62	0.62	10.338*	0.405 ns
Personal	2.98	0.62	2.92	0.59	2.92	0.54	3.00	0.47	0.095ns	1.640 ns
School atmosphere	2.73	0.80	2.78	0.75	2.70	0.81	2.74	0.79	0.320ns	0.002 ns

*$P<0.01$

4.1 Awareness

The results in Table 2 indicate that on the social dimension there was a significant effect on the raising degree of awareness ($F_1=10.38$; $p<0.01$) as a result of the intervention. In other words, the VR experiences and the film caused the teenagers to see that immigrants have more social difficulties than they thought in advance. The stronger effect was achieved with the control group who watched the film.

On the other hand, no significant effect was observed on the degree of awareness to the emotional dimension between the scores of the entire group of students and the two separate measurements. Nonetheless, one can see that as a result of the intervention, the students in the VR group attributed many more emotional problems to the immigrants than those attributed to the immigrants by the group which viewed the film.

Regarding the atmosphere in school parameter, no significant difference was found in the rating of all the native-born students as opposed to the two measurements ($F_1=0.320$ ns; $p>0.01$). Similarly, the interaction time X of the experimental group is not statistically significant ($F_1=0.002$ ns; $p>0.01$).

4.2 Interview

The hypothesis was also tested by means of the following two open questions before and after the experiment:

1. How does the new immigrant feel on his first day in school?
2. The teacher sits a new immigrant student next to you. What do you do?

The immigrant students were asked the question in a slightly different way: Let's say the teacher sits you next to a native-born student in your class, how would you like him to act toward you?

4.3 First Q results

A content analysis was carried out on the students' responses to the first question. We recorded all the responses and coded the responses. A range of expressions was received from the students. Most of the points made by the students expressed uncertainty and difficulty, while only a minority expressed positive feelings such as happiness or curiosity. The variable was calculated by counting the number of expressions of uncertainty and difficulty made by the student.

The findings indicate that before the intervention 13 students (8.7%) made no uncertainty or difficulty expressions, while 136 students (91.3%) made one or more expression (between one and five expressions).

We hypothesized that the large number of expressions made in response to the open question indicates better verbal skills on the part of the native-born students, as opposed to the immigrant students. For that reason, we carried out a grouping of responses: 0= no expressions, 1=one or more expressions. The hypothesis was examined by means of a Crosstabs analysis of the experimental groups multiple the response to the question as described in Table 3.

The results in Table 3 indicate that the number of expressions of uncertainty and difficulty after the intervention is higher than that before it, but there is no difference between the experimental (VR) and the control group (film).

4.4 Second Q results

Content analysis of the students' responses to the second question was also carried out by recording all the responses and coding them. A range of responses was received from the students, most of them positive. For example: "I will help him." "I will be his friend." "I won't tease him." "I will tell him that I'm there for him."

Two variables were calculated—positive attitude and negative attitude—by counting the number of positive and negative responses of each student. Since it may be assumed that native-born students are able to generate more responses to an open question than immigrant students, we carried out a grouping of responses, as follows: 0 =no positive expression, 1=one or more positive expressions.

The hypothesis was examined by means of a Crosstabs analysis of the experimental groups multiple the response to the question. The results indicate that there is no significant difference between the three groups as regards positive response [Chi Square (2) 3.440; sig=0.179; $p>0.01$], and no significant difference was found regarding negative responses [Chi Square (2) 1668; sig=0.434; $p>0.01$].

After the experiment no significant difference was found between the three groups regarding positive responses [Chi Square (2) 0.948; sig=0.623; $p>0.01$]. The score of negative responses was Chi Square (2) 0.012; sig=0.994; $p>0.01$.

In summary, no statistical differences were found between the three experimental groups (VR, film, and immigrants) before and after the experiment, as regards to the two kinds of expressions.

In order to see if there was a difference between the two groups of native-born students regarding the number of expressions, we examined the number of expressions which were made in these two groups (the film group and the VR group) before and after the experiment. The positive attitude variable was calculated by counting the number of positive expressions made by each student. This variable was examined by a repeated Manova Measure of the number of expressions before and after the experiment, according to the type of technology (VR or film). The findings are detailed in Table 4.

A nearly significant difference ($p=0.056$) was found before and after the experiment, and a significant interaction was found between the groups. Before the experiment in the control group (film) there were more positive expressions on the average, while after the intervention in the experimental group (VR) there were more positive expressions.

Table 3 The number of expressions of uncertainty and difficulty in the groups of native-born students before and after the experiment

Number of feelings before				Number of feelings after				Time	Time X experiment
Experimental group—VR		Control group—Film		Experimental group—VR		Control group—Film			
Average	S. deviation	Average	S. deviation	Average	S. deviation	Average	S. deviation		
1.67	0.90	1.69	0.85	2.15	0.98	1.96	1.18	11.90*	0.61 ns

*$P<0.01$

Table 4 The number of expressions before and after the experiment in response to Question 2 in the interview

Number of expressions before				Number of expressions after				Time	Time X experiment
Experimental group—VR		Control group—Film		Control group—Film		Experimental group—VR			
Average	S. deviation	Average	S. deviation	Average	S. deviation	Average	S. deviation		
1.37	0.81	1.56	0.98	1.47	0.87	1.12	0.62	0.74ns3	*9.57

*P<0.01

5 Discussion

The research hypothesis in this study was that native-born students are not aware of the feelings and of the experiences undergone by teenage immigrants. This hypothesis was based on a number of studies in which it was found that there is no improvement in the social situation of new teenage immigrants after two and even after 3 years in their new country, that there is social alienation, and mutual ignoring and even more active hostility between the native-born and the new immigrants (Ben-Ari and Kedem 1995).

Studies have indicated (Cohen 1993, Damian and Rosenbaum-Tamari, 1992, Mirsky and Prawer 1992, Tatar et al. 1994) that the social integration of immigrant students in school is a central component of their adaptation to a local society, and that attitudes toward immigrants do not contribute to this adaptation. One of the aspirations of professionals involved in immigrant integration and of educators who work with immigrants is to bring immigrants and the native-born closer together. A variety of different social programs have been developed and put into use over the years in order to make achieving that goal easier, and to create an atmosphere which will suit the needs of the immigrants. In Israel, for example, despite the large number of programs for bringing immigrants and the native-born closer together, evaluation studies have not found a qualitative change in attitudes toward immigrants, nor an improvement in relations between immigrants and native-born Israelis (Cohen 1993, Iluz 1997, Mirsky and Prawer 1992, Versano 1994). To the best of our knowledge, none of the social programs developed so far has used VR technology to try and educate native born teens about the difficulties teen immigrants have.

The current research considered whether an experience in VR simulating experiences and feelings of an immigrant teenager would improve the awareness of native-born students to these experiences. The study's findings indicate that before the intervention, the native-born students in the control and experimental groups attributed more personal and social difficulties than the immigrant students attributed to themselves. This finding differs from those of earlier studies, which reported social alienation, mutual ignoring, and even occasionally active hostility between native-born and immigrant students (Cohen 1993, Damian and Rosenbaum-Tamari 1992, Tatar et al. 1994).

The report of the immigrant students of few personal and social difficulties can be explained in that they filled out the questionnaire on awareness out of social desirability, a desire to please the questioner, and didn't report their actual level of difficulties. The immigrant was expected to report on himself in the questionnaire in his answers to questions such as "Is he embarrassed to invite friends home?" "If, when he doesn't understand something in school, he is embarrassed to ask?" The term "social desirability" is

taken from the field of Social Psychology, which maintains that reporting on oneself depends on the honesty of those reporting, and that most of the time people say what they think, and act accordingly. However, people like to leave a good impression. Most of us like to tell people what we think they would like to hear, and to show them what we think they want to see. This phenomenon is known as misleading social desirability, and can cause people to be less forthright in their reporting and in their behavior, especially when a sensitive issue such as integration to a new society is being considered (Fisher 1993).

Another possibility is that immigrants really do have few personal and social difficulties, and that their entry into mainstream society has been very successful. This possibility, as we have said, does not match the findings of previous studies carried out in recent years. This surprising finding, therefore, need to be examined in further research.

Since the hypothesis of the current study was that immigrants have social and personal difficulties, it is possible that the comparison with the immigrants' reporting lent a misleading cast to the results. For that reason, the improvement in the degree of awareness found in this study is measured by the amount of difficulty attributed to the immigrants in the four aspects which we examined. In other words, the attributing of a greater amount of difficulty after the experiment shows an improvement in awareness. From the findings one can see that before the experiment, the native-born students attributed (both in the experimental group and in the control group) more problems and social difficulties to the immigrants than the immigrants did to themselves. After the experiment, the gap was widened, as the native-born students attributed even more problems and social difficulties to the immigrants. In other words, the level of awareness was improved in the social aspect.

As regards to the experimental group in VR, our finding matches those of studies which found that with the help of the VR technology, the user is immersed in another environment, and feels as if he has a different identity (Lanier and Biocca 1992, Osberg 1993). Therefore, the opportunity given to teens to experiment with different kinds of personalities was likely to cause them to be more sensitive to different points of view held by others.

At the same time, it was found that a greater effect was achieved by the control group (film). This can be explained in a number of ways. The students viewed the film on a large screen, together, as a group, and were able to converse, and to talk with one another during the film, and exchange impressions. This was in contrast with the individual nature of the VR experiment. It's possible that shared viewing of the film created a stronger effect in the social aspect. Similarly, the film was modern, in full color, light-hearted in tone, and entertaining. It would seem that the teenagers in it appeared to be real, and similar to those who participated in the experiment, and not computerized graphic figures speaking about their feelings and difficulties. It could be that this element generated more identification on the part of the film group. In addition, the film spoke openly about native-born and immigrant teenagers, they spoke in their own voices, sometimes with foreign accents. There was no need to guess about what was being discussed, as everything was talked about openly. In the VR experiment, on the other hand, an experience was just simulated, and the immigrants weren't explicitly mentioned. It's possible that a greater effect was created by the film for that reason.

Another possible explanation might be that in VR the students were asked to perform tasks which could not be performed successfully, so that they would experience the difficulty felt by the immigrants. It could be that the students attributed their lack of success to the way they attempted to carry out the task and thought that if they had done something different they would have succeeded. Evidently, the participants didn't attribute their failure to immigration-related difficulties.

It is also possible that the students' level of expectations created a stronger effect in the film experiment, since they are used to films, while the VR group developed higher expectations than what they actually experienced, as they were not used to the VR experience through the Head Mounted Display (HMD), and, they encountered tasks which were impossible to carry out.

It's important to point out that approximately half the students in the VR group had the unpleasant experience of disorientation as a result of using the HMD, and that they attributed part of their difficulties to the HMD, and not to the difficulties associated with immigration. One could say that the virtual worlds gave the participants the experience of difficulties, and it is possible that these difficulties were strengthened after the experiment. It seems, however, that the film had additional influences which contributed to the creation of a greater effect, especially in light of the fact that in the personal aspect (despite it's not being statistically significant) the VR group expressed many more difficulties than the film group. We may conclude that the virtual experience focused the students on personal difficulty, on their lack of success in the tasks given to them, and on the feeling of personal discomfort. In contrast, the film had greater influence on the social aspect of the awareness.

On the aspect of school atmosphere no differences were found between the two groups. This hypothesis was also tested, as we mentioned, by two open questions in the interview before and after the experiment. Here, also, we found that VR improves awareness, and strengthens feelings, but, at the same time, the film had a similar effect. Further, it was found that prior to the intervention the control group (film) expressed more positive expressions on average, while after the intervention the experimental group (VR) expressed more positive expressions.

In summary, from the practical point of view, one can see that watching a film and participating in a VR simulation can raise the awareness to emotional as well as social difficulties of a teen immigrant. One could say that the experience in VR is likely to strengthen the awareness to the personal identity of a teen immigrant, and to cause him' in general, to be sensitive to different points of view of others.

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