The Netherlands

Background

The SmartPool program was piloted at two schools in the Netherlands. Both schools received a mobile, foldable pool table. The pilot ran from February 2022 to April 2022 at the first school. At the second school, the pilot ran from March 2022 to May 2022.

One mathematics teacher from each school (n=2) participated in the pilot. Both teachers completed the evaluation survey. One teacher implemented the SmartPool program in two classes, the other teacher implemented the program in one class. The average class size ranged from 8-10 students. The students were between 12 and 14 years old. In total, 7 students (all male) completed the evaluation survey.

We present the students' and teachers' experiences with the various aspects of the SmartPool program below.

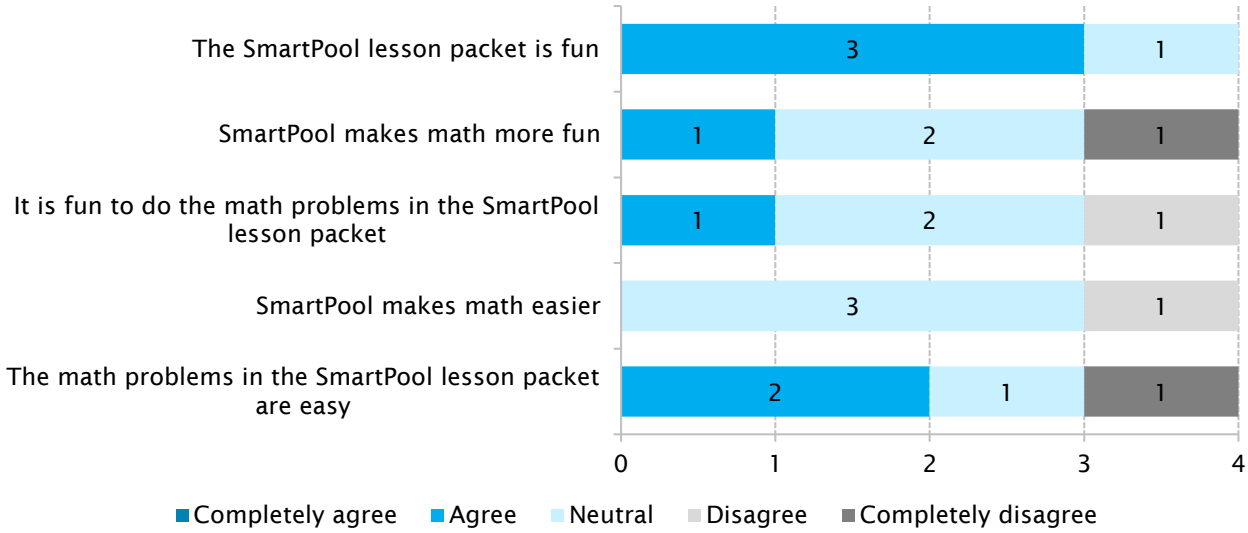
SmartPool lesson packet

Students

The students followed lessons from the SmartPool lesson packet during school hours in an elective course. The students were asked about their expectations and experiences regarding SmartPool. Almost all (n=6) students expected that it would be fun. Additionally, some students expected that the program would be interesting (n=2) and a single student expected that it would be difficult (n=1).

Four out of seven students indicated that they followed the lessons in the SmartPool lesson packet. Three students agree that the SmartPool lesson packet is fun (figure 1). The students differ in opinion on whether SmartPool makes math more fun (ranging from agree to completely disagree), whether it is fun to do the math problems in the SmartPool lesson packet (ranging from agree to disagree) and whether the math problems in the SmartPool lesson packet are easy (ranging from agree to completely disagree). Most students were neutral regarding the statement 'SmartPool makes math easier'.

Figure 1. Degree to which Dutch students agree with statements about the SmartPool lesson packet (in absolute values, n=4)



Source: Survey under Dutch participants in the SmartPool pilot, 2022, Mulier Institute.

The students were asked to indicate in an open-ended question what they liked about the SmartPool lesson packet. They indicated that they liked playing pool, learning new things and that they enjoyed the combination of learning and practice. The students were also asked to indicate what they disliked about the SmartPool lesson packet. They indicated that they found the material difficult to learn, that they did not enjoy practicing math skills, and that there was too much textual explanation.

Teachers

The teachers were asked to indicate how they balanced the theory and practice in the SmartPool lessons. Both teachers indicated that the lessons were mainly focused on practice (exercises at the pool table) with a bit of theory (SmartPool lesson packet). The teachers were also asked what they thought about the balance between theory and practice in the lessons. One teacher indicated that it had too much theory and too little practice. The other teacher indicated that it had enough theory and enough practice.

Both teachers indicated they used the SmartPool lesson packet during school hours, during an elective course. One of the two teachers taught one hour-long lesson per week, the other teacher taught multiple lessons spread throughout the week. One teacher completed nine out of ten lessons from the SmartPool lesson packet, the other teacher completed only four lessons. The teachers reported different reasons why they were unable to complete all ten lessons. The teacher that completed nine lessons reported that this was because the level of the lessons was not suitable for his/her students. The other teacher indicated that he/she completed only four lessons because there was not enough time to schedule all ten lessons, the lesson material did not fit the educational goals, the amount of lesson material was not feasible in the time available and it was not interesting enough.

The two teachers were asked to reflect on their expectations regarding the SmartPool lesson packet before starting the pilot. Both teachers expected that it would help to make math more fun and contribute to the promotion of pool. In addition, one of the two teachers also expected that it would contribute to the educational goals of the math classes.

The two teachers were then asked to indicate the extent to which they agreed with the following statements regarding the lesson packet (completely agree to completely disagree):

- *The lesson packet made mathematics more fun for the students.* One teacher agreed with this statement, the other was in complete disagreement.
- *The lesson packet made mathematics easier for students.* Both teachers (completely) disagreed with this statement.
- *The lesson packet contributed to achieving the educational goals of the mathematics lessons.* Both teachers (completely) disagreed with this statement.
- *The lesson packet contributed to the promotion of pool among the students.* Both teachers were in complete agreement with this statement.

One teacher found the level of difficulty of the SmartPool lesson packet to be suitable for his/her students, the other found it too easy for his/her students. Both teachers thought that the amount of mathematics in the lesson packet was (far) too little. One teacher was satisfied with the lesson packet, the other was dissatisfied. One of the two teachers expects to continue using the lesson packet in the future, the other teacher was not sure yet. The teachers were asked to indicate what they would keep and what should be improved/changed about the SmartPool lesson packet. Both teachers indicated that the practical exercises (about how pool works) should be kept. One teacher indicated that the snooker training should be kept. The teachers indicated the following aspects should be improved/changed:

- Incorporate competitive elements into the exercises;
- set up a score form for the pool exercises;
- provide a more detailed description of the pool technique in the teaching material;
- make the mathematics more interesting;
- focus on the pool exercises and not on the lesson packet.

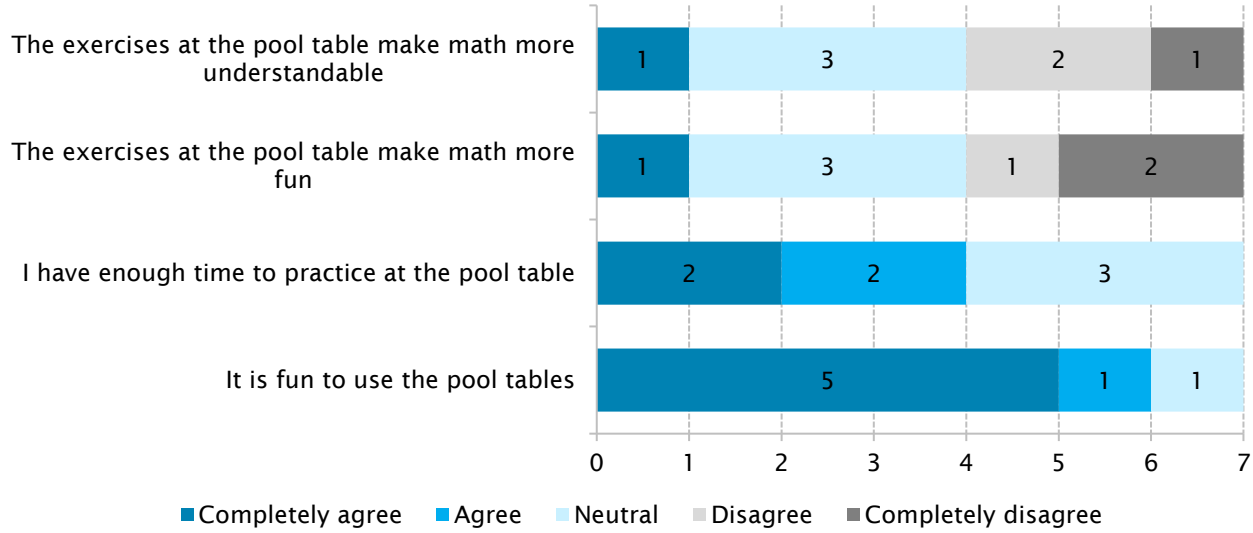
Part of the SmartPool program is to organize a pool competition at the end of the program. One of the schools organized this competition. The teacher from this school indicated that the tournament should remain a part of the program and that he/she liked that the tournament took place at a real pool hall. However, the location of the pool hall was a bit far away. The other school did not organize a tournament because there was insufficient interest from the students.

Pool tables

Students

All seven students indicated they used the pool tables. Three students indicated that it was possible to use the pool tables outside of the lessons when they wanted to. The other four students indicated that that was not possible. The majority of the students (completely) agreed that it was fun to use the pool table and that they had enough time to practice at the pool table (figure 2). The students differ in opinion on whether the exercises at the pool table made math more understandable or fun (both ranging from completely agree to completely disagree).

Figure 2. Degree to which Dutch students agree with statements about the pool tables (in absolute values, n=7)



Source: Survey under Dutch participants in the SmartPool pilot, 2022, Mulier Institute.

The students were asked to indicate in an open-ended question what they liked about using the pool tables. They indicated that they liked playing pool (with friends), that the exercises gave them a feeling of freedom, that they enjoyed learning how to improve in pool t, and that they enjoyed the hands-on approach. The students were also asked to indicate what they disliked about using the pool tables. Some students indicated that they did not dislike anything about the pool tables. Other students indicated that they disliked the rules and waiting for their turn.

Only one student indicated that he would like to play pool more often in the future because he liked pool The rest (n=6) indicated that they are not sure yet. One of the students comments that they enjoyed the program because it gave him a chance to learn to play pool, something he feels many people don't get the opportunity to do.

Teachers

One school received one mobile, foldable pool table, the other school received two tables. At both schools, the mobile, foldable pool tables were placed in the classroom. At one school, the students used the pool tables once per week for approximately 35 minutes at a time, at the other school they used the tables twice per week for approximately 60 minutes at a time. Both teachers indicated that there were enough pool tables available for the number of students. At both schools, the students used the pool tables during an elective course. At one school, the students also used the pool tables during their break/recess.

The teachers were asked what their initial expectations were regarding the pool tables. Both teachers expected that the pool tables would contribute to the educational goals of the math classes and to the promotion of pool. In addition, one teacher indicated that he/she thought that the pool tables would be fun to use during math class and fun for students to use outside class hours.

The teachers were presented with several statements regarding the pool tables and asked to indicate the extent to which they agree with the statements (completely agree to completely disagree):

- *The exercises at the pool table made mathematics more fun for the students.* One teacher agreed with this statement, and the other completely disagreed.
- *The exercises at the pool table made mathematics easier for the students.* Both teachers (completely) disagreed with this statement.
- *The exercises at the pool table contributed to achieving the educational goals of the mathematics lessons.* One teacher agreed with this statement, and the other completely disagreed.
- *The exercises at the pool table contributed to promoting pool among the students.* Both teachers (completely) agreed with this statement.
- *The pool table improved the atmosphere at school.* One teacher completely agreed with this statement, the other one was neutral.
- *The students had enough time to practice at the pool table.* Both teachers (completely) agreed with this statement.

Teachers were asked to indicate in an open-ended question what they liked about the pool tables. They indicated that the tables were foldable, mobile, and looked appealing. The teachers were also asked to indicate what they disliked about the tables. One teacher did not have any comments. The other teacher indicated that the pockets were too small, that is was difficult to create experiences of success and the table was difficult to adjust.

Training for teachers with a SmartPool trainer

Both teachers participated in a training for teachers provided by a SmartPool trainer. In total, five teachers participated in this training. The training was provided in person during school hours. Both teachers participated in one training and were very satisfied with it. They were asked what they liked and disliked about the training. Both teachers indicated that they liked the practical applications in the training. One teacher liked that the trainers were inspiring and the other teacher liked that the instructions were clear. One teacher indicated that something that he/she disliked was the lack of attention to technique.

Instructions for students from a SmartPool trainer

Students receive instructions from a SmartPool trainer as part of the SmartPool program. Both teachers indicated that their students received these instructions during school hours, during an elective course. Both teachers were very satisfied with the instructions the students received. The teachers were asked what they liked about these instructions. They liked that the instructions were clear and professional, that the trainers were flexible in scheduling the training, that the training was provided by an external trainer (not the teacher themselves), and the partnership between the trainer and teacher. The teachers were also asked what they disliked about the training for students. One teacher did not have any comments. The other teacher indicated that it would have been better if the instructions had taken place at the start of the program.

Future use

Both teachers believe that the best way to implement SmartPool is during school hours, during an elective course. The teachers were asked what they would change about the SmartPool program to improve it. One teacher stated that the mathematical component should be made more interesting. The other teacher indicated that there should be more focus on talent development, for example by implementing the program into the school's talent module and that prior to starting the program, schools should be personally approached by the KNBB for a trial day. When asked in an open-ended question if there was anything else they wanted to share about their experiences, one teacher

indicated that he/she wants to continue with the lessons, but that there is a need for the adapted teaching program that is currently in development by the KNBB. The other teacher indicated how much the students liked the SmartPool program: it was an unforgettable experience for the students and they were very disappointed by a lesson that had to be canceled.

Conclusions

The SmartPool program was piloted at two schools in the Netherlands in the spring of 2022 and evaluated with online surveys among teachers and students. One school received one mobile, foldable, pool table and the other school received two of these tables. Based on the experiences of the teachers and students with the program, we present the conclusions and recommendations regarding the feasibility, (perceived) effects, and satisfaction with the program in its current form.

Feasibility

Both teachers implemented the program as an elective course and indicated that they believe that this is the most suitable way to implement the program. The program was piloted with students aged 12-14 years old. One teacher found the level of difficulty of the SmartPool lesson packet to be suitable for his/her students, the other found it too easy for his/her students. Neither teacher completed all ten lessons for various reasons: the level of the lessons was unsuitable, there was not enough time to schedule all ten lessons, the teaching material did not fit the educational goals, the amount of teaching material was not feasible in the available time and it was not interesting enough. This suggests that the material in the lesson packet may need to be made more challenging for this age group and that the content of the lessons needs to be shortened, as it doesn't fit in the time available. Furthermore, the teachers may need more time for the entire program to complete all of the lessons and improvements should be made to the lesson packet to make it more interesting.

The SmartPool program was implemented with a small number of students (8-10 students). Classes had 1-2 pool tables available, 1-2 times per week, 35-60 minutes per time. Both students and teachers found that they (the students) had enough time at the pool tables. This implies that for this amount of students and time, 1-2 pool tables are sufficient. However, if the number of students per class increases, students may not have enough time to practice at the table.

(Perceived) effects

The students differ in their opinion on whether or not SmartPool makes math more fun. The teachers also differ in their opinion; one teacher agreed that the lesson packet and the pool table made mathematics more fun for the students, the other teacher was in complete disagreement with this statement. This further indicates that the content of the lesson packet should be adapted to make it more fun. Also, both teachers (completely) disagreed that the lesson packet and the pool table made mathematics easier for students. This is likely because one teacher found the lesson packet too easy for their students, therefore it cannot make math easier. Most students were neutral about this statement. Again, this indicates the level of difficulty of the content should be re-examined.

Furthermore, both teachers (completely) disagreed that the lesson packet contributed to achieving the educational goals of the mathematics lessons. This indicates that the lesson packet should be changed in such a way that it does contribute to achieving the educational goals of the mathematics lessons. Both teachers believe Smartpool should best be implemented as an elective course. If the ambition is to implement it in the regular mathematics lessons, it is imperative that the lesson packet aligns with the educational goals.

Both teachers completely agreed that the lesson packet contributed to the promotion of pool among the students. Almost all students indicated it was fun to practice at the pool table. However, only one student is sure about continuing playing pool in the future. This indicates that the program may have generated some interest among students.

Satisfaction

Overall, both students and teachers seem satisfied with the practical part of the program (using the pool table) but less satisfied with the theoretical part of the program. Teachers and students were generally positive about the exercises at the pool table. Both teachers were very satisfied with the training they and their students received from a SmartPool trainer. The students and teachers have mixed opinions regarding the lesson packet. One teacher was satisfied with the lesson packet, the other teacher was dissatisfied. One teacher expects to continue using the lesson packet in the future, the other teacher was not sure yet. However, the teacher that was not sure yet indicated at the end of the questionnaire that he/she wants to continue with the lessons, but that there is a need for the adapted teaching program that is currently in development.