

Teachers exploring the potential of Kinems movement-based learning gaming platform in 2 SEN schools in UK

UCL Institute of Education, University of London, UK
Lead faculty staff member: professor Maria Kambouri
Researcher: Mrs Foteini G. Tsiakalou, MSc student

Executive abstract

Context

This study, following the emerging trend of research on the integration of ICTs in Special Education (SEN), explored the value of using Kinems, a movement-based learning gaming platform with an embedded monitoring and reporting system, in a special needs school setting. The focus of the research was in developing innovative pedagogic strategies to enhance learning and propose alternative paths to children with ASD. The research paradigm followed was a participatory one where practitioners are trained to use the technology and are given time to reflect on its use and researchers coordinate, support, record and facilitate the process.

The research was conducted in London within two residential schools:

- one school (SCA) for students with ASD where the research room was a “working classroom” within which “Kinems” sessions took place
- one school (SCB) for students with severe and complex learning needs and the research room was a ‘natural’ classroom within which students with ASD receive their education, supported by a class teacher and four teaching assistants.

Both schools were graded as “Outstanding” according to latest OFSTED’s inspection reports and are teaching schools focusing on teacher training.

Research Question

The main research question was whether and how “Kinems learning gaming platform” could be integrated in the learning process of students with SEN. A special emphasis was given on investigating whether the Kinems platform reporting features can enrich the information teachers can gain for students and improve the assessment process.

Participants

The research study was implemented with a sample of six (6) SEN teachers from the two (2) different residential SEN schools in London (SCA & SCB) and seven (7) children (6 children in SchoolA and 1 child and 1 teacher in SCB) with ages ranging from 6-19 ranging from High Functioning Autism (HFA) to Autism Spectrum Disorder (ASD) with Moderate Learning Disabilities (MLD). All students had a diagnosis of ASD but they differed in variables such as autism severity, age, verbal skills, existing comorbidities and prior experience with KINECT technology (see: Table 1).

Students were selected by their teachers for individual education sessions following, again, purposive sampling methods, as they had set specific targets to improve with the aid of the “Kinems” platform. One teacher (T1) participated with 2 students (S1 & S6).

Table 1. Students’ profiles and prior experience with KINECT technology

<i>Student’s code name</i>	<i>Students’ Gender</i>	<i>Student’s Profile</i>	<i>Prior experience with KINECT technology</i>
----------------------------	-------------------------	--------------------------	--

S1 (SCA)	M	HFA, developed skills at maths, difficulties with reading and spelling, poor communication, poor concentration on tasks, often gets aggressive	✗
S2 (SCA)	M	HFA, no behaviour issues, some difficulties with maths	✓
S3 (SCA)	M	HFA, good with reading and spelling but difficulties with maths, changes upset him	✗
S4 (ScA)	M	MLD, verbal but difficult communication as he does not speak loudly/clearly	✓
S5 (ScA)	M	HFA, good communication and verbal skills, attention disorder, emotional instability, difficulties in following directions	✗
S6 (ScA)	F	ADHD, moderate LD, epilepsy, behaviour and emotional instability good communication and verbal skills	✗
S7 (ScB)	M	Anxiety disorder & emotional instability, moderate to severe LD, hyperactivity, speech supported by Makaton	✓

Procedure, research design and data collection

Teachers would log into their personal accounts, choose the appropriate games for each session, customise the settings to the children's level and started the games. They could change the game difficulty at any point by changing the parameters in the settings and without the children knowing. This allowed better flexibility in adapting the game. At the end of the session teachers made short evaluations about the child's concentration, performance and mood and kept personal notes using the appropriate feature of the Kinems platform if they wanted to comment on something.

The Kinems intervention/integration period lasted 10 weeks (May '15- 15 July '15). During late April 2015 one 2hour presentation, including live modeling and self-trials, took place at each school to present participants with the Kinect technology and give instructions on how to use the Kinems platform and the various games according to learning goals.

During the 10-week period, 20 min. The "Kinems sessions" were conducted once a week for each student-teacher. During the first two weeks, teachers were experimenting with the games, so as to reflect on the settings per game in order to achieve goals and create the baseline for each student. After this training period, they focused on specific games and the students' skills they would like to assess.

At the ScA, the "Kinems sessions" varied for each child and took place on different hours each week (from 9- 3p.m.) to fit their schedules. At the SchoolB, the "Kinems sessions" took place during the morning break (11-11:20 a.m.) so as not to disrupt the strict class timetable. The child was given extra time in the playground afterwards, so as to compensate for the time spent on "Kinems". On average each student had 6 sessions ($M=6.28$ / $MDN=6$) and played 3 games in each session ($M=3.29$ / $MDN= 3.42$).

A large volume of mainly qualitative data was generated from: 1) teachers' notes in the Kinems platform, 2) observation field notes 3) final interviews and quantitative data from the game analytics.

Interviews were used collect in-depth and immediate factual information regarding teachers' experiences about the researched. Teachers were asked to examine students' reports and their personal notes in the Kinems platform and reflect on all the procedure that had gone on before. A 10'-minute interview followed to investigate their views on Kinems.

A set of quantitative data on students' performance were automatically saved through the Kinems reporting system.

Findings

The most prevalent finding that emerged regarding benefits for the students is that the children were really focused and motivated while playing. Children saw the whole process mostly as a fun activity, rather than a learning task. This can be seen both from teachers notes in the Kinems platform as well as from teachers' statements during the final interviews:

- "He didn't want to stop" (Teacher3/sess.1)
- "He was really happy to play today" (Teacher1-Student1/sess.4)
- "He asked for his turn while peer was playing" (Teacher1-Student1/sess.2)
- "The important thing is that once he came in here we managed to keep him in here, because if he was bored or not interested he would just walk out the room and there would be nothing we could do..."(Teacher1-Student1).
- "I think with Kinems he was so focused. In the class he is usually distracted by other kids so he is quite different.....(Teacher3)".
- "The fact that Kinems is a game made him think that he was playing so he wasn't so stressed or distracted as he usually is in class"(Teacher2).

Furthermore, with aid of the Kinems reporting mechanism, the teachers managed to measure progress in the child's spelling ability, in math problem solving skills, in his/her motor skills and see important changes in his/her behavior while playing the games. For example, it is characteristic that Teacher1 observed:

"The reports record all the information I need to see for his progression [.....]. From doing really well with the math ones –which was expected- to doing really well to the literacy ones, plus understanding the hand movement interaction. [.....]. And he also made some great progress regarding behaviour".

Many teachers reported improved performance for their students and in many instances associated this with positive changes in their students' behaviour while playing the games.

In the following paragraphs we are presenting some characteristic examples of children's performance improvement.

Student 2 results

S2 managed through "Mathloons" to perform much more advanced math calculations than the teacher's expectations. Particularly, as the Figures 1a-1d show, the child showed a gradual increase in performance in each learning goal in Math, i.e. addition and subtraction operations with different numeric ranges.

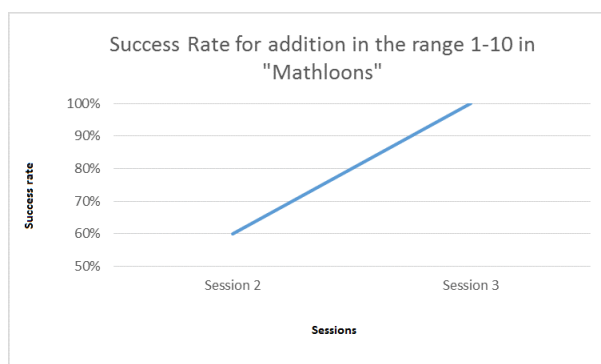


Figure1a: Performance in Mathloons game for addition in the range up to 10

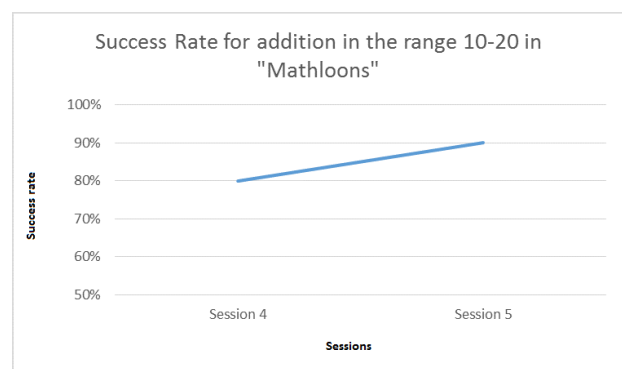


Figure1b: Performance in Mathloons game for addition in the range 10-20

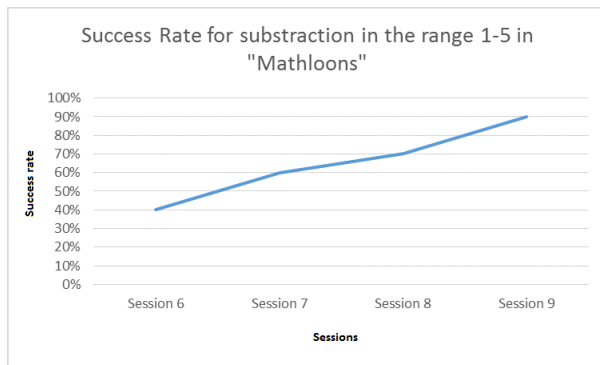


Figure1c: Performance in Mathloons game for subtraction in the range 1-5

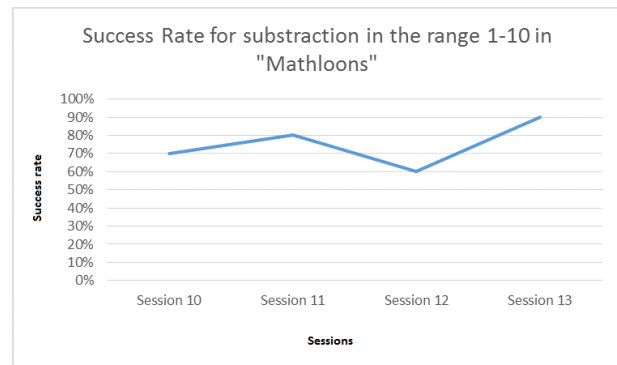


Figure1d: Performance in Mathloons game for subtraction in the range 1-10

Student 4

Similarly, S4 who had faced problems in simple math calculations, his "Mathloons" "success rates" were low but showed an overall improvement between sessions.

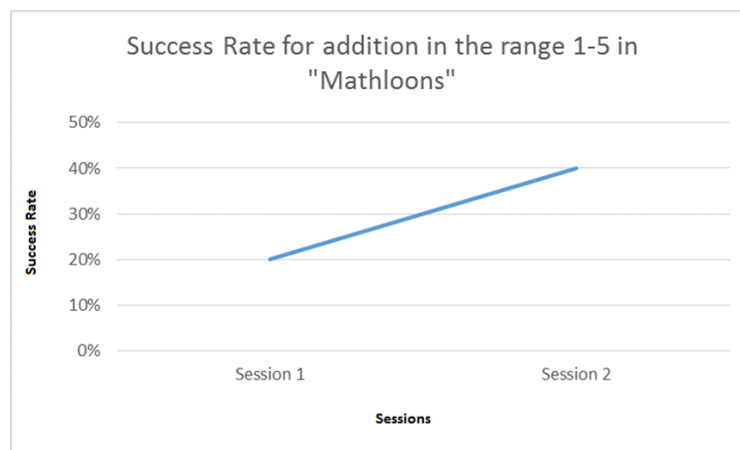


Figure2: Performance in Mathloons game for addition in the range up to 5

Moreover, S4 success rates in all the different levels in "Bilicious" were steadily 100%. The teacher confirmed that the student could distinguish quantities. With "Space Motif" the teacher wanted to check the development of the sorting concept. Despite gradually increasing task difficulty, as the Figures 3a and 3b show, S4 progressed well and gave fewer wrong answers in fewer attempts to complete the task: "every time he played a much harder level, we added the moving black hole and the 'items crash' so the game became more difficult. The child responded very well".

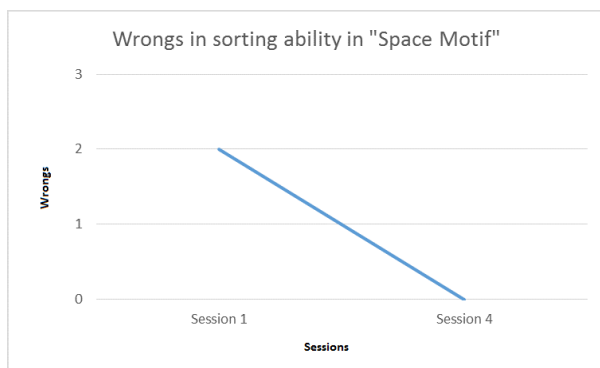


Figure 3a: Performance in the SpaceMotif game for the sorting concept (wrong answers)

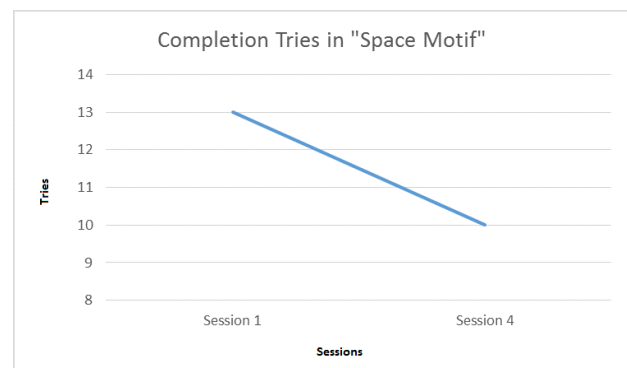


Figure 3b: Goal5 - Performance in SpaceMotif game settings for the sorting concept (completion tries)

Similarly, as shown in Figure 3c, based on the “number of crashes”, the teacher assessed the student’s fine motor dexterity. The diagram demonstrates that S4 performance was continuously improving since the number of crashes, which is related to hand instability had been reducing over 4 sessions.

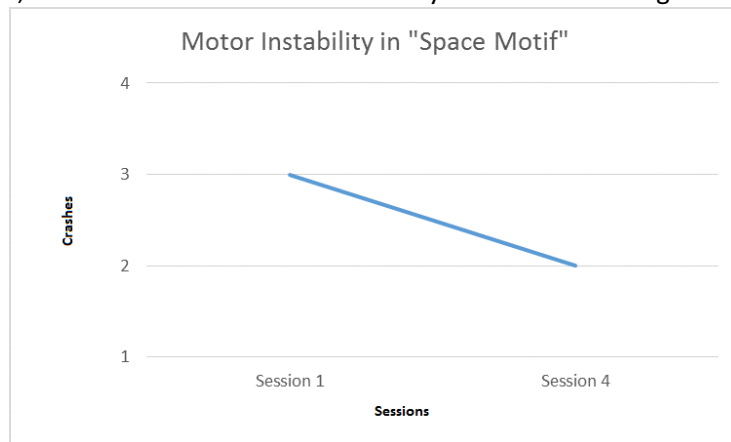


Figure 3c: Performance in the SpaceMotif game for the sorting concept (hand stability)

Student 1

Similarly, Figure 5 shows the performance for S1 in the “Lexis” game. As the diagram indicates, S1 in session 1 presented lower level of motor control and hand ability of grabbing (5 dropped eggs), but he managed to decrease his hand instability over the 7 sessions.

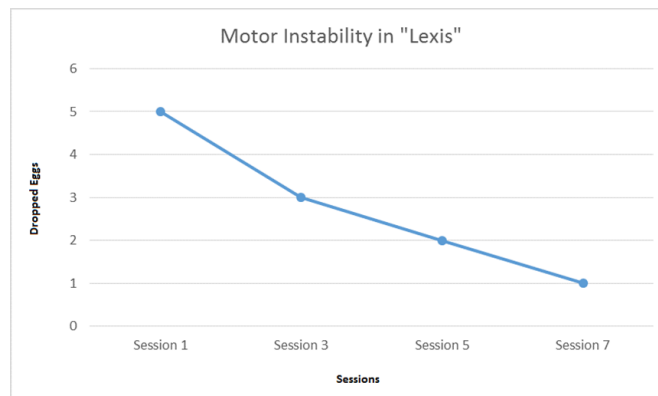


Figure 5: Performance in the LEXIS game for spelling a word (dropped eggs)

Student 3

S3 presented a gradually increased performance concerning the ability of comparing quantities, achieving two basic math goals: a) to compare quantities with a discernible difference in the ratio and b) to compare quantities with a moderate difference in the ratio. Figure 6a-6b shows the S3 performance in the “Bilisius” game, concerning the achievement of the above learning goals.

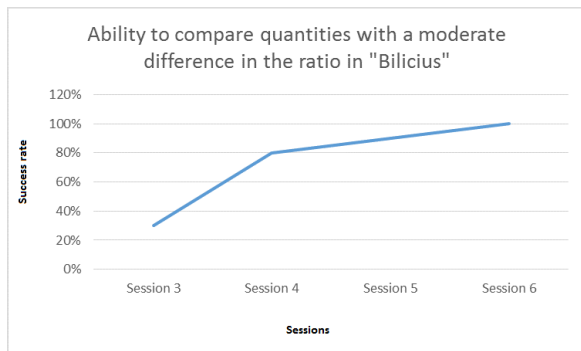


Figure6a: Performance in the Bilicious game for comparing quantities with a discernible difference in the ratio

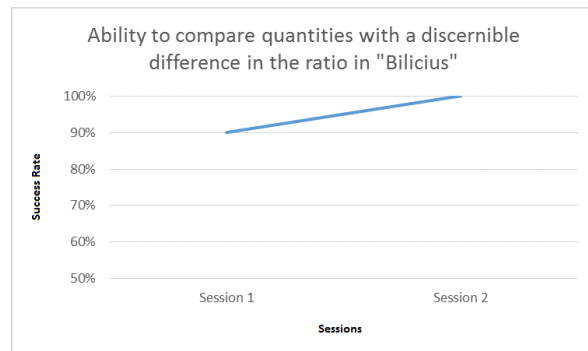


Figure6b: Performance in the Bilicious game for comparing quantities with a moderate difference in the ratio

Regarding calculations, the success rates showed that the child not only had consolidated addition but in subtraction he was able to do calculations with numbers bigger than those they are working on in class “We are working with numbers up to 20 and here he did calculations with numbers much bigger than these...!”

While the teacher used “Walks” as a reward for the child at the end of each session she realized that in parallel she was able to assess the child’s motor skills. She highlighted that “it’s nice because you can incorporate assessment of different skills into a game”.

Besides, observing the children while they played, valuable information had been revealed about their strengths, weaknesses and interests. Teacher 7 mentioned: “I didn’t expect him to be able to use his body so skillfully to be honest”.

Furthermore, students felt more confident about their decisions and actions, when teachers supported, encouraged, praised and prompted them (verbally and physically). The positive feedback -both from the games and the teacher- when they achieved their goal, boosted their self-confidence and made them happy in many cases. Characteristically, Teacher1 said about Student1:

“He was so extrovert whenever he won a game or did something good that he started hugging everyone, doing high-5’s etc. and this made me realize how much he likes computer games and how important it is for his self-confidence to give him positive feedback and praise”.

Specific comments about the Kinems platform reporting features

Teacher5 added two more advantages of the Kinems reporting system:

- 1) it allows access to the information even if someone was not present during the assessment session
“a Teaching Assistant can have a session with the child and if he/she keeps proper notes in combination with the reports I can have all the information I want about that session without even being present”
- 2) the reports layout and visual format can be used as evidence into students’ portfolios

Teacher 3 commented: “By the way, I also appreciate that Kinems games record the time it took the child to complete an activity because it shows how “secure” or confident he is in doing that thing.” So she planned a class intervention: “For quantities I could teach him that “more” has nothing to do with “bigger” because he had this difficulty with the marbles”.

Concluding Remarks

The Kinems movement-based learning gaming platform was seen by teachers as a simple to use and a valuable assistive tool. It was admitted that Kinems platform has the potential to open completely new horizons in the process of offering personalized learning experiences to SEN students in order that they can improve their academic performance, motor skills and executive functions such as short-term memory, problem solving, concentration and attention. Also, the Kinems platform and its monitoring capabilities gave teachers the chance to enrich the quantity and quality of information they can get for their students' level during each intervention session, to guide their class instruction and easily differentiate tasks to meet students' needs. They could see the benefits of using Kinems as an assessment tool since they can automatically produce reports with detailed objective data in visual-tabular form that could be shared with peers and parents. We are conducting a new intervention with precisely this aim next.