cogent
education

INFORMATION & COMMUNICATIONS TECHNOLOGY IN EDUCATION | RESEARCH ARTICLE

Using an ice-skating exergame to foster inter-cultural interaction between refugees and Dutch children

Teresa de la Hera Conde-Pumpido, Eugène Loos, Wiljan van Wilgenburg, Myrte Versteeg, Amanda Aléncar, Monique Simons, Claudine Lamoth and Catrin Finkenauer

cogent ⚬ oa

cogent · education

INFORMATION & COMMUNICATIONS TECHNOLOGY IN EDUCATION | RESEARCH ARTICLE

Using an ice-skating exergame to foster intercultural interaction between refugees and Dutch children

*Corresponding author: Teresa de la Hera Conde-Pumpido, Erasmus University Rotterdam, Burg. Oudlaan, Rotterdam, PA 503062, The Netherlands
E-mail: delahera@eshcc.eur.nl

Reviewing editor:
Shuyan Wang, Instrcution, The University of Southern Mississippi, USA

Additional information is available at the end of the article

Teresa de la Hera Conde-Pumpido[1*], Eugène Loos[2], Wiljan van Wilgenburg[3], Myrte Versteeg[4], Amanda Aléncar[1], Monique Simons[3], Claudine Lamoth[5] and Catrin Finkenauer[6]

Abstract: The aim of this study was to evaluate whether an ice-skating exergame can stimulate intercultural social interaction between refugees and Dutch children in controlled play sessions organized at elementary schools. We conducted an exploratory qualitative study based on observations of exergame play sessions and structured interviews conducted after the play sessions. A total of 58 children (7-12 years old), divided into 29 couples, each of which consisted of a refugee and a Dutch child, played the game at two Dutch elementary schools. We used Johnson and Johnson's theoretical framework for cooperative interaction to structure the observations and analyze the results. A total of 8 dimensions (positive interdependence, individual accountability, face-to-face promotive interaction, social skills, self-analysis, language barrier, lack of teacher's training barrier and preventing formation of pseudo-groups), were used to analyze the ways in which the game facilitated social interaction among participants. The results showed that in controlled playing sessions the game could be used to foster positive interdependence, individual accountability and face-to-face promotive interaction.

ABOUT THE AUTHORS

This paper was written by a multidisciplinary group of eight researchers from three Dutch universities: Erasmus University Rotterdam, Utrecht University, University of Groningen. These teams join expertise coming from five research areas: game studies, intercultural communication, movement sciences, interpersonal dynamics and organization studies.

The research that resulted in this paper was conducted under the umbrella of the Sport & Society focus area of Utrecht University. Sport & Society uses the characteristics, qualities and functions of sport as a vehicle to study the meanings and impact of sport and related activities such as games, fitness and play for a healthy, inclusive and secure society.

PUBLIC INTEREST STATEMENT

The purpose of this study was to gain insight into how an ice-skating digital game can foster intercultural interactions during play between refugees and Dutch children in school classes. Since 2015, the European territory has become a final destination for asylum seekers. The sociocultural inclusion of refugees in their new country is a process that requires the involvement of both the refugees and the host society. In this regard, new inclusive practices for children might help to reduce educational disparity and disadvantage and promote the achievements and skills of migrant-background students. The results of this study show that the game could be used to foster the capacity of children to recognize the value of cooperating with their partners and to identify in them valuable skills that can help them to achieve goals together. Besides this, the game showed to overcome the language barrier associated with this type of intercultural interactions.

cogent · oa

Subjects: Sports and Leisure; Communication Studies; Education; Media & Communications

Keywords: cooperative play; intercultural interaction; exergame; refugees; digital games

1. Introduction

Many European countries are currently facing the reception of an unprecedented number of asylum seekers. Since 2015, the European territory has become a final destination for asylum seekers, who have been forced to leave their own countries both as a result of political conflicts and for humanitarian reasons (Eurostat 2017; Edwards 2017). The scale and pace of the most recent flows in Europe in the so-called refugee crisis on the Mediterranean Sea underscore the urgent need to explore successful practices that can facilitate the social inclusion of these new-comers, both at the EU and national levels. According to the EU Common Basic Principles (2004), the sociocultural inclusion of refugees in their new country is a process that requires the involvement of both the refugees and the host society. Hence, sociocultural inclusion processes not only make demands on individual refugees but also on national citizens and institutions, such as educational centers (Strang & Ager 2010).

In this regard, the educational context plays a major role in providing opportunities to engage refugee youths in intercultural contact with native peers (Pettigrew & Tropp 2008). New inclusive practices for children, introduced at educational centers from an early age (e.g. elementary schools) might help to reduce educational disparity and disadvantage and promote the achievements, skills and accomplishments of migrant-background students. Furthermore, an intercultural approach to education has been strongly linked to improvements in social interactions between students in multicultural classrooms, as it facilitates the development of competencies that foster an understanding of different cultures, and the harmonious coexistence among students representing this diversity (Phillips, 2012; Severiens, Wolff, & van Herpen, 2014). To ensure the efficiency of these practices, it is necessary to provide institutions and educators with resources that can help them to deal with diversity and social inequality (Severiens et al., 2014).

In this setting, sports have become a creative way to engage students in active and inclusive pedagogic activities. A large body of empirical research on the use of sport to prevent social exclusion shows how physical activity can contribute to the social inclusion and intercultural interaction of refugees and asylum seekers (Devecioğlu et al., 2005). The positive effects of sports range from individual benefits of participation (health, fitness, dealing with stress, enhancing life quality), social benefits (tackling isolation and building social networks), community benefits (using sport as a vehicle of communication between refugees, asylum seeker groups and host communities), and societal benefits (reducing problems of crime and delinquency) (Devecioğlu et al., 2005).

Aside from the benefits of sports within the context of refugee integration, prior research has shown the potential of digital games to foster intercultural interaction (De la Hera Conde-Pumpido & Paz Aléncar, 2015). However, the majority of expectations regarding the value of this type of intervention has not been empirically tested (Bleumers et al., 2012), which means that in-depth knowledge of the appropriate implementation of playful interventions aimed to support at-risk communities, such as migrant children, is lacking (Haché & Cullen, 2010). Previous studies have explored the potential of digital games to foster multicultural integration (Kayali, Schwarz, & Götzenbrucker, 2011; Memarzia & Star, 2011). However, the analysis of the collaborative features of the research-based games used in the context of these studies was not supported by a theoretical framework that clearly connected the benefits of collaboration in digital games to intercultural interaction.

The purpose of the present study was to gain insight into how an exergame, a digital game focused on triggering physical movements as an input for gameplay (Yang, 2010), can foster playful interactions and, by extension, intercultural social interactions during play between refugees and Dutch children in school classes. Exergame play enables multiple players to compete or

cooperate on a team, thereby providing both virtual and real social interaction (Staiano & Calvert, 2011). Besides this, exergames are mainly focused on physical interactions and are less dependent on language in comparison with other genres of digital games (Loos, 2017), which helps to overcome the language barrier associated with the purpose of this study.

2. Theoretical framework

This study proposes a new application of the cooperative learning method (Johnson and Johnson 1994a) with an aim to come to a better understanding of how a collaborative digital exergame can encourage positive social interactions among pupils from different migrant backgrounds. Cooperative learning is a learning methodology in which students with *equal status* are involved in an activity in which they have to *cooperate* to achieve *common goals*. This method fosters promotive interaction in comparison with individualistic and competitive learning approaches. This means that pupils involved in cooperative learning realize that they can only achieve their goals if their partners also do so (Johnson & Johnson, 2002).

The social psychologists David W. Johnson and Roger Johnson, who have extensively studied the potential of the cooperative learning method (1988, 1989, 1994a, 2002), have also conducted research on the benefits of this learning method to foster intercultural interactions (1988). The results of their study show that when compared to individualistic and competitive experiences, pupils involved in cooperative experiences better develop their interaction skills, are more effective interpersonally and more positive about each other regardless of differences in ethnic background (1988). Another study conducted by Coelho also showed that cooperative activities contribute to intercultural interaction and reduced pupils' stereotypical notions about their peers (Coelho 1998).

Johnson and Johnson (2002) identified five collaborative components that promote the positive effects of collaborative interactive activities designed to foster intercultural interaction: positive interdependence, individual accountability, social skills, face-to-face promotive interaction and self-processing (described in detail later in this section). However, other researchers have also pointed out various barriers that can limit the effectiveness of this cooperative learning method when used with children from different cultural backgrounds. These are, in the first place, the language barrier, resulting from the fact that participants speak different languages; second, the lack of teachers' training in the design of activities that efficiently foster intercultural interaction; and third, the risk of pupils dividing the tasks and working individually instead of collaborating.

De la Hera and Paz Aléncar (2015) have argued that cooperative digital games can be used to apply Johnson and Johnson's cooperative learning method. They discuss how the use of this type of game can serve, not only to elicit the benefits of cooperative interaction in educational settings but also to overcome the barriers associated with cooperative learning practices. Collaborative digital games are digital games in which "all the participants work together as a team, sharing the payoffs and outcomes; if the team wins or loses, everyone wins or loses" (Zagal, Rick, & Hsi, 2006). Within the game "a team is an organization in which the kind of information each person has can differ, but the interests and beliefs are the same" (Marschal in Zagal, Rick, and Hsi 2006). The interactive nature of digital games and their capacity to adjust the experience and provide feedback based on players' performances become relevant characteristics when used with the purpose of encouraging intercultural interactions (De la Hera and Aléncar, 2015). As such, digital games have the potential to help overcome the difficulties associated with cooperative learning practices, such as lack of training of teachers in designing cooperative activities, language difficulties and lack of motivation of students (2015). Moreover, collaborative digital exergames combine the benefits of collaboration, games and sports.

Aléncar and De la Hera (2018) propose an eight-dimension theoretical model, described below, that explains the way collaborative digital games can be used to elicit the five cooperative components mentioned by Johnson and Johnson (2002) to achieve the benefits of cooperative activities and to overcome the three barriers associated with these practices when conducted for

the purpose of intercultural interaction. This model was used in the present study to structure the data collection procedure and for the analysis of the results, as described in the methods section.

2.1. Positive interdependence

Positive interdependence happens when collaborating pupils are aware that their success is linked not only to their own performance, but also to the performance of their peers. This means that they acknowledge that they can benefit from their partners' performance, and that their success benefits not only themselves, but also their peers (Johnson and Johnson 1994b; Tielman, Den Brok, Bolhuis, & Vallejo, 2012).

De la Hera Conde-Pumpido and Paz Aléncar (2015) argue that the capacity of cooperative digital games to establish a common goal for all players can serve to foster positive interdependence. Having a common goal and sharing their failure or success together can increase the players' bond.

2.2. Individual accountability

Collaborative games usually "bestow different abilities upon the players" (Zagal, Rick, and Hsi 2017, p. 37). This means that collaborative digital games usually require a combination of different abilities or skills that can range from orientation skills, to coordination skills or problem-solving skills, for example. This gives players with different skills the opportunity to demonstrate the value of these and to recognize the value of the skills of other players.

2.3. Face-to-face promotive interaction

Face-to-face promotive interaction as a cooperative component arises when pupils are involved in activities that encourage them to discuss different perspectives to identify or achieve their goals. When sharing common goals, pupils tend to support the progress of their peers, which encourages them to communicate with others to verbally or non-verbally explain how to face specific problems or situations. Communication is of particular relevance to collaborative games, as players usually have to coordinate what they do to achieve their goals in the game (Zagal, Rick, and Hsi 2017, p. 35). Sharing their knowledge, discussing different points of view and orally teaching their own skills become essential to progress in the game (Zea, Sánchez, Gutiérrez, Cabrera, & Paderewski, 2009). Moreover, digital games offer communication flexibility (Zagal, Rick, and Hsi 2017, p. 35), meaning that players have many different options to communicate either verbally or non-verbally, including, for example, communication with their characters in the game via movements or gestures, showing how to use the controller of the game or pointing at a specific element in the screen.

2.4. Social skills

In cooperative sessions, pupils usually need to use their social skills to achieve their goals. Social skills such as leadership, conflict management or decision-making are usually of special value when playing collaborative digital games (Zagal, Rick, and Hsi 2017, p. 37). According to Johnson and Johnson (2002), having the opportunity to use and demonstrate these social skills is beneficial for the positive outcomes of the activity.

2.5. Self-analysis

Johnson & Johnson (2002) also noted that when pupils are encouraged to reflect on the outcomes of a collaborative learning session, and to discuss their results and the efficiency of their collaboration, this can also yield positive outcomes for the activity. Self-analysis of the gaming session allows the value of each player's contribution to be examined and enhances group commitment to common targets (Zea et al., 2009). A study conducted by Usart, Romero, and Almirall (2011) reported that discussion on individual feelings of knowledge increased feelings for another's knowledge (2011, p.33), which helps to overcome stereotyping and prejudice in multicultural education environments (Johnson, Johnson, & Smith, 1998).

2.6. Language barrier

The wide range of player-to-player forms of communication provides collaborative digital games with the potential to help players overcome the difficulties associated with the lack of language competences while playing (Aléncar and De la Hera, 2018). Digital games have the potential to foster different forms of player-to-player communication that go beyond face-to-face language communication. On the top level, we can differentiate between in-game communication and out-of-game communication, both of which can consist of forms of communication other than language. On the one hand, out-of-game communication can happen during and/or after play, and it may take the form of verbal communication and non-verbal communication, including gestures, paralanguage and the non-verbal part of speech. On the other hand, in-game communication includes in-character and out-of-character communication. In-character communication occurs when players act out their characters' personality in the game, and can consist of verbal interaction with other characters, but also non-verbal interaction with other characters in the game space. Players who speak different languages can make use of in and out-of-game non-verbal communication to interact with one another.

2.7. Lack of teachers' training as a barrier

Using collaborative games as a mediating tool, teachers can promote intercultural interaction that meets the guidelines proposed by Johnson & Johnson, even if they have not been specially trained on how to effectively enhance promotive interaction.

2.8. Preventing formation of pseudo-groups

Pseudo-groups are defined as groups in which members who have been assigned to work together have no interest in doing so. Digital games may incorporate small persuasive elements, called *microsuasive* elements, to motivate players to engage with an experience, complete certain tasks, gain a better understanding of specific material and/or stay on task longer (Fogg, 2003). Microsuasive persuasive techniques, this is, the incorporation of small elements in a digital game that aim to foster specific interactions with it, can, therefore, help to overcome the difficulties related to the lack of motivation of some participants (Baker & Clark, 2010).

3. Materials and methods

We conducted a qualitative study in which we used observations of play sessions followed by structured interviews as the method for collecting data. In the following sections, more detail is provided on how participants were recruited for the study, the characteristics of the game that they played and how the data were collected and analyzed.

3.1. Recruiting participants

Participants were recruited from Dutch schools who were able to meet the requirement of offering both reception classes and regular classes. Reception classes are special classes for children who have recently arrived in the Netherlands and who still need to learn the language and adapt to the culture. After completing the adaptation process, they are then sent to a regular class where they mingle with Dutch children and children from other cultural backgrounds.

To meet the inclusion criteria for participation in the study, the refugee children had to still be attending a reception class, which meant that they were not yet fluent in Dutch and had not yet fully adapted to the Dutch culture. After contacting several schools, we received permission to conduct play sessions at two Dutch schools in the Dutch cities of Almelo and Putten, in the first half of 2017. We included as many participants as possible, ultimately ending up with a total of 58 children (7–12 years old), who we divided into 29 couples. Each couple was required to consist of a Dutch child and a refugee child who, for technical reasons, were of a similar age and length. The game was played in two different schools by a total of 27 male students and 31 female students divided into 13 female–female couples, 11 male–male couples and five male–female couples. Same gender couples were created in most cases to respect different cultural backgrounds.

Figure 1. Kinect silhouette recognition.
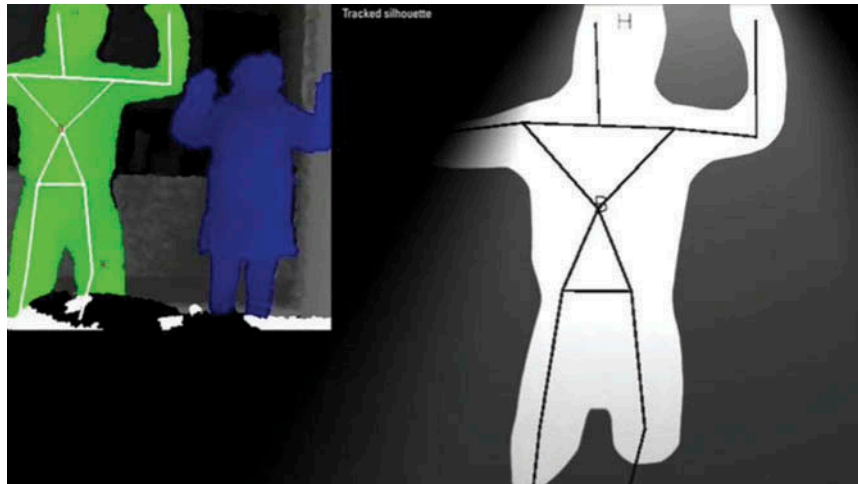
3.2. The ice-skating game

The ice-skating game used in this study is a game originally developed to train the balance of older adults. The game was created by research center SPRINT at the University Medical Center of Groningen in collaboration with the game company 8D games [see http://www.imdi-sprint.nl/huidige-projecten /exergaming-project/]. The game runs on a mini-PC which connects to any modern television and is controlled using infrared sensor technology [Kinect v1 Microsoft Corp, Redmond, USA]. In the game, the user controls the speed and direction of a virtual ice skater on a frozen canal by shifting his or her bodyweight in both lateral directions (see Figure 1). Thus, the players control the avatar [skating figure]

Figure 2. One couple playing the game.

in the game by making body movements, which makes playing the game highly intuitive, reducing the learning curve, and allowing players with different gaming skills to quickly understand how it is played. When played by two players at the same time, both players need to synchronize their movements to control the character and complete the different levels of the game. If the movements of the two players are not synchronized, the avatar in the game will not move (see Figures 1 and 2). No verbal or written instructions are needed to play the game; hence the lack of a common language is not a barrier for playing it.

We decided to use this game for the present study, because it was developed in such a way that it is intuitive, requiring no previous game knowledge or gaming skills. Moreover, the game has a bearing on Dutch culture and can be played in couples, meeting the requirement of being a collaborative digital exergame.

3.3. Collection of data and data analysis
We conducted controlled play sessions at both schools, during which one couple at a time played the game. Two researchers observed the play sessions (without participating or interacting with children while they were playing) and took notes for later analysis, using an observation scheme. Each couple was asked to play one level of the game twice, with the players taking turns to be in the front: in the first round, player 1 stood in front of player 2; in the second, player 2 stood in front of player 1. They decided among themselves who would go first in front. The play sessions were also recorded on video.

An observation scheme (see Annex 1) based on the eight dimensions discussed in Section 1 was used to structure the notes of the observations: (D1) positive interdependence, (D2) individual accountability, (D3) face-to-face promotive interaction, (D4) social skills, (D5) self-processing, (D6) overcoming the language barrier, (D7) game independence, (D8) prevention of individual play. The coding scheme was proposed by one researcher, and revised and agreed upon by three other researchers.

After the game sessions, two researchers conducted a structured interview, each with one player (see Annex 2). Due to the young age of the children, the interview was composed of simple questions aimed at complementing and triangulating the information collected through observations.

One researcher was responsible for data extraction and data coding (based on the observations and interviews) using a coding scheme (Annex 3). A third researcher interpreted and summarized the results. The observation notes were structured using a coding scheme based on the eight dimensions presented in Section 1.

4. Results

4.1. Positive interdependence
To assess whether playing the game facilitated positive interdependence, during the play sessions, we observed children's interaction to look for signs of players identifying the need for mutual collaboration to progress in the game. After the analysis of data collected, we found several signs of positive interdependence that have been coded into four categories: (1) *recognition of the need for collaboration*, (2) *providing and receiving help*, (3) *celebrations* and (4) *compliments*.

In the first category, *recognition of the need for collaboration*, we observed couples verbalizing the need for looking for discussions together ($n = 16$) and coordinating to move together ($n = 12$). During the gameplay, children were also providing and receiving help, something that was also interpreted as a sign of positive interdependence. In this category, we observed couples giving each other verbal directions ($n = 6$), looking at each other and using facial gestures ($n = 2$) and couples in which one of the two players was taking the other by the shoulders to help him/her moving ($n = 7$). Couples were also *celebrating together their achievements* ($n = 11$), by laughing together ($n = 7$), using

onomatopoeia such as "yesss!" (*n* = 2), or hugging each other (*n* = 2). Finally, some couples also used *compliments* such as "we did it great" to recognize the well-done work team.

In almost all couples (*n* = 27), we observed at least one of these signs of positive interdependence, although there were two couples in which children tried to play individually and were not paying attention to each other or trying to collaborate. We observed that positive interdependence was mainly fostered after failing to achieve difficult challenges in the game, such as passing a bridge. After a failing moment, we could observe children starting to discuss how to work together, trying to help each other and celebrating and complementing after later overcoming together the challenge.

When asked about if they enjoyed playing this game in couples, a vast majority of children answered that they found value in playing together (*n* = 48) and only two of them said that they would play the game better alone. An 8-year-old Dutch girl said, for example, "if I would have played alone, I would have made many more mistakes". A 9 years old Syrian girl also said: "better playing together, this way we can help each other".

4.2. Individual accountability

To assess whether playing the game facilitated individual accountability, the questionnaire included questions designed to find out whether players were able to recognize that their partner had at some point performed better than they themselves had while playing; if they thought they helped their partner during the game and if they felt their partner had helped them during the game. Most players mentioned something that their partner did better than they did while playing the game (*n* = 48). In their answers, they mentioned (1) *coordination* (*n* = 22), (2) *the ability to identify obstacles* (*n* = 18), (3) *the ability to lead the game* (*n* = 6) and (4) *their capacity to provide support* (*n* = 18), as topics in which they were helped.

Most players mentioned something that they did that helped their partner during the game (*n* = 48) and also manifested that they felt their partner had helped them during the game (*n* = 45). When she was asked in which ways she thought she was helped her partner during the game an 8-year-old girl from Aruba said: "When she stopped and she was supposed to bend over I told her to bend. That was fun!". Also, a 9-year-old Dutch girl said: "I helped her a lot. When she did not bend over I told her 'bend, bend, bend'. It was fun to help". Also, when asked in which ways he was helped by his partner a 10-year-old Syrian boy said: "when I failed, he took me to the right side".

4.3. Face-to-face promotive interaction

The capacity of the game to foster face-to-face promotive interaction was assessed through gameplay observations. We noted whether the players interacted during play using *verbal communication* (VC) or *non-verbal communication* (NVC). The results show that the majority of players interacted with their partners during the game (*n* = 54). In most cases, non-verbal communication was used to give indications to their partners (*n* = 47), and taking their partners by the shoulders was the most prevalent form of non-verbal interaction (14 couples). Gestures were also used to give indications and as a form of approval/disapproval of what their partners were doing (nine couples). The use of verbal communication was frequent (17 couples) but when it was used, this was mainly to give compliments or reinforce non-verbal communication. It is also important to highlight here that there was no significant difference observed in the use of verbal and non-verbal communication by Dutch or refugee children.

4.4. Social skills

According to Johnson and Johnson (2002), cooperative activities that foster students' social skills are more likely to result in positive forms of intercultural interaction. To discover whether playing this game encouraged players to use their social skills, we watched to see whether they assumed specific *social roles* while playing the game. We observed that, indeed, most of the children assumed a specific role while playing the game, either as the *leader* (*n* = 27) or as a *follower* (*n* = 27). The lead was mainly showed through non-verbal communication (*n* = 47), by taking the

initiative on the movements that the couple needed to take. This was done by taking their partners' hands or shoulders ($n = 14$), using gestures to point what to do ($n = 9$), or through visual contact ($n = 4$). Verbal communication was also used to establish leadership, by giving indications on what to do and how to do it ($n = 17$). In all cases, the use of verbal communication was reduced to single words or short sentences. Some examples of some small sentences that they used for this purpose were: "Be careful with the bridge", "Bend over, bend over", "Bridge", "Stop", "Now right". No noteworthy differences were seen regarding those taking the lead in terms of nationality. Only in some exceptional cases ($n = 2$), we observed players using rude behavior when leading: yelling (but not aggressively) or being rude in the way they moved their partner.

4.5. Self-processing
The positive benefits of cooperative activities are also better elicited when there is a self-processing moment after the activity. The results presented in relation to dimensions D1, positive interdependence, and D2, individual accountability, show the value of the self-processing moment that was provided for children after the game session. These results show the capacity of children to identify the value of playing together ($n = 48$). Besides this, they also illustrate how this self-processing moment serves players to recognize the way they supported their partners during the game session ($n = 45$); and the way they were supported by them ($n = 48$). See also dimension eight, below, on preventing individual play.

4.6. Language communication barrier
An important part of the study was to assess whether the game could be useful in promoting intercultural interaction, considering the language limitations of some of the children. This is one of the barriers usually associated with using cooperative learning activities to foster intercultural interaction. To assess this dimension, we observed the different ways (verbally and non-verbally) in which players interacted while playing and whether they needed external help to communicate or understand how to play the game. In the interviews, we also asked players how they communicated to their partner what they wanted to do during the game and whether they liked playing with someone who spoke a different language.

Both *verbal* and *non-verbal communications* were mentioned by them as methods to communicate with their partners. Non-verbal communication was, however, and as discussed in Section D3, observed to be the most prevalent form of communication ($n = 47$). Although verbal communication was also used by 17 of the 29 couples, it was in most cases limited to give *short instructions* (left/right, now/stop, wait), to give *compliments* and to *support non-verbal communication*. Nevertheless, only two children indicated during the interviews that they needed external help to communicate with their partners. The comparison between the results of the observations and what was expressed by players during the interviews seems to show that language has not supposed a communication barrier for most players, as non-verbal communication was a powerful communication tool for this activity.

4.7. Lack of teacher's knowledge
The second barrier to establishing effective cooperative learning activities is the teacher's inexperience with designing, conducting and supervising cooperative activities. In this case, we observed whether the children were able to understand what they were supposed to do in the game without external support. As previously stated, only two children required external help to understand what they were supposed to do in the game. Note, however, that some technical knowledge is needed to install the game, which can also pose a challenge to teachers.

4.8. Preventing formation of pseudo-groups
Another barrier to the realization of effective cooperative learning activities is the risk of formation of pseudo-groups. Here, this would have been the case that had one of the players played alone, disregarding his/her partner while playing. To assess whether the game was helpful in overcoming this barrier, we observed whether the children clearly made contact and seemed to be playing

together, and clearly did not seem to be trying to play individually. In the questionnaires, we also asked whether they would have preferred to play alone. Most of the children clearly seemed to *play together*, communicating one way or the other with their partners (*n* = 53). The remainder (*n* = 5) did not clearly play individually, but also *did not interact in any way with their partners*. We also found that most of the children valued playing together, saying they would not play the game alone (*n* = 45).

5. Discussion and conclusions

The objective of this study was to explore the capacity of a cooperative digital ice-skating exergame played in a controlled session at a school to elicit intercultural interactions between refugee and Dutch children. To that end, we conducted play sessions with 29 couples made up of refugee and Dutch children between the ages of 7 and 12 years at two schools in The Netherlands. We applied Johnson and Johnson's (2002) cooperative learning method in a new way, namely to evaluate the potential of the game to elicit the five dimensions associated with the benefits of cooperative learning activities, as well its capacity to overcome the three barriers to the use of this practice.

The results of this study clearly show that the game has the capacity to elicit positive inter-dependence and individual accountability among players. It also successfully elicits face-to-face interaction between players. However, it should be noted that this interaction mainly took the form of non-verbal communication that was used to give instructions to the other player on how to play the game. We should also point out that, on the one hand, due to the type of game and the fact that the players stand one behind the other to play the game, non-verbal communication was mainly used by the players to indicate to their partners what to do in the game; in most cases, we did not observe any personal interaction that would allow the players to get to know each other better. On the other hand, the players did use verbal communication in most cases to provide positive feedback to their partners or to celebrate a couple of achievement.

We also observed a clear pattern in game players regarding the use of their social skills. In most cases, we observed that one of the players took the lead, while the other player simply followed the leader. It was interesting to observe that this relationship only worked when the leader was behind the other player, rather than in front of him; from behind, the leader was able to control the movement of the character in the game by taking his/her partner by the shoulders. It is important to note here, that no noteworthy differences were seen regarding those taking the lead in terms of nationality, which leads us to conclude that the topic of the game (ice-skating), which could be more familiar for Dutch children due to cultural background, was not an impediment for refugee children to understand, play and take a leader role in the game.

Finally, in relation to the lack of expertise on the part of the teacher, it is relevant to add that, although the game works independently to elicit cooperation, and the teacher does not need to have the skills to design an activity for this purpose, the fact that the technical installation of the game is difficult could become an additional barrier to its actual use. The development of innovative, user-friendly technologies, however, is opening up new options for using games for these purposes, with no prior technical knowledge required.

The results generated through this research increase our understanding of the role of digital games as tools to foster intercultural interaction. Hence, they can contribute to educative or social programs that aim to foster relationships between majority and minority groups, and that pursue social inclusion of ethnic minority groups. Further research, however, should also explore whether this type of inter-vention impacts on the relationships of children beyond the gaming sessions, and if so, how.

cogent ·· education

Author details
Teresa de la Hera Conde-Pumpido[1]
E-mail: delahera@eshcc.eur.nl
ORCID ID: http://orcid.org/0000-0002-5102-813X
Eugène Loos[2]
E-mail: e.f.loos@uu.nl
Wiljan van Wilgenburg[3]
E-mail: w.vanwilgenburg@uu.nl
Myrte Versteeg[4]
E-mail: myrte_v@live.nl
Amanda Aléncar[1]
E-mail: pazalencar@eshacc.eur.nl
Monique Simons[3]
E-mail: M.Simons@uu.nl
Claudine Lamoth[5]
E-mail: c.j.c.lamoth@umcg.nl
Catrin Finkenauer[6]
E-mail: c.finkenauer@uu.nl

[1] Department of Media and Communication, Erasmus University Rotterdam, Rotterdam, PA, 503062, The Netherlands.
[2] Utrecht University School of Governance, Utrecht, ZC, 3511, The Netherlands.
[3] Department of Human Geography and Planning, Utrecht University, Utrecht, CS, 3584, The Netherlands.
[4] Department of Human Geography and Planning, Utrecht University, Utrecht, CS, 3584, The Netherlands.
[5] Department of Human Movement Sciences, University of Groningen, Groningen, AV, 9713, The Netherlands.
[6] Department of Social and Behavioural Sciences, Utrecht University, Utrecht, CS, 3584, The Netherlands.

Disclosure statement
No potential conflict of interest was reported by the authors

Cover Image
Source: Author.

Citation information

References
Alencar, A., & de la Hera Conde-Pumpido, T. (2018). Gaming in Multicultural Classrooms: The Potential of Collaborative Digital Games to Foster Intercultural Interaction. In *Social Interactions in Virtual Worlds* (pp. 288–310). Cambridge University Press. http://doi.org/10.1017/9781316422823.012

Baker, T., & Clark, J. (2010). Cooperative learning – A double-edged sword: A cooperative learning model for use with diverse student groups. *Intercultural Education,* 21 (3), 257–268. http://doi.org/10.1080/14675981003760440

Bleumers, L., All, A., Mariën, I., Schurmans, D., Van Looy, J., Jacobs, A., … de Grove, F. (2012). State of play of digital games for empowerment and inclusion: A review of the literature and empirical cases. *J.* doi:10.2791/36295

Coelho, E. (1988). *Cooperative group learning: A theoretical and Practical Overview.* Colloquium presentation at TESOL, Chicago

De la Hera Conde-Pumpido, T., & Paz Aléncar, A. (2015). Collaborative digital games as mediation tool to foster intercultural integration in primary Dutch schools. *E-Learning Papers, 43,* 13–23.

Devecioğlu, S., Amara, M., Aquilina, D., Argent, E., Betzer-Tayar, M., Green, M., … Taylor, J. (2005). The roles of sport and education in the social inclusion of Asylum seekers and refugees: An evaluation of policy and practice in the UK. Retrieved from https://www.sportanddev.org/en/article/publication/roles-sport-and-education-social-inclusion-asylum-seekers-and-refugees

Eurostat. (2017). *Asylum quarterly report Main statistical findings Main trends in the numbers of.* Retrieved from http://ec.europa.eu/eurostat/statisticsexplained/

Edwards, A. (2017). Forced displacement worldwide at its highest in decades. Retrieved December 15, 2017, from http://www.unhcr.org/afr/news/stories/2017/6/5941561f4/forced-displacement-worldwide-its-highest-decades.html

Fogg, B.J. (2003). *Persuasive Technology, Using Computers to Change What We Think and Do.* San Francisco: Morgan Kaufmann Publishers.

Haché, A., & Cullen, J. (2010). *ICT and youth at risk: How ICT-driven initiatives can contribute to their socio- economic inclusion and how to measure it.* Sevilla, Spain. Retrieved from http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/14508/1/jrc58427.pdf

Johnson, RT and Johnson, DW. (1988). Cooperative learning: two heads learn better than one. Transforming Education: In Context; 18:34. Available from: http://www.context.org/ICLIB/IC18/Johnson.htm.

Johnson, D. W., and Johnson, R. (1989). Cooperation and competition: Theory and research. Edina, MN: Interaction Book Company.

Johnson, D., Johnson, R., & Smith, K. (1998). Cooperative learning returns to college. *Change, 30*(4), 26–35. doi:10.1080/00091389809602629

Johnson, D. W., & Johnson, R. T. (1994a). *Learning together and alone.* (4th ed.). Boston, MA: Allyn and Bacon.

Johnson, R. T., & Johnson, D. W. (1994b). An overview of cooperative learning. *Creativity and Collaborative Learning: A Practical Guide to Empowering Students and Teachers,* 31–44. doi:10.1007/BF00962280

Johnson, D.W. and Johnson, R. (2002). Learning Together and Alone: An Overview. In S. Sharan (Guest Editor), Cooperative Learning. Asia Pacific Journal of Education, 22 (1), 95–105.

Kayali, F., Schwarz, V., & Götzenbrucker, G. (2011). Serious beats: Transdisciplinary research methodologies for designing and evaluating a socially integrative serious music-based online game. In *Proceedings of DiGRA 2011 Conference: Think Design Play* (pp. 1–19). Retrieved from http://www.digra.org/wp-content/uploads/digital-library/11313.13454.pdf

Loos, E. (2017). *Exergaming: Meaningful play for older adults?* (pp. 254–265). Springer: Cham. doi:10.1007/978-3-319-58536-9_21

Memarzia, M., & Star, K. (2011). Choices and voices - A serious game for preventing violent extremism. In *Intelligence management: Knowledge driven frameworks for combating terrorism and organized crime* (pp. 133–142). Retrieved from http://playgen.com/wp-content/uploads/images/cv/choices_and_voice_book_contribution.pdf

Phillips, J. L. (2012). *Preparing teachers and developing school leaders for the 21st century* (Vol. 17). OECD Publishing. doi:10.1787/9789264174559-en

Pettigrew, T. F., & Tropp, L. R. (2008). How does intergroup contact reduce prejudice? Meta-analytic tests of three mediatorsy. *European Journal of Social Psychology.* http://doi.org/10.1002/ejsp.504

Severiens, S., Wolff, R., & van Herpen, S. (2014). Teaching for diversity: A literature overview and an analysis of the curriculum of a teacher training college. *European Journal of Teacher Education*, *37*(3), 295–311. doi:10.1080/02619768.2013.845166

Staiano, A. E., & Calvert, S. L. (2011). Exergames for physical education courses: Physical, social, and cognitive benefits. *Child Development Perspectives*, *5*(2), 93–98. doi:10.1111/j.1750-8606.2011.00162.x

Strang, A., & Ager, A. (2010). Refugee integration: Emerging trends and remaining agendas. *Journal of Refugee Studies*. http://doi.org/10.1093/jrs/feq046

Tielman, K., Den Brok, P., Bolhuis, S., & Vallejo, B. (2012). Collaborative learning in multicultural classrooms: A case study of Dutch senior secondary vocational education. *Journal of Vocational Education & Training*, *64*(1), 103–118. doi:10.1080/13636820.2011.622448

Usart, M., Romero, M, Almirall, E. (2011). Impact of the Feeling of Knowledge Explicitness in the Learner' Participation and Performance in a Collaborative Digital Game Based Learning Activity. In: M. Ma. M. Fradinho Oliveira, J. Madeiras Pereira (Eds.): SGA 2011, pp. 23-35. Berlin: Springer-Verlag

Yang, S. (2010). Defining exergames & exergaming. *Proceedings of Meaningful Play, 2010*. doi:10.1017/CBO9781107415324.004

Zagal, J. P., Rick, J., & Hsi, I. (2006). Collaborative games: Lessons learned from board games. *Simulation & Gaming*, *37*, 24–40. doi:10.1177/1046878105282279

Zea, N. P., Sánchez, J. L. G., Gutiérrez, F. L., Cabrera, M. J., & Paderewski, P. (2009). Design of educational multiplayer videogames: A vision from collaborative learning. *Advances in Engineering Software*, *40*(12), 1251–1260. doi:10.1016/j.advengsoft.2009.01.023

Annex 1.

Observation scheme [translation of the Dutch original]
Name of observer:
Date:

Pair: Child No… (Dutch) and Child No… (foreign)
[number is stated on the child's wristband]:

START

1. Note how they determine who goes first when playing the game:
2. How do they greet each other?

DURING THE GAME

Understanding of the game
3. Do they understand how the game should be played?
4. Do they understand what moves they need to make?
5. Do they understand how to go faster and how to avoid obstacles?
6. Do they use the feedback given by the game (points, scores, falling in an ice hole)?

Contact
7. How do they make contact with one another?
8. In what language? Body language? Do they interact physically?
9. Do they give each other directions? Who to whom?
10. In what language? Body language? Do they interact physically?
11. Is there anything else noticeable in their body language?
12. Do they look at one another? If so, how often?
13. Or do they look mainly at the screen?
14. Do they shout out? If so, when?
15. Are they silent? If so, when?
16. Do they laugh? If so, when? Do they look at one another at those times?

TOWARDS THE END
17. Do you observe any changes in the way they interact as time passes?
18. To what extent was there something different at the end of play compared to the start?
19. How do they say goodbye? Do they look at one another at that moment?
20. Any other comments:

Annex 2. Interview [translation of the Dutch original]
Interviewer's name:
Child No. [number is stated on the child's wristband]:
Name of child:
Girl/Boy
Age:
Country:
Date:

1. Did you like playing the game? [Have the child circle a smiley face]

Why? [Probe for details about what was/wasn't fun]

2. Did you think the game was easy to play? [Have the child circle a smiley face]

Why? [Probe for details about what was/wasn't easy]

3. What were you good at when you were playing?

4. What was the other child good at when you were playing?

5. Did you like playing the game together with the other child? [Have the child circle a smiley face]

cogent ·· education

Dimension	Questions associated with this dimension	How to code depending on the observations
D1 Positive interdependence	O.17. Do you observe any changes in the way they interact as time passes?	D1 is positive if there is any sign of a change in attitude from competitive to collaborative, from neutral to positive or from negative to positive
	O.1. Note how they decide who is allowed first to stand in the front when playing the game: O.2. How do they greet one another? O. 18. Is there anything different at the end of play than at the beginning? O.19. How do they say goodbye? Do they look at one another at that moment? O.9. Do they give each other directions? Who to whom?	D1 is positive if there is any sign of a change in attitude from competitive to collaborative, from neutral to positive or from negative to positive
	I.5. Did you like playing the game with the other child?	D1 is positive if the find any type of value in playing with a partner (green faces)
	I. 9. If you were to be able to play the game again, with whom would you play it? I.10. Would you have rather played the game alone?	D1 is positive if they would like to play with their mate again
D2 Individual accountability	I.4. What was the other child good at in the game?	D2 is positive if they are able to recognize a good quality in their partner
	I.6. Did you help the other child during the game?	D2 is positive if they are able to recognize a way in which they have helped their partner during the game
	I.7. Did the other child help you during the game? Overall, questions from the OB Scheme were not directly related to this dimension.	D2 is positive if they are able to recognize a way in which their partner have helped them during the game the game

(Continued)

(Continued)

Dimension	Questions associated with this dimension	How to code depending on the observations
D3 Face-to-face promotive interaction	O.7. How do they make contact with one another during play?	D3 is positive if they make any kind of contact, if they communicate in any way
	O.9. Do they give each other directions? Who to whom? What about O10? V8b could be linked to this dimension, maybe?	D3 is positive if they make any kind of contact, if they give any kind of directions to each other.
	O.11. Is there anything else noticeable in their body language?	D3 is positive if they make any kind of physical contact to try to communicate to each other
	O.12. Do they look at each other? If so, how often? O.13. Or do they look mainly at the screen?	D3 is positive if they make any kind of eye contact
D4 Social skills	O.7. How do they make contact with one another during play?	D4 is positive if one of the two seems to lead the game session while the other obeys orders
	O.8. In what language? Body language? Do they grab hold of each other?	D4 is positive if one guides the other one by moving his body
	O.9. Do they give each other directions? Who to whom?	D4 is positive if one of the two seems to lead the game session while the other obeys orders
	O.14. Do they shout out? If so, when? O.14. Do they shout out? If so, when? O.15. Are they silent? If so, when? O.16. Do they laugh? If so, when? Do they look at one another at those times?	D4 is positive if they treat each other with respect.
	I8a. How did you like playing the game with a child who didn't speak the same language as you?	D4 is positive if they do not express that the language barrier was a problem (yellow and green faces)
D5 Group processing	Refers to all questions in the "Interview"	D7 is positive if their answers indicate that they recognize any value in playing with their partner

(Continued)

(Continued)

Dimension	Questions associated with this dimension	How to code depending on the observations
D6 Language Barrier	O.3. Do they understand how the game should be played?	D6 is positive if no support of a third party is required to communicate with one another during play
	O.4. Do they understand what moves they need to make?	D6 is positive if no support of a third party is required to communicate with one another during play on how to move
	O.5. Do they understand how to go faster and how to avoid obstacles? Is it about understanding how the game works or communication between the players? In my view, the former does not necessarily relate to positive interactions/communication.	D6 is positive if no support of a third party is required to communicate with one another during play to understand how to do so.
	O.8. In what language? Body language? Do they interact physically?	D6 is positive if they use any form of non-verbal communication
	O.10. In what language? Body language? Do they interact physically?	D6 is positive if they use any form of non-verbal communication
	O.11. Is there anything else noticeable in their body language?	D6 is positive if they make any kind of physical contact to try to communicate to each other
	I.8b. How did you make it clear to the other child that you wanted to do something you needed him or her for?	
D7 Lack of teachers' training	O.3. Do they understand how the game should be played?	D8 is positive if they do not need extra help during play to understand how to collaborate to play the game
	O.4. Do they understand what moves they need to make?	D8 is positive if they do not need extra help during the game to understand how to move
	O.5. Do they understand how to go faster and how to avoid obstacles?	D8 is positive if they do not need extra help during the game to understand how to do so
D8 Formation of pseudo- groups	O.17: Do you observe any changes in the way they interact as time passes?	D7 is positive if there is a change from an individual to a collaborative form of play
	O.7. How do they make contact with one another during play?	D7 is positive if they clearly make contact and seem to be playing "TOGETHER"
	O.9. Do they give each other directions? Who to whom?	D7 is positive is they give any type of indications to each other

Why? [Probe for details about what was fun or less fun about playing together.]

6. Did you help the other child during the game?
[With what? Did you like it or not like it when that happened?]

7. Did the other child help you during the game?
[With what? Did you like it or not like it when that happened?]

8a. How did you like playing the game with a child who didn't speak the same language as you?
[Have the child circle a smiley face]

[Probe: Did this make it harder or more fun to play, or did it make no difference?]

8b. How did you make it clear to the other child that you wanted to do something you needed him or her for?
[Probe: How was it for you to do that? Hard, easy, fun, stupid, tricky?]

9. If you were to be able to play the game again, with whom would you play it?
[Probe: With the same child or with someone else. Why?]

10. Would you have rather played the game alone?
[Why/why not?]

11. Was playing the game more fun than skating on real ice? [Why/why not]?
12. What is your most important tip for other children to play the game as well as possible?
13. Is there anything else you would like to say about playing the game?

Annex 3. Guidelines for coding results of playing sessions
Child No.:
Name of child:
Girl/Boy
Age: ..
Country:

The observations of the playing sessions can be coded in the following way (O.: Questions coming from the "Observation scheme",
I.: Questions coming from the "Interview")

Cogent Education (ISSN: 2331-186X) is published by Cogent OA, part of Taylor & Francis Group.

Publishing with Cogent OA ensures:

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

Submit your manuscript to a Cogent OA journal at www.CogentOA.com