University of Twente

BMS Faculty

Bachelor Thesis on the Topic:

The effect of a serious game on teachers' awareness and attitude about giftedness

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Abstract

Teachers often have limited knowledge of giftedness. This leads to low awareness of the problems of gifted children in the educational setting and may also lead to negative attitudes of the teachers towards these children. This results in poor teaching methods that harm the development of gifted children and also can cause psychological problems. In the context of this study, a pre- and posttest design was used to test whether a serious game was able to improve awareness and attitude in the 11 participants who consisted of teacher trainees, pre- and in-service teachers. Results showed that the serious game was not entirely able to change awareness and attitude. However, the study has shown how beneficial teachers thought the game could be to reflect on own beliefs and skills and that the game was inducing the wish to be more professional. Future research should investigate whether the wish for professionalization would indeed be implemented by those who made this wish.

Introduction

Since the nineties awareness and knowledge about gifted children has been increased in the Netherlands. More and more studies deal with topics like how gifted children learn and which character trades they have. Also, with and through this growth in research over the years the definition of giftedness changed. In early stages of research purely a high IQ was perceived as giftedness. Later, Gagné (2000) defined giftedness as "[…] the possession and use of untrained and spontaneously expressed superior natural abilities (called aptitudes or gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of his or her age peers" (p.1). The author also made a very clear distinction between giftedness and talents. Talents can better be described as learned skills and giftedness as intellectual, creative, socioaffective or sensorimotor abilities which are not learned but more of natural origin (Gagné, 2000). According to other professionals and researchers as well, it is not only the IQ to determine giftedness. Internal and external factors play an important role in gifted children as well (Mooij, 2013). Mönks for example states with his 'triadisch interdepentiemodel' that high IQ, motivation

and creativity are not enough to let one's abilities flourish and develop to its fullest. School, family and friends are also important to develop these abilities (Heller, Mönks, Subotnik & Sternberg, 2000). It is also mentioned that family and friends help children to develop through stimulation and inspiration and so should school.

Giftedness is multifaceted. It is difficult to get a clear picture of what giftedness is exactly. There is not one clear definition that would be applicable for every gifted person, there are many definitions and views about giftedness. That is because gifted children are not a homogeneous group. Da Costa and Lubart (2016) described it as followed: "If we want to know and to understand the gifted [...], we must focus on the inter-individual and intra-individual differences that characterize them" (p.670). Not only Da Costa and Lubart (2016) tried to identify profiles, also a lot of other researchers tried to categorize or describe different types of gifted children. So did Betts and Neihart (1988). Till today, they identified the most well-known six types of gifted individuals which will also be the major categories used in this study: "The successful" is the most common type of gifted individuals. They understand the system at an early stage and adapt it very easily. This type tries to be approved and admired by teachers, parents and other adults which makes it very dependent. They get bored quiet easily and lack creativity and autonomy. The second type "the challenging" is highly creative. They can be perceived as rebellious. The school system is hard for them and therefore, they are often not included in social groups. This damages their self-esteem. The third type "the underground" feels ashamed for their giftedness and often tries to hide its abilities. This type can only be identifies during middle school when social needs begin to be more important. Others tend to push type three individuals too much. The fourth type "the dropouts" is depressed and angry over a long period of time. They failed to fit in anywhere because their abilities lay outside the school area.

They can react aggressively or defensively to other people. Often therapy or even psychological testing is needed to help these individuals back on track because of their long damaging period of frustration during school time. The fifth type "the double-labelled" is handicapped in either physical or psychological way and never perfectly fits in any program because most of the time one of its needs is not addressed. They can be depressed by their own failure and are very sensitive to criticism. Type five is in particularly high risk of not being recognized as gifted. The last type "the autonomous learner" is rare. This type does not work for school or appreciation, they learn for own interest and have strong self-concepts. They are high in self-acceptance and are in general very independent (Betts & Neihart, 2010).

Regardless this growth in knowledge and research about giftedness, especially in primary education, there are still a lot of grievances when it comes to gifted students. Teachers often inhibit the development and full potential of their gifted students. But how do they do that and why? Literature research showed that two factors are mainly responsible for such a negative teacher influence on the gifted children.

Firstly, the missing understanding of teachers represents one threat to the development of gifted children. Teachers lack awareness for giftedness in general and for their affected students. Ngara and Mahdi (2015) characterized teachers as struggling when it comes to understanding giftedness. They have gaps in gifted education, or even more basic, teachers just fail to identify gifted children. Teachers simply do not know current theory about giftedness and a lot of them never practiced teaching gifted students. Furthermore, teachers reported that extra tasks or skipping a class were the only methods they know to stimulate or foster gifted students. In their study Bermann, Schultz and Weber (2012) conducted questionnaires with preservice teachers about their existing beliefs regarding giftedness. It turned out that a lot of the participants never

thought about what gifted students need or that it was their own responsibility to include the gifted learners in an appropriate class.

Secondly, teachers' negative attitudes about gifted children represent another threat to the development of the children. As mentioned before, it is important that teachers have a good understanding of giftedness because they are a key participant in the development of their gifted students. Teachers influence their students everyday through their behavior. Their behavior towards the gifted children is extremely shaped by their hold attitudes (Perkovic & Boric, 2015). The attitude of teachers towards their gifted students is important to ensure a good teaching-learning process (Troxclair, 2013). Positive attitudes on the side of the teachers ensure a positive and supporting learning environment for the gifted students, whereas negative attitudes produce a negative environment in the classroom and also negative attitudes of the classmates (Perkovic & Boric, 2015). Furthermore, negative attitudes prevent the supply with gifted education. Teachers with strongly negative attitudes towards their gifted students are not willing to offer them differentiated teaching. By this, the professional development of those students is threatened (Geake & Gross, 2008). Some teachers even have prejudices and extreme stereotypes of gifted children.

The question why teachers have so little awareness and sometimes negative attitudes about giftedness is already answered by the literature. Teacher training in general spends no time and attention to the education of gifted children. A study with preservice teachers showed that the teacher education did not train awareness of gifted children and that preservice teachers were not aware of the fact that gifted children have special needs in the educational setting (Bermann, Schultz & Weber, 2012). For this reason, they have no theoretical and professional knowledge about giftedness. They have and will have only amateurish knowledge. Their amateurish

knowledge will build up a negative attitude which is also reflected by the society that for example gifted children are intelligent exceptions with social problems.

A finding by Lassig (2009) concludes the problem very precisely. He stated that too little knowledge and understanding of gifted children and their education can cause false beliefs and negative attitudes. So, it can be assumed that more awareness and a shift in the attitude of teachers could help them to get better in the handling of gifted children. Once more, a better way of handling helps gifted children to flourish and not just serve their school years (Mönks, no date). This is of interest of the gifted children, their environment and also society. Gifted children who are fostered in the best possible way are of great social value. Otherwise, mistakes in the handling of gifted children in the educational setting can lead to motivational problems like described in the six types of giftedness, poor school performances and in extreme cases also to psychological problems (Betts & Neihart, 2010).

There are several methods to increase teachers' awareness. Most of them include teacher training like done by Hanninen (1988). These studies and teacher trainings are aimed to inform teachers more about the needs of gifted students and which teaching methods are fitting to the needs. At first, the most important question should be: How can teachers be sensitized to the topic of giftedness and not just informed? Should teachers spend more time on building up a correct picture of giftedness? How could it be made sure that teachers dedicate more attention to the two important factors of awareness and attitude rather than on pure knowledge? However most of those studies using teacher training can show positive results like Lassig (2009), other researchers report that the pure scientific knowledge about a topic is not enough to produce a change in the attitude of people (Brossard, Lewenstein & Bonney, 2005).

Persuasive technology is a powerful opportunity that creates and allows such change of

attitudes within people. Persuasive technology can be defined as “any computing system designed to change people’s attitudes or behaviors” (Fogg, 2002, p.29). It is a technological solution to a lot of societal problems which could be of political, social or educational nature. Persuasive technology could be for example a website on the Internet that promotes the responsible handling of alcohol or an application on smartphones that helps to manage diabetes and its treatment. Besides to those applications, there is persuasive teachnology in form of video games that help users to learn new things. For example, video games help children to learn to read more fluently or to learn vocabulary. The reinforcing properties of a game create a strong learning experience (Fogg, 2002). In those video games persuasion does not play such an important role, it is more about the learning process and learning materials. Nevertheless, there are video games in which persuasion plays an important role. Those games deal with topics like economics, business or politics. This subdomain of video games is known as serious games (Bogost, 2007). Games in general and especially serious games have a strong persuasive power. Serious games shall support existing positions that are important in terms of social or cultural problems. Furthermore, serious games are not only a tool for institutional goals, they can also “disrupt and change fundamental attitudes and beliefs about the world, leading to potentially significant long-term social change” (Bogost, 2007, p.9). Serious games are able to help consumers to reflect on business, social and moral principles.

The ability of games to cause attitudinal changes was investigated more closely by Williams and Williams (2007). A series of own studies resulted in the development of a theory of simulation game design. Goal of this theory is to explain which factors lead to a revision in attitude. The researchers, who are mostly dealing with simulation games, came to the conclusion that a Multiple Identification Theory (MIT) was the most suitable theory to predict and influence

attitudinal changes. The MIT states the fact that games are able to change attitude when the game offers three different possibilities of identification to the player: affective, cognitive and behavioral identification. Affective identification is possible when players of a game are emotionally involved with the results of it and can relate to the character or group they portray. Cognitive identification will take place if players of a game can see the validity and realness of the game for their own life. Behavioral identification is possible under the condition that players feel autonomous in their actions. Personal exploration and commitment in the game are important factors for this. Williams and Williams (2007) do no only state and explain their theory but also give evidence for its correctness. Based on the MIT a simulation game for "cooperation versus competition"- attitude was designed. After playing the game, all participants had a significant change in their attitude towards cooperation.

As a basis of this study, a serious game was designed to help teachers create this improvement in their awareness and attitude. The game called "De Meester De Baas" is a three-level interactive online game. Teachers dive into a virtual world in which they are working at a school with many gifted children. First, they have to detect the different characteristics of gifted children. Second, they should get to know different sources of information when it comes to gifted students. Third, they experience how to possibly react to the different behaviors of gifted children. The characteristics of the children in this game are oriented at the "profiles of the gifted and talented" by Betts and Neihart (2010). The game will be described in detail under 'materials'.

This study will take a closer look on how a serious game about giftedness can influence the awareness and attitude of teachers in a positive way by playing the game and reflecting on the set stimuli. The research question is therefore: *"What is the effect of a serious game on*

teachers' awareness and attitude towards gifted children?" It is expected that a serious game can influence awareness and attitude of teachers in a positive way because the serious game is a powerful tool to change the attitude of users. Teachers playing the game portray basically themselves and encounter children with different trades of giftedness. According to the MIT, these "true to life" features of the game "De Meester De Baas" ensure an attitudinal change. Furthermore, the serious game is not only able to change attitudes but also start a thinking process about giftedness and stimulate reflections on own beliefs. This will inevitably also bring up more awareness for giftedness.

Methods

Design

A single group with pre- and posttest within subjects design was employed. There was one independent variable (confrontation with giftedness through playing the game). The dependent variables were the change in awareness and attitude.

Participants

Participants were selected through convenience sampling in 2018. To take part in this study, participants had to be working elementary school teachers. They were approached by the researcher through mail and telephone. In total, (n=11) participants volunteered their time for the study (10 women, 1 man, M_{age} = 31.45 years, SD = 11.70). Participants were 36.4% (4) Dutch, 54.5% (6) German and 9.1% (1) others. All participants gave their consent prior to the study. The average participant approximately taught 5.90 years (SD=7.53) as a primary teacher before and 63% encountered gifted students during that time. On average the participants dealt with 6.25 (SD=1.89) gifted children in their job as a teacher, from which a quarter was diagnosed as gifted.

Materials

Serious game. The serious game "De Meester De Baas" was the essential material and focus of this study. Purpose of the game is to give teachers the possibility to confront their own images of giftedness, think about those and reflect on them. In this game, there are no right or wrong answers. Teachers are asked to deal with the topic of giftedness in detail by playing the serious game. Long-term goals of the serious game are an increase in awareness for giftedness and a

positive change in possible negative hold attitudes. “De Meester De Baas” is a three level online game designed for a single-player.

The game began with a start-up screen that explained that players of the game were going to research their own image, attitude and actions with respect to gifted students. A fictitious colleague introduced the participant to the game by stating that the participant had his/ her first day at the school and wanted to get to know the students very well in order to offer them the best possible guidance. In level 1, participants had to look for characteristics and traits of gifted children. Instructions for this level were given through the game itself. Participants were asked to think about characteristics that fit into their image of giftedness. Afterwards, participants saw a model of a school with a lot of students in it, each with its own characteristic of giftedness. The participants had to select the six most matching students according to their image of giftedness. In total, the game can offer 35 different characteristics from 5 domains (independency, motivation, ability to learn, social emotional competence, self-image). As can be seen in Figure 1, by clicking on a student, a small screen popped up with a feature of giftedness like “Milan performs well at school, he often comes home with a good grade on a test or paper.”. The participant than had to decide whether “performs well” suites his or her image of giftedness. This selection of characteristics went on until the participant sorted out the six most matching ones. All selected characteristics were saved in the little backpack in left lower corner. At the end of level 1, before entering level 2, the self-gathered results were displayed to the participants.

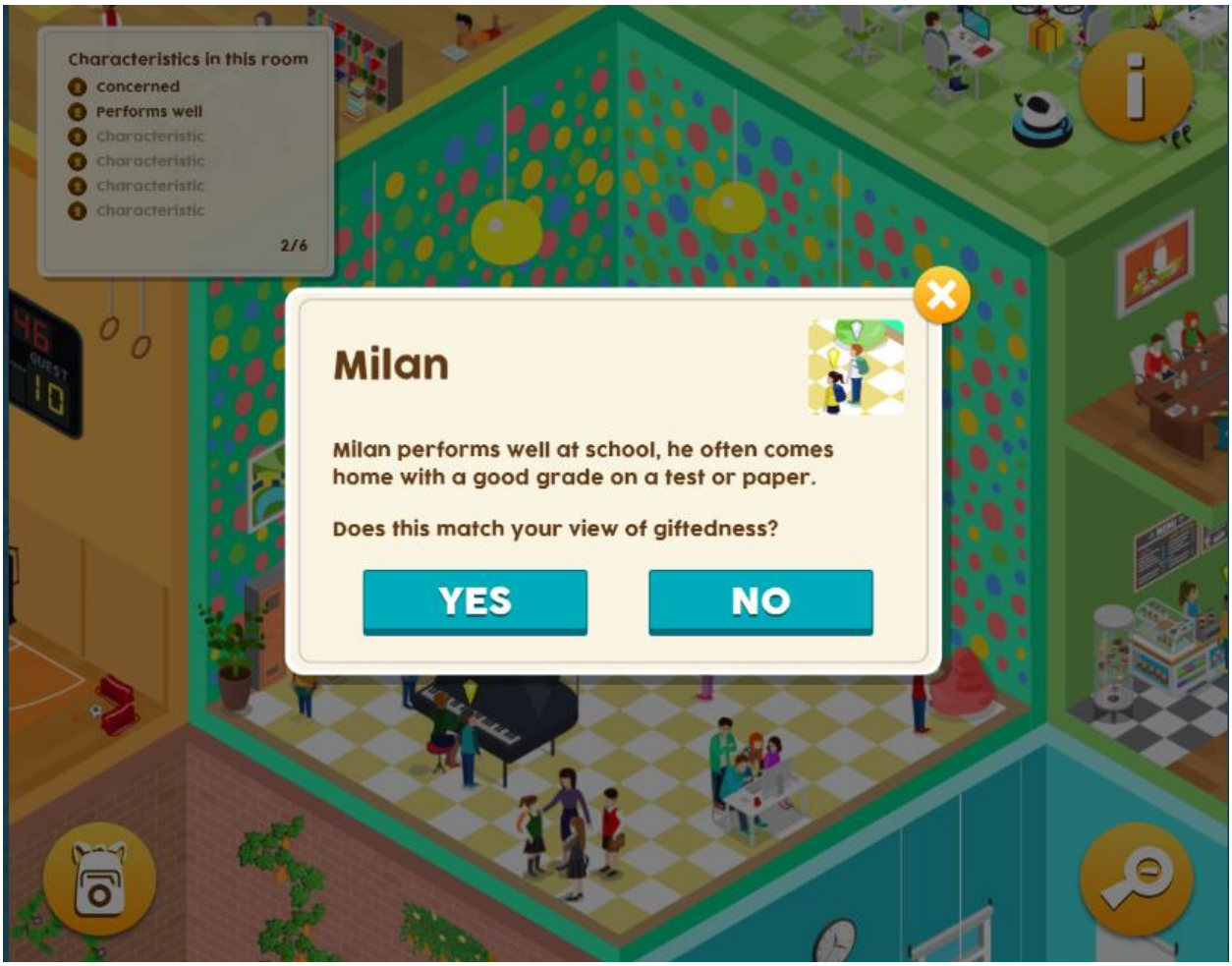

Figure 1. Screenshot of the game "De Meester De Baas" from level 1.

In level 2 participants had a more detailed look at one of the students. The fictitious colleague told that there was a walk-in day for parents and that this would be a good opportunity to get to know the student better by consulting different sources. For level 2, the game includes 6 different students, each based on one type of Bett's and Neihart's profiles (2010). Participants in this study met Lars, a fictitious student who was designed based on 'The Underground'. The student can be described as follows: *Lars is a hiding student. Parents and teacher each seem to experience a different child. The teacher sees a modal student, sometimes even on the weak side. The parents often experience their child as inquisitive and curious. This student succeeds in*

staying under the radar for a long time because it adapts extremely to its surroundings. The only goal this student has is 'not to be noticed'. Often this child does not have his own opinion, goal or vision that he comes up with. You also notice this in his friendship relationships. He jumps from one group to another. This description was not given within the game at any moment. The information about Lars had to be found out by interacting with persons in the game. Participants were asked to collect more information about that student by consulting different sources of information. Therefore, two interesting phrases about the student had to be stored in the logbook by marking parts of the statements of e.g. teacher, parents, fellow students or Lars.

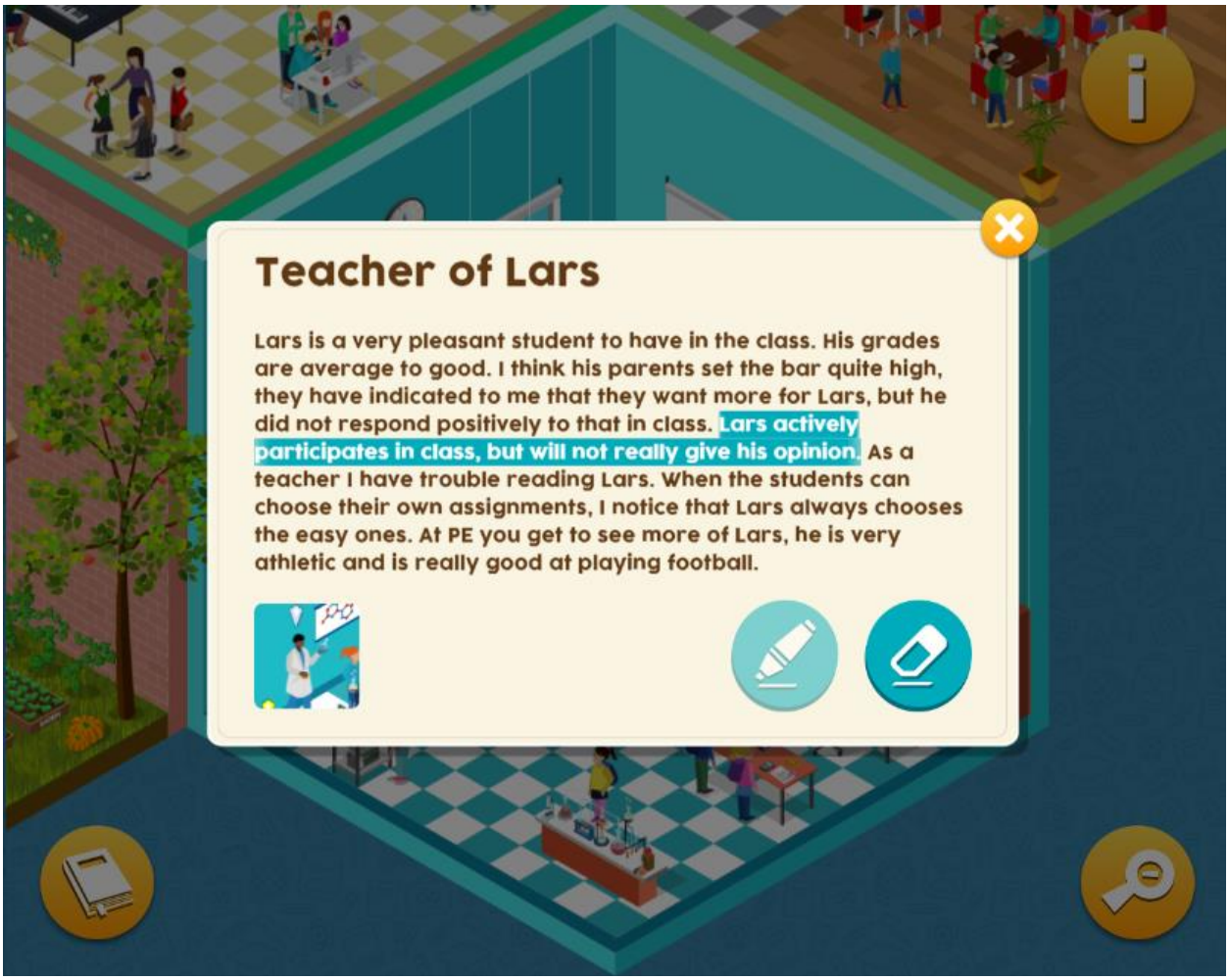

Figure 2. Screenshot of the game “De Meester De Baas” from level 2.

In level 3 participants had to interact with four of the students in different situations in order to see how the own actions can lead the course and influence the student. One student for example was dreaming in class while the teacher was giving instructions. Participants then had to decide between three options, as can be seen in Figure 3. The possible reactions can be described as activating, ignoring or reacting to the child. Participants got feedback on their decisions by the facial expressions of the children. At the end of the game participants received their results on screen. Results, in this case, were the summary of all given answers of the game without any comments or additional feedback.

Figure 3. Screenshot of the game "De Meester De Baas" from level 3.

Questionnaires. The questionnaires used in this study were aimed to measure the two constructs awareness and attitude. Both constructs were measured in a pre- and a posttest. In the first part of the pretest, some demographic questions and questions about previous experiences with gifted children were asked. The questionnaires were available in English and Dutch for the participants and were distributed in the preferred language of each participant.

Awareness. In order to test the awareness of the participants, three open questions which were related to the three levels of the game were asked. Participants had to write about the characteristics of gifted children, which sources of information they would consider to get more insight in possibly gifted children and which strategies they had to handle gifted children. The following three questions were asked: (a) Based on which characteristics do you recognize a gifted student?; (b) What sources of information do you approach when you think that a student is gifted?; (c) What approaches do you have to deal with gifted students?. The answers which were given during the pretest to the three open questions were presented again to the participants in the posttest. Participants were asked to adjust answers if needed.

Attitude. Statements based on Gagné and Nadeau's questionnaire "Opinions about the gifted and talented and their education" (1994) were used to indicate the attitudes of teachers towards giftedness, gifted students and gifted education. The original instrument consisted of 34 items, 29 of those 34 were used in this study. Five items were excluded in this questionnaire since they only asked about what skipping a class would mean to the student and its environment. This was not relevant for the two constructs. All items were translated by a native speaker from English into Dutch language for the Dutch questionnaire to achieve as authentic results as possible. Furthermore, six new subscales were made: (a) Current state of being (Do teachers think that schools are already doing sufficient for highly gifted children at this

moment?) with 4 items; (b) Special services (Do teachers think that gifted children should receive extra support?) with 6 items; (c) Grouping (Do teachers think that gifted children should be placed in separate classes?) with 5 items; (d) Elitism (Do teachers think that separate treatment of gifted children leads to elite formation?) with 4 items; (e) Social consequences (Do teachers think that gifted children experience/ create difficulties in the social area?) with 3 items; (f) Value for society (Do teachers think that gifted people are important to society and that for this reason attention should be paid to their talent development?) with 7 items. The items were answered with a 5-point Likert-scale varying from "totally disagree" to "totally agree".

Evaluation. At the end of the posttest, four open questions for evaluation purposes were asked. Participants should describe what they thought about a possible change in their image of giftedness, their way of thinking about giftedness, their skills regarding giftedness and their wish to further professionalize on this domain: ((a) Did the game let you think about your own image, the way you look at giftedness); (b) Has the game allowed you to think about your own opinion with regard to giftedness?; (c) Has the game allowed you to think about your own skills in dealing with gifted students?; (d) Would you like to further professionalize in the field of giftedness?).

Procedure

Participants were informed that they were to be given two questionnaires, each containing open and closed questions and that they would play a serious game about giftedness. Each questionnaire took 20-30 minutes to fill it in and playing the game another 20 minutes. They were told that in the questionnaires they had to answer each closed question by clicking the relevant box and each open question by writing an answer as detailed as possible. Participants got instructions on how to play the game. For the first session, participants got the first

questionnaire and the link for the game at any time during the data collection. They were asked to fill in the questionnaire first and to play the game without a time span longer than a day afterwards. All participants had to use a working Internet connection to play the game.
It was then expected, that participants send back the filled in questionnaire to the researcher, so that the given answers from the pretest can be pasted into the posttest. For the second session of the study, the second questionnaire was given to them one week later. Participants were informed that they could have a look at the results of the study when finished.

Data Analysis

Awareness. To score the three open questions about awareness from the questionnaire, a coding scheme was used to produce quantitative data for further analysis. On the basis of the retrieved data, it became clear that next to the original codes a code for answers outside the frame were needed. This code was in all three questions described as code "others" and would not be paid attention to during the quantitative analysis. The code "others" would be discussed in words not in numbers.

For the first open question about the characteristics of gifted children (a), participants got one point for every characteristic based on the "Revised profiles of the gifted and talented" by Betts and Neihart (2010) implemented in the game. The overall codes were "self-image", "task orientation/ motivation", "learning ability", "independency" and "social emotional competence". Also, it was possible to code given answers under the code "others". When a participant wrote for example that gifted children are more mature than other children the same age, the participant would have gotten one point for the code "social emotional competence". For the second open question (b), any answer that mentioned a source that is informative for determining whether a child is indeed gifted or not and was implemented in the game, was coded as one point. The

categories were “child”, “teachers”, “parents”, “peers” and “grades”. Answers like asking friends of a child to see how it behaves in social relationships would have been accounted as one point under the code “peers”. Also, it was possible to code given answers under the code “others”. For the third question about approaches used to handle gifted children (c), participants could earn one point for each answer that could have been found back in the game. The codes were “activating”, “responding” and “ignoring”. Answers containing for example a motivation for a child to do more difficult tasks would have been accounted as one point under the code of “activating”. It was also possible to code given answers under the code “others”. The same assessment was used for pre- and posttest and the results were compared. To test the reliability of the coding scheme and the retrieved data, the interrater reliability was calculated. The interrater reliability showed off high with a Cronbach’s Alpha of .93.

Attitude. A quantitative analysis with SPSS was carried out to score the 5-point Likert-scale items about attitude. Negatively formulated items were rescaled, so that given answers with a highly negative attitude got lower scores and answers given with a highly positive attitude got higher scores. In total, participants could get a minimum score of 29 and a maximum score of 145. Means of the total score in both tests were compared in order to determine the differences in attitude between pre- and posttest. A within subjects dependent samples t-test with significance level $p < .05$ was used. Reliability analysis revealed a Cronbach’s Alpha of .68 and a Spearman-Brown-Coefficient of .66 for the items of the pretest and a Cronbach’s Alpha of .59 for the posttest. The reliability concerning Cronbach’s Alpha (.70) gets the highest in the pretest when deleting item 2 but deleting items in general had no big impact on the reliability.

Evaluation. The open questions at the end of the second questionnaire will not be coded or analyzed in detail. The questions are meant to give additional information about the

judgement of the participants with regard to the game. Answers which are vicarious or outstanding should be cited or discussed. An overview of the answers will be given in the results and they will be discussed in more detail in the discussion and conclusion section of the report.

Results

Awareness. From the data that was coded with the help of the regular codes, a SPSS data set was made. First of all, it should be said that only 36% (4) of the participants made any changes with regard to their awareness. The other 64% (7) made no changes to their answers in the posttest at all. A dependent samples t-test revealed that there was no significant difference between pre- and posttest mean scores in the awareness of the participants which can be seen in Table 2. None of the three questions about characteristics (a) (t =-1.24, d.f. = 10; p = .24), sources of information (b) (t =-1.00, d.f. = 10; p .34) or approaches for the handling (c) (t =-2.06, d.f. = 10; p = .07) showed significant changes with regard to the awareness of the participants. Nevertheless, it should be mentioned that none of the p values was extremely high. The p value judging about the significance of the change in awareness regarding open question three (c) was only minimally over the limit (p = .07).

Answers coded as “others” could not be statistically analyzed and revealed other aspects regarding the awareness of teachers about giftedness. At question (a), only one outstanding code had to be marked as “others”. One participant wrote that a high IQ would be a characteristic for gifted children. This answer is not fundamentally wrong but it is not a criterion that could have been coded as “learning ability” or any other code. At question (b), participants thought about

external sources next to the ones given in the game. Participants would approach for example intelligence tests, other professionals or would search for additional information on the Internet. Nearly every teacher that was still in teacher training would approach either their University or mentors when they suspect a child to be gifted. At question (c), participants reported that they would try to build a personal bond with that child in question, that they would show great interest for that child or that they would consult theory how to handle the child. Another participant would try to arrange regular meetings with child and parents to evaluate the progress.

Table 2

Points for the coded results of the open questions concerning the awareness of the participants.

Question	Pre-measurement M (SD)	Post-measurement M (SD)
Characteristics	3.36 (1.63)	3.81 (2.23)
Sources of information	1.18 (1.78)	1.36 (1.96)
Approaches for the handling	2.00 (1.55)	2.64 (1.63)

Attitude. Inferential statistics showed no significant change in the attitude of the participants through playing the game was found. A dependent samples t-test revealed that there was no significant difference between pre- and posttest mean scores of all items in the attitude of the participants [t =-.46, d.f. = 10; p > .05]. Only a slight change in the scores between pre- and posttest (M = -.03) was reached, whereby the correlation was high (r = .83). For subscale (a)-(f), there were no significant changes in attitude found: subscale (a) (t =.00, d.f. = 10; p > .05), subscale (b) (t -.41, d.f. = 10; p > .05), subscale (c) (t =.56, d.f. = 10; p > .05), subscale (d) (t =-

1.00, d.f. = 10; $p > .05$), subscale (e) (t =-1.00, d.f. = 10; $p > .05$), subscale (f) (t =-.69, d.f. = 10; $p > .05$). Table 3 shows the mean scores and standard deviations per subscale to illustrate the differences between pre- and posttest more deeply.

Table 3

Means and standard deviations of scores on the attitude questionnaire.

Subscale	Pre-measurement M (SD)	Post-measurement M (SD)
(a) Current state of being	3.77 (.51)	3.77 (.51)
(b) Special services	3.83 (.54)	3.79 (.47)
(c) Grouping	3.31 (.40)	3.27 (.36)
(d) Elitism	3.43 (.55)	3.55 (.38)
(e) Social consequences	3.00 (.78)	3.18 (.66)
(f) Value for society	3.60 (.39)	3.65 (.32)

Evaluation. In general, participants evaluated the gaming experience and their own change of thoughts very positively. Regarding the first evaluation question the overall response was positive ((a) Did the game let you think about your own image, the way you look at giftedness?). Nine out of the eleven participants realized a positive change in their image. Those with little prior experience with giftedness noticed the biggest change in their own image and those with more prior experience noticed the potential of the game to do so, like this participant: "[...] I think I am already aware. I think the game is good to think about it or rather to animate the uninformed to think about it". Only two of the participants recorded no change in their personal image at all.

Regarding the second evaluation question the overall response was also positive ((b) Has the game allowed you to think about your own opinion with regard to giftedness?). Eight of the participants reported that they got a more positive opinion about giftedness through the game. Most of all, the confrontation with the topic was mentioned as really positive:

> The game encourages the confrontation with possible behaviors of the gifted which are again influenced by my behavior. My opinions and interactions as a teacher contribute decisively to the situation of the gifted. The game made that clear and allowed me to reflect on my opinion and behavior.

"It showed partly that you change your mind the longer you think about it - and that, you normally cannot do. You have to respond very quickly." Apparently, one participant was still holding on to previous prejudices about giftedness. The participant did not think about its own opinion but rather thought about the inability of gifted children to have empathy. Another participant who was already an expert in the field of giftedness noted that the game was primarily appropriate for teachers with little knowledge about the topic in order to change the opinion one would already have about it. A third participant reported to have just no change in opinion.

The third evaluation question got positive responses as well ((c) Has the game allowed you to think about your own skills in dealing with gifted students?). Ten out of the eleven participants thought about their skills. Several participants pointed out the bad state of teacher training and the little attention for giftedness in it. One participant noted that especially in level 3 it was difficult to react adequately to the gifted students. At that point, the participant was able to see that gifted students sometimes have different needs than expected: "I noticed that I sometimes answered very intuitively and then again looked at it critically. Sometimes I found out

that my first suggestion is actually not how I would like to act. This was a good reflection on my own behavior." Another participant noted his own lack of skills: "I definitely need to work at my (...) skills to meet all needs of my future students." Furthermore, participants were worried about not meeting the needs of their students. Only one participant did not think about skills as the game had too little feedback moments to do so.

Lastly, regarding the fourth evaluation question, most of the participants reported that they would like to further professionalize ((d) Would you like to further professionalize in the field of giftedness?). Two participants explained that they were already busy with further professionalizing. One of them wrote additionally: "I think it is bad that there is little to no [attention for giftedness] in the most studies, traineeships and additional courses. Actually, a must!" The other participant who also was professionalized in the field was less positive and stated that: "The profiles by Betts and Neihart give the same information but at the same time [they give] also characteristics and which approaches would be good. These are more useful for education and less time consuming than the game (…)."

Discussion and Conclusion

The major purpose of this study was to test whether the serious game "De Meester De Baas" is a reasonable and functionable tool to improve teachers' awareness and attitude for and to their gifted students. Regarding the research question "*What is the effect of a serious game on teachers' awareness and attitude towards gifted children?*" it can be said, that there was little to no effect on teachers' awareness or attitude. Statistical analysis of the data showed that there was

neither a significant change in the awareness nor the attitude of the participants who played the serious game "De Meester De Baas". Overall, teachers had indeed not that much awareness for giftedness in their practice and that is in fact also what was found in the literature (Bermann, Schultz & Weber, 2012). Contradictory to the literature was, that the participants in this study already had a relatively positive attitude towards giftedness. None of the eleven participating teachers had an extraordinarily negative attitude on gifted students before playing the game. This could be explained by the fact that "teachers who hold stereotypical hostile views of gifted students are unlikely to enroll voluntarily in such (…) programs" (Geake and Gross, 2008). With programs we mean interventions or studies that are aimed to confront teachers with giftedness. So, it would be possible that all teachers that took part in this study on own request, did so because they already had a quite positive attitude towards giftedness. Those who may hold negative attitudes could have refused to participate.

The results of the questionnaires showed that the game was not able to improve the awareness or change the attitude of the participants. In contrast, the evaluation of the game and the self-reflection part stood out in a very positive way. In this, most described the game as a good food for thought. Participants wrote that they liked to play the game and thought a lot about their own images, opinion and skills. It is questionable why the participants describe the game as mind changing but the results can not show any of these changes.

Possible reasons for this deviation between results of the study and participants' opinion might be found in the measuring instruments and in the sampling of the participants. Regarding the measuring instruments, it could be possible that for the open questions about awareness, participants did not understand the formulation of the task. The participants were asked to adjust previous given answers in the posttest by stuffing, deleting or rewriting the old answers. Only

four of the participants did so. Maybe the instructions for the open questions were not clear to the participants and therefore, only a few edited their answers.

Regarding the sampling of the participants, it can be said that it was difficult in general to find teachers who agreed to play the game. In the planning of this research an experimental group with at least 20 participants and an equal big control group was considered. Due to the difficult recruitment of teachers and the time limit of this bachelor thesis, the sample size of eleven teachers was the maximum achievable group. Dependent on the small sample size, the variety and characteristics of the teachers was limited. Participants were either students in teacher training, teachers with very little experience or experts on the field of giftedness and already deep in the matter.

The significant results that were produced by Williams and Williams (2007) with their simulation game based on the MIT could not be reproduced. Although the approaches of identification possibilities were included in “De Meester De Baas”, like for example portraying a teacher (affective identification), encountering gifted students in school (cognitive identification) or choosing actions in level 3 (behavioral identification), it seemed not be sufficient for attitudinal change. Missing feedback within the game, no postgame debriefing and single play of the serious game are explanations for that. Like some of the participants negatively commented, the game had no feedback moments which would have helped to facilitate the learning process (Williams & Williams, 2007). The design of the study did not intend a postgame debriefing except the second questionnaire. Postgame debriefing is also a condition facilitating cognitive and behavioral identification (Williams & Williams, 2007). On top of that, a more frequent playing of the game could have helped too. At the same time, the duration of the game was approximately 20 minutes. Even if all participants took playing the game serious, that is not a

long time to revise attitude about giftedness.

This study may not show the significant changes in attitude and awareness that were expected, though it is fundamental to start the research field around serious gaming and attitude change with regard to giftedness. Until now, there was no research done that would have tested how serious games or other games could help to familiarize teachers with the giftedness of their students. Obviously, teacher training is not capable of educating teachers sufficiently about the characteristics and needs of the gifted. "De Meester De Baas" could be a good alternative or additional tool to do so. For me as the researcher it was terrifying to see how little the willingness of teachers was to deal with the topic of giftedness. That alone was proof that until now there is not enough awareness and positive attitudes among teachers. Besides this, the study showed that nearly all participating teachers have the urgent wish to further professionalize on the field of giftedness. That was also found by the project group of "De Meester De Baas" (De Meester De Baas, 2018). Obviously, a lot of teachers turn away from giftedness and get away with it for years, others try to professionalize but teacher training does not ensure this schooling.

An implication of this study is to test whether first of all, a serious game can trigger an own induced professionalization and second of all, whether own professionalization can lead to more awareness and higher attitudes. Other implications are to investigate whether a more representative sample would show different results. In the case of this study only interested and voluntary participants were playing the game but it would be even more interesting to see whether non-voluntary teachers of all ages and experiences as participants could produce similar results or very different results. In order to ensure a higher external validity of retrieved data.

Final thoughts

In my opinion, as the main researcher of this study, it would be helpful to lay more emphasis on gifted education in teacher training and to help those who have the urgent wish to professionalize. I hope that games like “De Meester De Baas” will be further developed and improved.

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Appendix

Appendix A

Subscales a-f

(a) Current state of being

11. The specific educational needs of the gifted are too often ignored in schools.

13. Our schools are already adequate in meeting the needs of the gifted.

20. The gifted are already favoured in our schools.

28. The regular school program stifles the intellectual curiosity of gifted children.

(b) Special services

1.Our schools should offer special educational services for the gifted.

3. Children with difficulties have the most need of special educational services.

7. Gifted children are often bored in school.

9. We have a greater moral responsibility to give special help to children with difficulties than to gifted children.

12. The gifted need special attention in order to fully develop their talents.

15. It is parents who have the major responsibility for helping gifted children develop their talents.

(c) Grouping

2. The best way to most the needs of the gifted is to put them in special classes.

6. When the gifted are put in special classes, the other children feel devaluated.

8. The gifted waste their time in regular classes.

17. Gifted children should be left in regular classes, since they serve as an intellectual stimulant for the other children.

18. By separating students into gifted and other groups, we increase the labelling of children as strong-weak, good-less good, etc.

(d) Elitism

4. Special programs for gifted children have the drawback of creating elitism.

5. Special educational services for the gifted are mark of privilege.

14. I would very much like to be considered a gifted person.

25. Gifted children might become vain or egoistical if they are given special treatment.

(e) Social consequences

16. A child who had been identified as gifted has more difficulty in making friends.

19. Some teachers feel their authority threatened by gifted individuals.

27. Often, gifted children are rejected because people are envious of them.

(f) Value for society

10. Gifted persons are a valuable resource for our society.

21. In order progress, a society must develop the talents of gifted individuals to a maximum.

22. By offering special educational services to the gifted we prepare the future members of a dominant class.

23. Tax-payers should not have to pay for special education for the minority of children who are gifted.

24. Average children are the major resource of our society; so they should be the focus of our attention.

26. Since we invest supplementary funds for children with difficulties, we should do the same for the gifted.

29. The leaders of tomorrow's society will come mostly from the gifted of today.

Appendix B

Coding Scheme: Awareness

Participant: _____

Question 1

Based on which characteristics do you recognize a gifted student?

Codes	Points
Self-Image	
Task orientatien/ motivation	
Learning ability	
Independency	
Social emotional competence	
Others	

Question 2

What sources of information do you approach when you think that a student is gifted?

Codes	Points
Child	
Teachers	
Parents	

Peers	
Grades	
Others	

Question 3

What approaches do you have to deal with gifted students?

Codes	Points
Activate	
Respond	
Ignore	
Others	

Additional Comments:

Appendix C
Questionnaire 1

Welcome,

Thank you for participating in this survey. Before you complete the questionnaire, please read the following information carefully.
The aim of this research is to gain more insight into the attitude of teachers with regard to giftedness.
Completing the questionnaire will take about 15 minutes. Participation is completely voluntary and you can stop the research at any time without giving any reason. Take the time you need. There are no right or wrong answers.
Data and results of the research are treated confidentially and are processed anonymously. If you have questions or are interested in the results, please contact Tessa Markus (t.markus@student.utwente.nl).
By clicking "Yes" you give your permission to participate in this study.
Yes ☐

Before you start the questionnaire, enter a personal code that you will also use later in the game. The personal code consists of the first two letters of your first name, the first two letters of your last name and the last two digits of your birth year. Make sure that you keep the code.

1. What is your gender?
   Female ☐ Male ☐
2. How old are you?
   Klicken Sie hier, um Text einzugeben.
3. How many years are you already working as primary school teacher?
   Klicken Sie hier, um Text einzugeben.
4. Did or do you, as a teacher, deal with gifted students?
   Yes ☐ No ☐

If question 4 applies, continue with question 5, if question 4 does not apply continue with question 7.

5. How many gifted children have you dealed with?
   Klicken Sie hier, um Text einzugeben.
6. Are all these pupils diagnosed as gifted?
   Yes ☐ No ☐

Please answer the following open questions as detailed as possible.

7. Based on which characteristics do you recognize a gifted student?

8. What sources of information do you approach when you think that a student is gifted?

9. What approaches do you have to deal with gifted students?

Indicate to what extent you agree with the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Our schools should offer special educational services for the gifted.	☐	☐	☐	☐	☐

The best way to meet the needs of the gifted is to put them in special classes.	☐	☐	☐	☐	☐
Children with difficulties have the most need of special educational services.	☐	☐	☐	☐	☐
Special programs for gifted children have the drawback of creating elitism.	☐	☐	☐	☐	☐
Special educational services for the gifted are mark of privilege.	☐	☐	☐	☐	☐
When the gifted are put in special classes, the other children feel devaluated.	☐	☐	☐	☐	☐
Gifted children are often bored in school.	☐	☐	☐	☐	☐
The gifted waste their time in regular classes.	☐	☐	☐	☐	☐
We have a greater moral responsibility to give special help to children with difficulties than to gifted children.	☐	☐	☐	☐	☐
Gifted persons are a valuable resource for our society.	☐	☐	☐	☐	☐
The specific educational needs of the gifted are too often ignored in schools.	☐	☐	☐	☐	☐
The gifted need special attention in order to fully develop their talents.	☐	☐	☐	☐	☐
Our schools are already adequate in meeting the needs of the gifted.	☐	☐	☐	☐	☐
I would very much like to be considered a gifted person.	☐	☐	☐	☐	☐
It is parents who have the major responsibility for helping gifted children develop their talents.	☐	☐	☐	☐	☐
A child who had been identified as gifted has more difficulty in making friends.	☐	☐	☐	☐	☐
Gifted children should be left in regular classes, since they serve as an intellectual stimulant for the other children.	☐	☐	☐	☐	☐
By separating students into gifted and other groups, we increase the labelling of children as strong-weak, good-less good, etc.	☐	☐	☐	☐	☐
Some teachers feel their authority threatened by gifted individuals.	☐	☐	☐	☐	☐
The gifted are already favoured in our schools.	☐	☐	☐	☐	☐
In order to progress, a society must develop the talents of gifted individuals to a maximum.	☐	☐	☐	☐	☐
By offering special educational services to the gifted we prepare the future	☐	☐	☐	☐	☐

members of a dominant class.					
Tax-payers should not have to pay for special education for the minority of children who are gifted.	☐	☐	☐	☐	☐
Average children are the major resource of our society; so they should be the focus of our attention.	☐	☐	☐	☐	☐
Gifted children might become vain or egotistical if they are given special treatment.	☐	☐	☐	☐	☐
Since we invest supplementary funds for children with difficulties, we should so the same for the gifted.	☐	☐	☐	☐	☐
Often, gifted children are rejected because people are envious of them.	☐	☐	☐	☐	☐
The regular school program stifles the intellectual curiosity of gifted children.	☐	☐	☐	☐	☐
The leaders of tomorrow's society will come mostly from the gifted of today.	☐	☐	☐	☐	☐

Appendix D

Questionnaire 2

Welcome to the second questionnaire!

Please fill in the personal code you used in the first questionnaire and the game (first two letters of your first name, first two letters of your last name and the last two digits of your birth year).

Please answer the following open queations as detailed as possible.You can edit the answers you gave last time.

10. Based on which characteristics do you recognize a gifted student?

11. What sources of information do you approach when you think that a student is gifted?

12. What approaches do you have to deal with gifted students?

Indicate to what extent you agree with the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Our schools should offer special educational services for the gifted.	☐	☐	☐	☐	☐
The best way to meet the needs of the gifted is to put them in special classes.	☐	☐	☐	☐	☐
Children with difficulties have the most need of special educational services.	☐	☐	☐	☐	☐
Special programs for gifted children have the drawback of creating elitism.	☐	☐	☐	☐	☐
Special educational services for the	☐	☐	☐	☐	☐

gifted are mark of privilege.					
When the gifted are put in special classes, the other children feel devaluated.	☐	☐	☐	☐	☐
Gifted children are often bored in school.	☐	☐	☐	☐	☐
The gifted waste their time in regular classes.	☐	☐	☐	☐	☐
We have a greater moral responsibility to give special help to children with difficulties than to gifted children.	☐	☐	☐	☐	☐
Gifted persons are a valuable resource for our society.	☐	☐	☐	☐	☐
The specific educational needs of the gifted are too often ignored in schools.	☐	☐	☐	☐	☐
The gifted need special attention in order to fully develop their talents.	☐	☐	☐	☐	☐
Our schools are already adequate in meeting the needs of the gifted.	☐	☐	☐	☐	☐
I would very much like to be considered a gifted person.	☐	☐	☐	☐	☐
It is parents who have the major responsibility for helping gifted children develop their talents.	☐	☐	☐	☐	☐
A child who had been identified as gifted has more difficulty in making friends.	☐	☐	☐	☐	☐
Gifted children should be left in regular classes, since they serve as an intellectual stimulant for the other children.	☐	☐	☐	☐	☐
By separating students into gifted and other groups, we increase the labelling of children as strong-weak, good-less good, etc.	☐	☐	☐	☐	☐
Some teachers feel their authority threatened by gifted individuals.	☐	☐	☐	☐	☐
The gifted are already favoured in our schools.	☐	☐	☐	☐	☐
In order to progress, a society must develop the talents of gifted individuals to a maximum.	☐	☐	☐	☐	☐
By offering special educational services to the gifted we prepare the future members of a dominant class.	☐	☐	☐	☐	☐
Tax-payers should not have to pay for special education for the minority of children who are gifted.	☐	☐	☐	☐	☐
Average children are the major resource of our society; so they should be the focus of our attention.	☐	☐	☐	☐	☐
Gifted children might become vain or	☐	☐	☐	☐	☐

egotistical if they are given special treatment.					
Since we invest supplementary funds for children with difficulties, we should so the same for the gifted.	☐	☐	☐	☐	☐
Often, gifted children are rejected because people are envious of them.	☐	☐	☐	☐	☐
The regular school program stifles the intellectual curiosity of gifted children.	☐	☐	☐	☐	☐
The leaders of tomorrow's society will come mostly from the gifted of today.	☐	☐	☐	☐	☐

Please answer the following open queations as detailed as possible.

1. Did the game let you think about your own image, the way you look at giftedness?

2. Has the game allowed you to think about your own opinion with regard to giftedness?

3. Has the game allowed you to think about your own skills in dealing with gifted students?

4. Would you like to further professionalise in the field of giftedness?