Coding with VinciBot

MatataStudio-VinciBot programme-Report

February 2024

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Authors: Elisavet Vlachou, Antoine Bilgin and Agueda Gras-Velazquez.

Design/DTP: Rocío Benito and Celia Prados

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Executive summary

With the common strategic goal to ensure that teachers and ultimately students are equipped with the skills necessary to thrive, both personally and professionally, in the 21st century, European Schoolnet and MatataStudio joined forces to introduce children of later primary and early secondary school to programming and fundamental artificial intelligence (AI).

The MatataStudio-VinciBot pilot project engaged 21 teachers from 19 classes with a total of 303 students from four different countries, (Finland, France, Israel, and Spain), in testing the VinciBot coding robot in the classroom.

The pilot was launched in June 2023 and completed in February 2024. The pilot engaged students from different socio-economic status, with different technology levels and behaviour towards it and with different academic skills and competences.

In the beginning of the action, some issues with the delivery of the equipment to schools were encountered, which led to initial setbacks in the timeline for implementation. However, once the equipment was successfully delivered to the schools, the implementation process began in earnest. he commitment and collaboration of all stakeholders played a crucial role in navigating obstacles and ultimately achieving positive outcomes for students and educators alike.

Over a period of about 5.2 weeks and with an average of 17.7 hours of use of the robot in class, teachers and students covered various topics using it from traffic/road safety to mathematics and from learning programming concepts to social/behavioural characteristics. Pilot participants evaluated the whole process by sharing feedback during the pilot implementation and after its completion filling in structured evaluated surveys.

From teachers' perspective, they used the VinciBot primarily to support the learning process and encourage collaboration and they reported positive feedback overall, with VinciBot being easy to use and facilitating student motivation and engagement. It was perceived as beneficial for students of different skill levels and seemed that VinciBot was seen as advantageous for motivating weaker students and promoting inclusion. They also mentioned some external barriers like lack of time for planning activities, which were more prominent than issues with VinciBot itself. Teachers provided various suggestions for technical and content-related improvements to VinciBot, aiming to enhance its functionality and educational value.

On the other hand, students seemed to have enjoyed using the VinciBot, particularly its dancing, drawing, and music features. Students developed programming skills and the use of VinciBot raised their interest in programming, while they also appreciated the hands-on application and collaboration was highlighted as a positive aspect. However, some found coding challenging, while others reported difficulties in using the robot because of the language of the resources. Students also provided some suggestions for further development of the robot.

Overall, teachers' and students' evaluations suggest that the pilot was well received. They valued the chance to investigate and test the new technology and considered the pilot as a gratifying endeavour. Both teachers and students reached a consensus regarding the effectiveness and enjoyment of the educational program, the heightened motivation and focus on the use of the new materials and the pleasurable experience shared by all.

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Introduction

The purpose of this report is to present the results of the MatataStudio-VinciBot programme and delve into the pedagogical use and value of MatataStudio[1] programming learning tools.

The project was coordinated by European Schoolnet (EUN) with the active support of its Future Classroom Lab and Scientix initiatives, and in close collaboration with European Schoolnet's Network of FCL Ambassadors (see Behind the project).

The project aimed to introduce children of later primary and early secondary school to programming and fundamental artificial intelligence (AI) through task-based and project-based technology activity.

The goals for this project were:

1. To test the pedagogical value of **MatataStudio** programming learning tools and in particular their educational robot called VinciBot;
2. To review **MatataStudio's** educational concepts and learning solutions.

The pilot unfolded in nine months, from June 2023 to February 2024. Teachers from four countries participated in the project namely Spain, Finland, France, and Israel. The pilot activities in each country were coordinated by the local FCL Ambassadors, who also acted as the main contact point between EUN and the pilot teachers.

Five pilot teachers from each country were initially involved in the pilot. Pilot teachers were asked to:

- test the VinciBot in class from 4 to 6 weeks, for at least 15 hours,
- evaluate the use of the robot and provide feedback,
- develop a learning scenario illustrating the integration of the robot into the classroom setting for educational purposes.

Students were also invited to evaluate the use of the robot in their classroom. Both students' and teachers' evaluation were recorded through online surveys[2].

The project evolved in five main phases:

1. Identification of FCL Ambassadors and Pilot Teachers
2. Shipment of MatataStudio solutions to the Pilot Teachers and training by MatataStudio on the effective use of these educational tools
3. Workshop for pilot teachers led by FCL Lead Ambassadors on the use of the solutions and the tasks related to the pilot.
4. Testing MatataStudio VinciBot sets within schools.
5. Evaluation of the Programme activities

[1] MatataStudio is the brand from Matatalab Co., Ltd.
[2] The surveys were anonymous. Apart from the country of residence, no other personal data was collected.

In the following units of this report, we present all the different elements of this pilot study. First, we outline the five phases of the programme, and present the pilot methodology. Moreover, the learning scenarios that pilot teachers developed and visual representations from the implementation process, namely images and videos are showcased. Then, the results of both teachers' and students' surveys are demonstrated, and conclusions are drawn.

Behind the project

European Schoolnet is the network of 30+ European Ministries of Education, based in Brussels. As a non-profit international organisation, EUN aims to bring innovation in teaching and learning to key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners. Since its founding in 1997, European Schoolnet has used its links with education ministries to help schools become effective in the pedagogical use of technology, equipping both teachers and pupils with the necessary skills to achieve in the digital society.

MatataStudio, is an education technology company striving to provide innovative learning and entertainment experiences through technology, and empowers children with the skills, mindset, and confidence to excel in a rapidly evolving world. Starting from the field of early programming, MatataStudio has developed programming robots and artificial intelligence products for children and teenagers aged 3-18, providing teaching tools and professional educational content for the K-12 education stage.

Scientix, is the community for science education in Europe. It aims to promote and support a Europe-wide collaboration among STEM teachers, education researchers, policymakers, and other educational stakeholders to inspire students to pursue careers in the field of Science, Technology, Engineering and Mathematics (STEM). Scientix is an initiative of EUN.

The Future Classroom Lead Ambassadors network, namely FCL Ambassadors network, works towards promoting and helping mainstream the results of European Schoolnet's projects and the concept of the Future Classroom Lab, and to support educational innovation in local networks of teachers. The Future Classroom Lab was created by European Schoolnet, and it is an inspirational learning environment in Brussels, challenging visitors to rethink the role of pedagogy, technology, and design in their classrooms.

Acknowledgements

The authors would like to thank the Ministries of Education from Spain, France, Finland, and Israel for their support in the implementation of the project.

The aim and objectives of the MatataStudio pilot programme were achieved with the invaluable contribution of the pilot teachers from Finland, France, Spain and Israel and the essential involvement of the FCL Ambassadors, Sampo Forsström (Finland), Isabelle Dufrêne (France), Sara Sánchez Vílchez (Spain) and Karina Batat (Israel) who efficiently coordinated the pilot activities in their countries.

The authors would also like to thank Vivian Huang and the MatataStudio team for their vital and continuous support throughout the project, which has been a catalyst in its successful completion.

Methodology

EUN and MatataStudio outlined the parameters of the pilot and predefined the specific actions to be taken. Based on this plan and the mutual agreements reached as the project progressed, the pilot was implemented across 9 months from June 2023 until February 2024, in 4 countries, i.e., Finland, France, Spain and Israel.

The programme activities progressed in five main phases, namely 1) the identification of FCL Ambassadors and Pilot Teachers, 2) the shipment of MatataStudio solutions to the Pilot Teachers and training by MatataStudio on the effective use of these educational tools, 3) a workshop for pilot teachers led by FCL Lead Ambassadors on the use of the solutions and the tasks related to the pilot, 4) the testing of MatataStudio VinciBot sets within schools, 5) the evaluation of the Programme activities.

Participants

EUN first onboarded the FCL Ambassadors in the countries of interest and with their contribution 21 teachers were involved in the study (seven from Finland, five from Spain, five from Israel and 4 from France). These teaches worked with students in 19 classes[3].

The choice of the pilot teachers was made based on specific criteria which were the following: teachers should be in late primary-early secondary education teaching in at least five classrooms in at least two different schools, while the previous knowledge of visual programming (e.g., Scratch) would be an asset.

The terms of collaboration, roles and expectations of the parties involved in the action were defined in a Charter that both EUN and Ambassadors signed. EUN also developed info sheets for teachers, students, and parents/legal guardians which included information about the pilot and circulated them in the beginning of the action. In addition, EUN collected signed consent forms from them regarding their involvement in the pilot.

Instruments

The research methodology that we followed was based on a mixed based approach, collecting both qualitative and quantitative data both from teachers and students via post-implementation questionnaires. In addition, we collected feedback during the implementation through meetings that we had with the FCL Ambassadors.

[3] In Finland, some of the teachers worked collaboratively.

The questionnaires

The main research question was to explore the pedagogical use of the VinciBot coding robot in an educational context, i.e., in classroom. The research focused on how teachers and students used the robot in class, and what the outcomes were in terms of development of programming and digital skills but also examined the evolution of certain social skills and behavioural characteristics towards technology.

Each participating teacher and their students evaluated their experience using the VinciBot sets by filling in the assessment questionnaires developed by EUN for the purposes of the study.

At the beginning of the action, EUN developed and provided to all participating FCL Ambassadors with an assessment questionnaire, standardised with some space for qualitative feedback, for their teachers and another one for the students. Teachers' questionnaire is in English, while students' questionnaire is the students' language. All questionnaires were anonymous and, apart from the country of residence, no other personal information was requested. To address the issue of some classes not receiving the Creator Kits, EUN developed two versions of the same questionnaire for both students and teachers. This approach facilitated data analysis by accounting for potential variations in results attributable to differences in equipment availability.

The development of the questionnaires was based on previous research (Bachmann & Gras-Velázquez, 2021; Gras-Velázquez et al., 2020) and we provide here an overview of the topics. Teachers and students were asked to fill in the questionnaire after completing the testing period, sharing their feedback on the overall process and experience with the MatataStudio products. The results of these questionnaire are presented in a following unit. The questionnaires can be found in the Annex.

Teachers' questionnaire

The teachers' questionnaire comprised seven distinct sections, each designed to solicit various forms of input from participating educators.

- Section 1 was about personal information, only asking the country of residence.
- Section 2 inquired details related to teacher experience, i.e., the educational level that they worked in.
- Section 3 asked for information relevant to their class, namely their students' characteristics and the class schedule.
- Section 4 requested for information regarding teacher's experience with using digital technologies for teaching.
- Section 5 navigated teacher's experience with the VinciBot.
- Section 6 explored teachers' perceptions on the impact that the use of VinciBot had on students.
- Section 7 was designed to gather teachers' future perspectives, expectations, and overall rating.

Students' questionnaire

The questionnaire administered to students consisted of four sections, each tailored to elicit specific types of feedback and insights from the respondents.

- Section 1 requested for personal information, namely the country of residence.
- Section 2 was about the level of education.
- Section 3 explored students' experience with using digital technologies.
- Section 4 investigated students' views on the use of the VinciBot in class.

Feedback Meetings

EUN organised two online meetings to receive feedback from the implementation.

The first feedback meeting was organised in the middle of the implementation process. During this meeting the FCL Ambassadors shared feedback they had collected from the pilot teachers and clarifications were made to ensure the smooth delivery of the pilot implementation.

EUN also organized ad-hoc meetings with the FCL Ambassadors with the same objectives.

The second feedback meeting was held at the end of the pilot implementation. The FCL Ambassadors and the pilot teachers were invited to this meeting to discuss, exchange views on the pilot and share their insights and experiences.

Procedure

Delivery of equipment

The FCL Ambassadors collected the address details from the pilot teachers and sent them to EUN. EUN then shared this information with MatataStudio which organized the delivery of equipment to the teacher. Each teacher would receive 5 VinciBot sets and 5 Creator kits. Some teachers were onboarded at a later stage which led to the delivery of equipment at a subsequent time. These teachers only received the VinciBot sets and not the Creator kits.

The delivery of equipment was challenging in some cases. Imposed custom costs that led to delays in the release of the equipment till the moment they would be covered, failure of delivery from the delivery companies and reorganization of new deliveries to ensure that pilot teachers would have the equipment to implement the pilot even at a later stage, caused delays in launching the pilot process in some schools.

Pilot Implementation

EUN organized a training for the FCL Ambassadors. This training was part of the kick-off meeting and during this training MatataStudio provided all the necessary information and instructed the Ambassadors regarding the pedagogically sound use of their solutions, including the installation of the educational

solution in the classrooms. Due to the conditions that affected the pilot implementation in some countries, there were finally three different training sessions organized by EUN and conducted by MatataStudio, one for the FCL Ambassadors from France and Spain, one for the Ambassador from Finland and another one for the Ambassador from Israel.

After each training session organised for the FCL Ambassadors, they respectively instructed the pilot teachers in their group on the use of the VinciBot, therefore launching the testing of the robot in schools.

Teachers, students, and parents/legal guardians signed consent form developed by EUN. Throughout the implementation, the FCL Ambassadors acted as the main contact point for the activities in their country, supported the pilot teachers to develop activities which would be tested in the classrooms over a period of 4-6 weeks and joined each of the online meetings that EUN organised to share insights and feedback.

As for the teachers, they would need to use the VinciBot sets in their classroom(s) the educational solutions for at least 15 hours during the testing period. Each participating teacher was also requested to develop one learning scenario using the Novigado scenario tool [4]and implement that during the testing period in the classroom(s). The learning scenarios are in English and are included in this report.

[4] The Novigado Scenario Tool is part of the Novigado project of the Future Classroom Lab and funded with support from the European Commission's Erasmus+ Programme. The learning zones of the FCL are core to the tool, helping teachers to create a meaningful lesson plan. The tool guides teachers in building active learning scenarios and practical lesson plans that support active learning pedagogy.

The VinciBot in practice

Visual representations and teachers' activities

Pilot teachers shared with EUN videos and images from the implementation. Examples of these can be found in some of the learning scenarios that are presented below and in this folder: MatataStudio-pilot-2023-2024.

Some pilot teachers also disseminated the pilot through their channels. For example, one teacher from France wrote two articles in her blog: "J'ai découvert les robots VinciBot de Matatalab" and "Dessiner un robot avec un robot" and an article in the journal "Des Twittclasses": Le Jd T N°7 (calameo.com).

Learning scenarios

As part of the pilot activities, teachers developed learning scenarios that illustrate the use of the VinciBot in a classroom setting. The 19 learning scenarios created are on diverse topics showcasing the numerous possibilities of the use of VinciBot for educational purposes (Table 1).

Table 1 Learning scenarios produced within the pilot

	Learning scenario	Country	Topic
1	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Duo-final.pdf	Spain	Approaching mathematical concepts and developing STEM projects with VinciBot.
2	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Ahokas-final.pdf	Finland	Testing the VinciBot from implementing simple tasks to developing projects to help the world.
3	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-ElHalougi-final.pdf	France	Using the VinciBot to learn coding and sparkle creativity.
4	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-First-final.pdf	Israel	Learning about the quadrilaterals with the use of the VinciBot.

	Learning scenario	Country	Topic
5	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Hilpinen-final.pdf	Finland	Meeting and imaginatively travelling the Nordic and Baltic countries using the VinciBot.
6	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Yosef-final.pdf	Israel	Learning the English alphabet with the use of VinciBot.
7	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Mouhu-final.pdf	Finland	Learning about the geography and cultures of the Nordic and Baltic countries and designing games with VinciBot.
8	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Zacai-final.pdf	Israel	Investigating feelings and developing friendship skills using the VinciBot.
9	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Gorodishthev-final.pdf	Israel	Practicing traffic laws with VinciBot.
10	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Thomas-final.pdf	France	Drawing robots with VinciBot.
11	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-delSalto-final.pdf	Spain	Developing and playing a treasure hunt game with VinciBot.
12	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-GarciaFernandez-final.pdf	Spain	Coding and reflecting on the process with VinciBot.
13	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-GomezAliaga-final.pdf	Spain	Learning about dances and approaching Science, Technology, Engineering, Arts, and Mathematics (STEAM) with VinciBot.

	Learning scenario	Country	Topic
14	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Harjula-final.pdf	Finland	Learning geometry concepts with VinciBot.
15	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Reyes-final.pdf	Spain	Learning, practicing programming and coding concepts and developing programming challenges with VinciBot.
16	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Yakov.pdf	Israel	Getting to know basic programming concepts with VinciBot.
17	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Noullez-final.pdf	France	Creating a server robot with VinciBot.
18	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Dufrene.pdf	France	Exploring physical activities and well-being with the support of VinciBot.
19	https://files.eun.org/scientix/MatataStudio-2023-learning-scenario-Forstrom-final.pdf	Finland	Exploring machine learning with the VinciBot.

Presentation of results

As explained in a previous unit, we created two versions of the questionnaire for students and teachers to account for differences in equipment availability and facilitate data analysis. After the initial data analysis revealed no significant differences, we consolidated both versions of the questionnaire into a single unit for analysis, considering the data received from them collectively.

Teachers' and students' profile

There were 17 teachers in primary school education (age 5 to 11) and 4 in lower secondary school education (11-14). Four teachers were from France, seven from Finland, five from Spain and five from Israel. The age of students ranged from 8 to 15, with the most common range being 10-11 years. The subjects in which VinciBot was used ranged from traffic/road safety to mathematics (Figure 1). Teachers used the VinciBot for an average of 17.7 hours and 5.2 weeks.

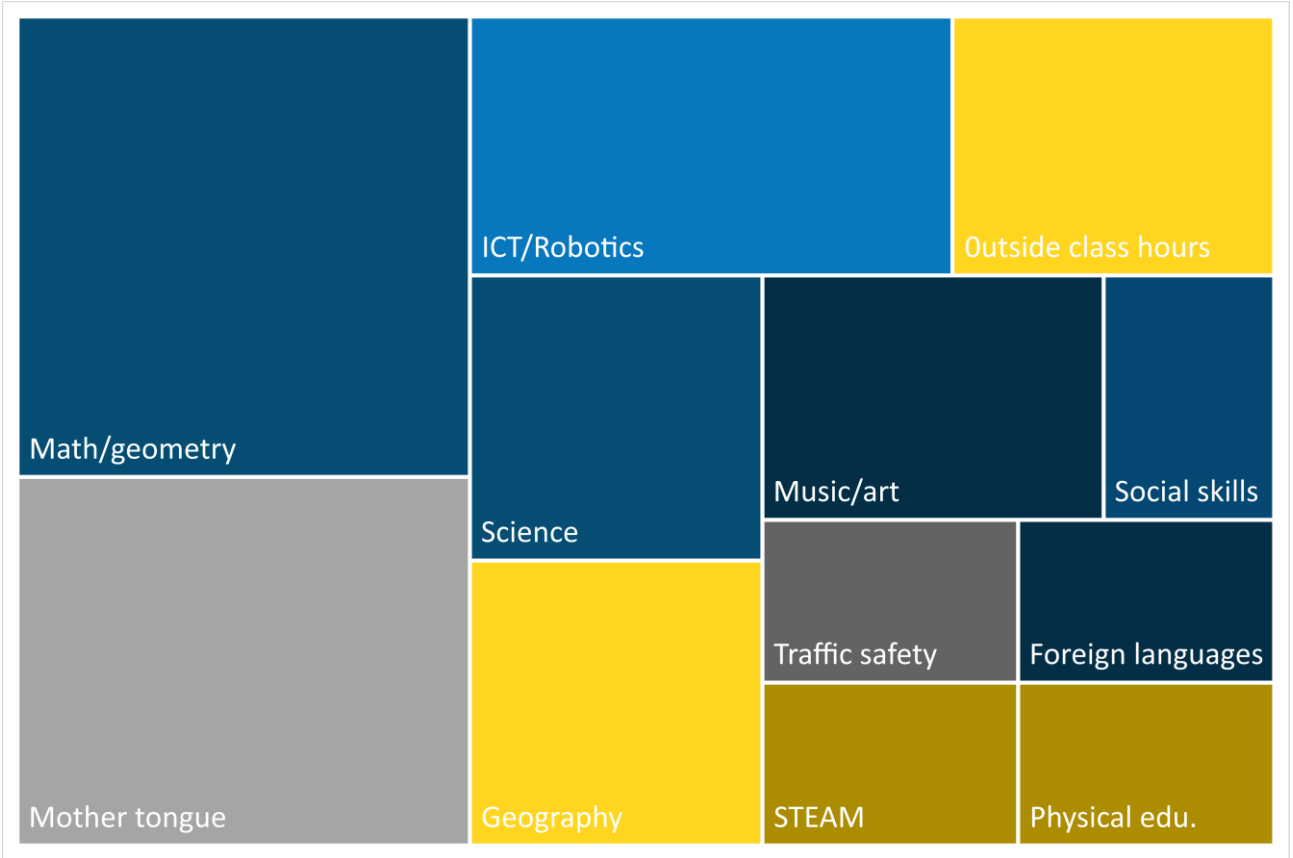

Figure 1 Subjects/context in which VinciBot was used by the teachers.

There were in total 303 students: 92 students from Finland, 78 from Israel, 73 from Spain and 60 from France (Figure 2). Three quarters of the sample were late primary education students.

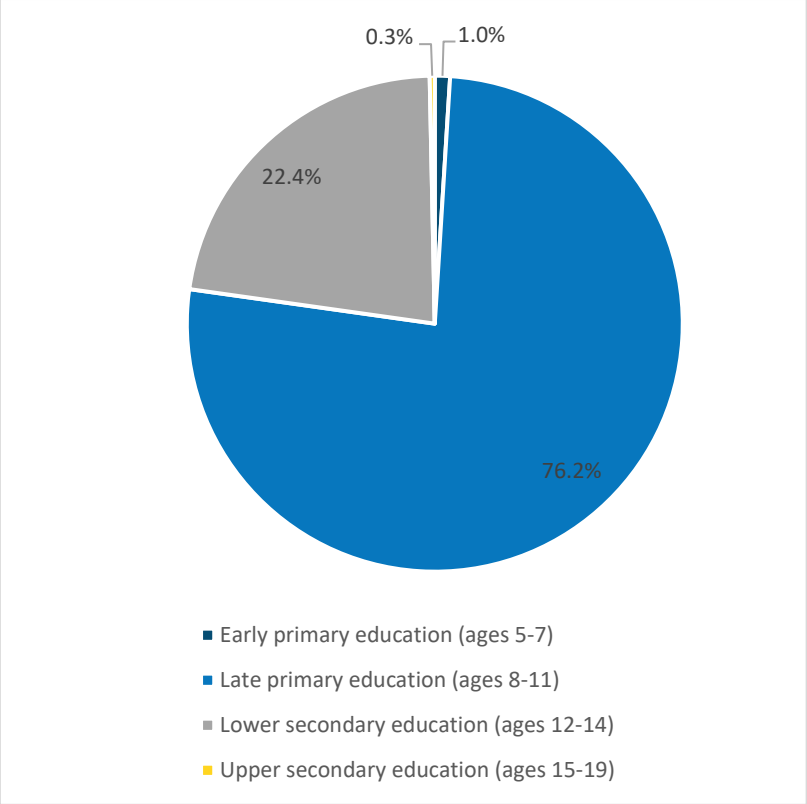

Figure 2 The student sample according to education level (n = 303)

The impact of VinciBot according to teachers

Teachers used VinciBot for a wide range of pedagogical purposes (Figure 3). On top of the list, 90% of the teachers said they used it to trigger and support the learning process. Since both teacher and student comments (explored further below) suggest that students were motivated and engaged, this seems to have been overall successful. Most teachers also used it to encourage collaboration (81%), a good way to keep students active and help them regulate their own learning. VinciBot was used by fewer teachers for self-organised work (43%) and assessment (24%). However, it would be interesting to investigate the role of VinciBot for these purposes.

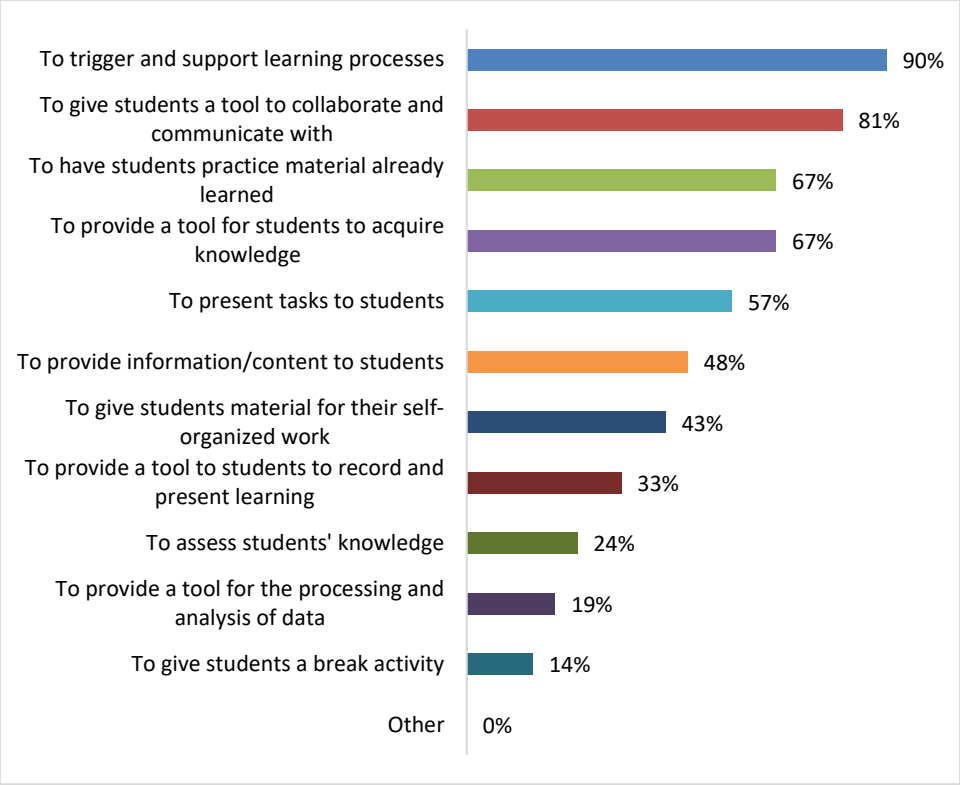

Figure 3 The ways in which the teachers used VinciBot in the classroom (multiple selections are possible).

Teachers' impressions overall about VinciBot were positive (Figure 4). One teacher from France summed it up as following:

> *My expectations are met. The robot is easy to handle and to transfer the codes. The programming interface uses a language found in other software. [The robot] is precise in its movements and takes up little space on a table.*

All teachers agreed that their students were motivated by the VinciBot and they liked it (Figure 4). A majority of teachers agreed that their students wanted to know more about VinciBot after the implementation (90%), found the design eye-catching (95%), found the content useful (90%) and acquired communication skills (81%).

Education technologies can sometimes be more beneficial for students with better ICT skills, causing a digital divide between high and low-achieving students. Therefore, we wanted to check what teachers observed concerning the impact of VinciBot on students with different skill levels. Most teachers agreed that both strong, weak, and average students benefited from VinciBot. However, the agreement score was relatively a bit lower for the weak students (81%), where a few teachers seem to think weak students might have benefited less.

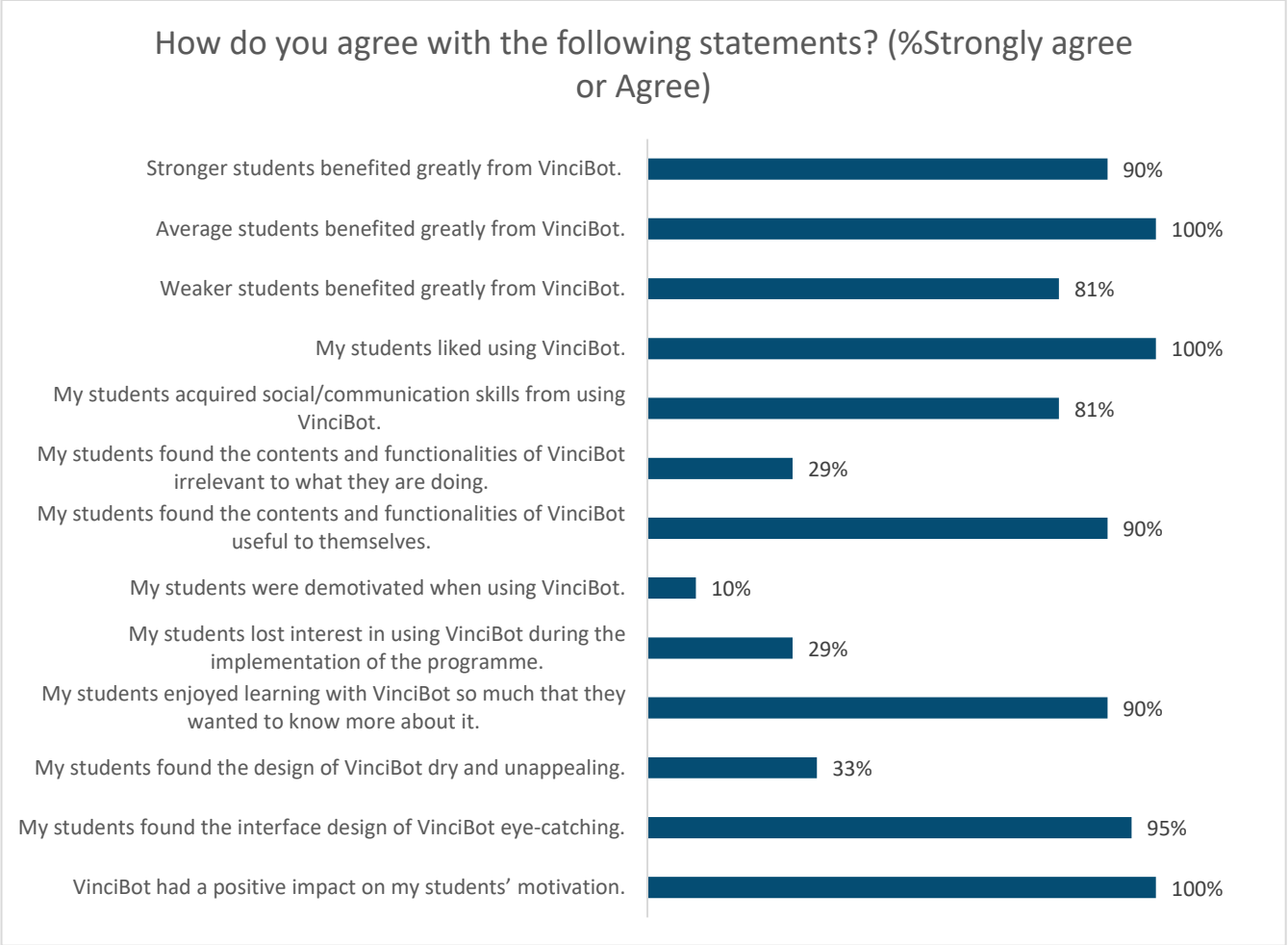

Figure 4 Teachers' impressions about VinciBot. Percentages indicate proportion of teacher who either agree or strongly agree with the statement.

Teachers found that VinciBot was overall easy to use (Figure 5). Teachers were asked to rate four statements concerning the use of VinciBot from 1 (Very hard) to 4 (Very easy). Both technical and pedagogical aspects of use seemed to come easily to teachers, with pedagogical aspects being less relatively more difficult. It is perhaps not surprising that teachers did not experience much difficulty using VinciBot because all teachers except one reported using technology in their classes at least once a week. It would be interesting to organise a follow up pilot with less experienced teachers.

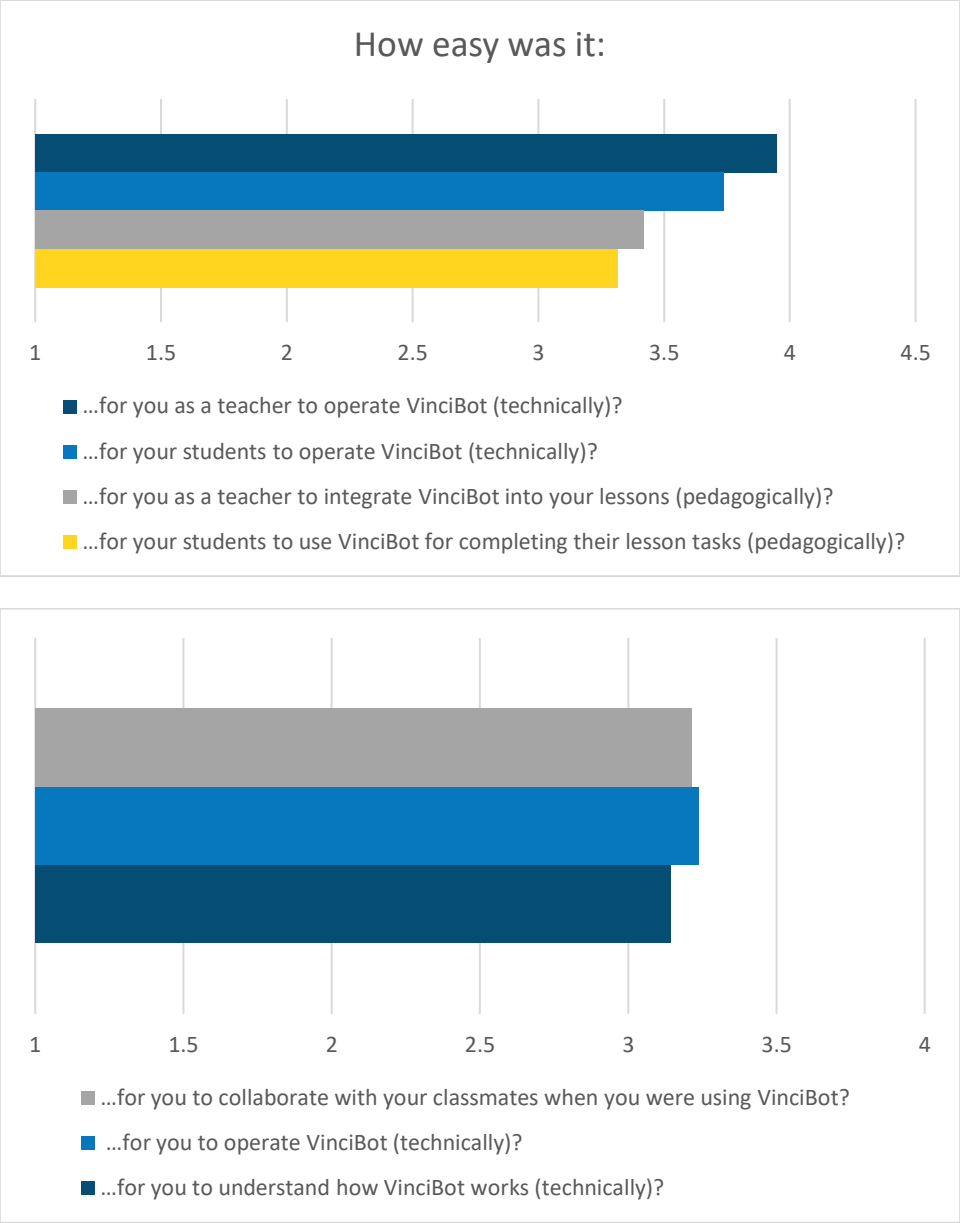

Figure 5 Teachers' and students' average rating of how easy it is to perform technical and pedagogical tasks from 1 (Very hard) to 4 (Very easy). Since the proportion of easy/very easy ratings were high, the average numerical rating scores are displayed on the graph instead.

The main impact of VinciBot is on students' motivation and cognitive/behavioural engagement according to teachers (Figure 6). Teachers agreed that their students were more focused, persistent and were strategic learners. The impact on emotional engagement and agentic engagement was relatively smaller according to teachers. Perhaps students can have more agency after a longer use of VinciBot.

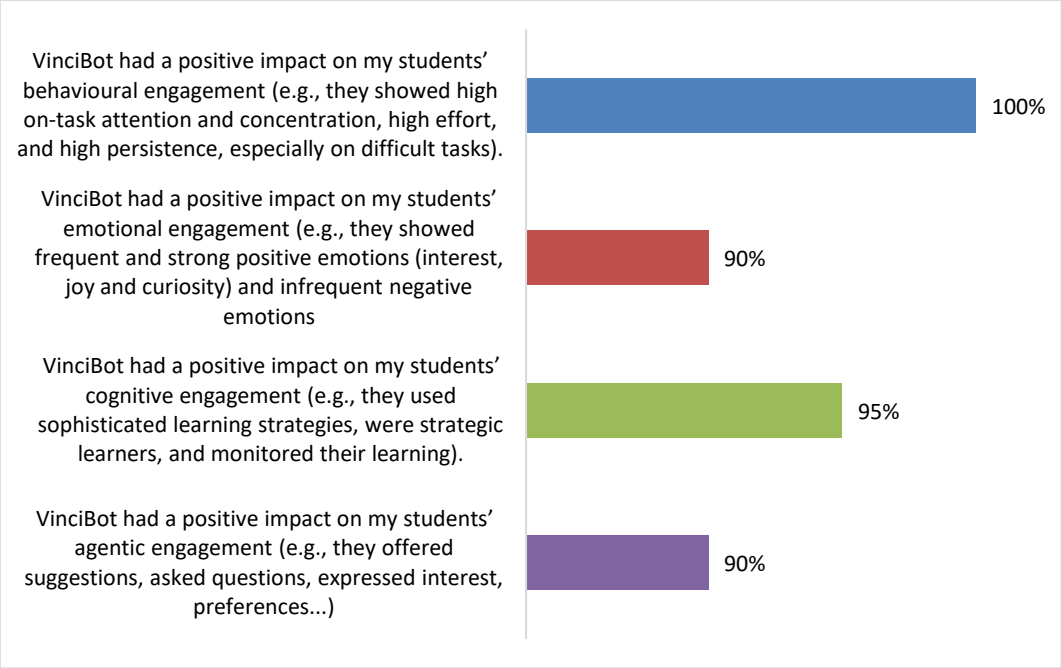

Figure 6 Teachers' impressions about the impact of VinciBot on their students. Percentages indicate the proportion of teachers who either strongly agree or agree with the statements.

To have a deeper understanding of teachers' experiences with VinciBot, we asked them to answer a series of open-ended questions in the survey. When asked about the impact on students' engagement and knowledge in the class topic, the top thing mentioned was that students were more motivated and engaged than usual (Table 2). Three teachers mentioned that it made coding more hands-on. In line with this, another teacher mentioned the robot provided quick feedback. Student comments, which we explore in the next section, also suggest that students enjoyed seeing the results of their coding in the robot. Encouraging collaboration and competitiveness were also mentioned, which are elements that gamify learning.

A teacher from Finland commented on the easiness of VinciBot compared to other tools:

> *Students were highly engaged during the whole learning process and they acquired effectively the intended learning outcomes. VinciBots provided an excellent tool for teaching coding and programming in general - easy to use (compared to e.g. Micro:Bit), quick to get to the pedagogical point of programming (compared to e.g. Lego which takes a lot of time to assemble) and a versatile concrete tool (compared to e.g. plain graphic coding environments such as Scratch Jr.).*

According to the teachers, increased student motivation was the main impact of VinciBot. One teacher commented that it helped to persevere with more complex topics:

I would say that implementing computer science through a device such as VinciBot enhances motivation due to the possibility to do "actual" things with "touchable" results. I also see the pen implementation as a success, enabling us to draw on paper. Most students show engagement to task, which only decreases when the coding requirements grow more complex for those students with less skills to be able to turn challenges into coding.

Table 2 The impact of VinciBot on students' engagement and knowledge according to teachers (n = 21).

The impact of the use of VinciBot on students' engagement and knowledge acquisition	**Number of mentions**
Motivating/engaging	11
Made things more hands-on	3
Positive impact	2
Students enjoyed it/wanted to only play with it	2
Encouraged collaboration	2
Students practiced problem solving skills	1
Gives quick feedback	1
Encouraged competitiveness	1
Ready-made coding challenges suited their age level.	1

When asked about their expectations, teachers' overall impression was positive according to their comments (Table 3). Four teachers commented that they were positively surprised, eleven said it met their expectations. In addition, two said it was easier for them to use VinciBot than expected. Only one teacher mentioned not observing a difference in students' motivation.

Three teachers commented that students could work quite independently. As a teacher from France said:

The surprise was how self-directed the students were. Although some had never seen block programming before. They helped each other out, and soon this difference in skills disappeared.

Table 3 Teachers' expectations concerning their students and themselves when using the VinciBot (n = 21).

Were expectations met for yourself and your students?	**Number of mentions**
VinciBot met my expectations	11
Motivation/excitement increased	7
Better than expected	4
They could work on their own without teacher support	3
My students are familiar with programming and could use it well	2
Promoted students' collaboration skills	2
Easier than I expected	2
It sparked interest in STEM subjects	1
It did not affect students' motivation	1
Easy and motivating	1
I would use VinciBot with students older than 10. They understood that music can be shown as numbers and codes.	1

Students seemed to enjoy the VinciBot. One teacher said students wanted to just play with it as a toy, while a teacher from France used its more fun aspects as an incentive to use it also for course work:

My students were eager to use VinciBot. They loved the features and I promised them to let VinciBot perform a dance if they were engaged in their coding tasks.

Barriers experienced by teachers

Eight teachers (38%) said that they experienced no barriers to their VinciBot implementation. The most frequently mentioned barrier was the lack of time in planning activities using VinciBot (Figure 7). Students' unfamiliarity with technology and lack of infrastructure at school were also mentioned (Figure 8). Taken together, there seems to be more external barriers than barriers generated by VinciBot itself. Four teachers picked the "other" category, which was inspected in more detail: (1) A music teacher, mentioned that the sound quality should be better to use it for music lessons; (2) another teacher said it took time to get the software approved and installed by technicians; (3) a language/ICT teacher mentioned that the content in English was a barrier; (4) a science teacher mentioned the lack of more units.

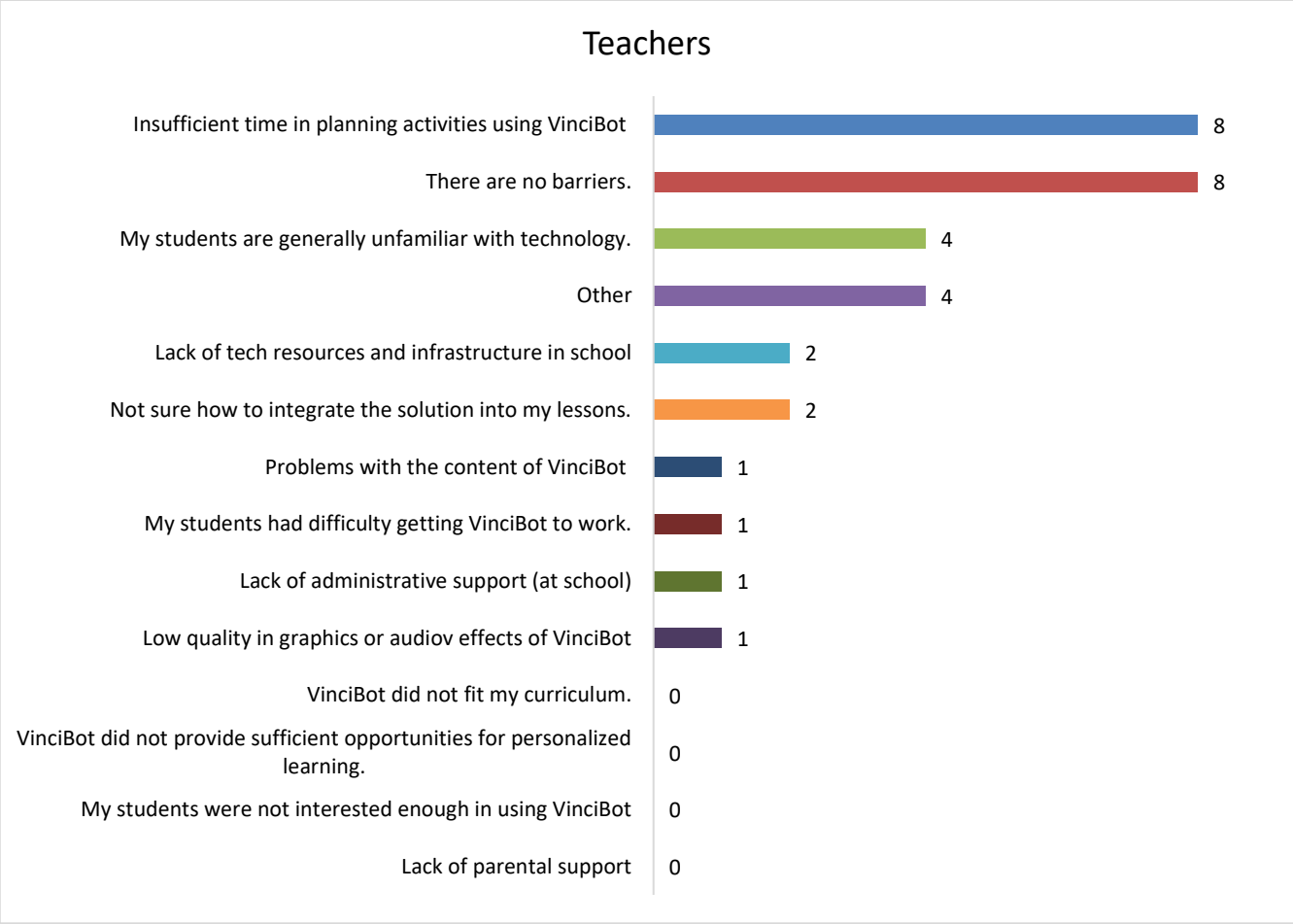

Figure 7 Problems, barriers or difficulties faced according to teachers (n = 21). Multiple selections were possible. Due to the smaller teacher sample, raw data were reported in place of percentages.

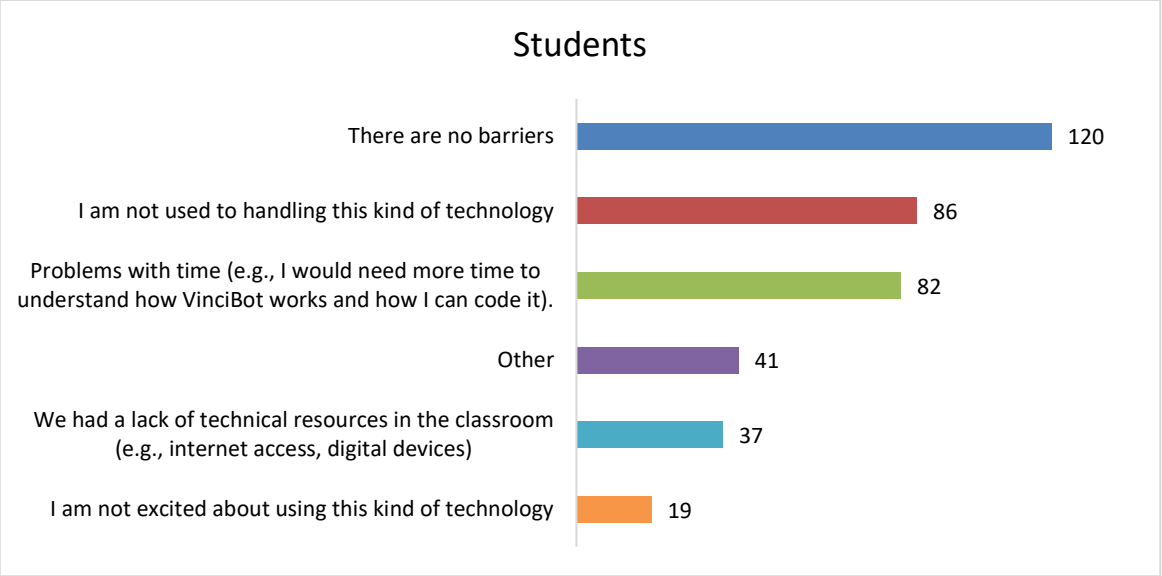

Figure 8 Problems, barriers or difficulties faced according to teachers students (n = 303). Multiple selections were possible. Due to the smaller teacher sample, raw data were reported in place of percentages.

The role of VinciBot on special education needs

The array of special education needs was not diverse in the participating teachers' classrooms (Figure 9). Attention deficit and hyperactivity (ADHD) was mentioned by 16 out 21 of teachers. Autism spectrum disorder, dyslexia, giftedness, intellectual disability were also mentioned. In addition, one teacher mentioned that they have students with a migrant background, with difficulties with the local language. Overall, the comments of teachers regarding special education needs can be considered as mostly referring to ADHD.

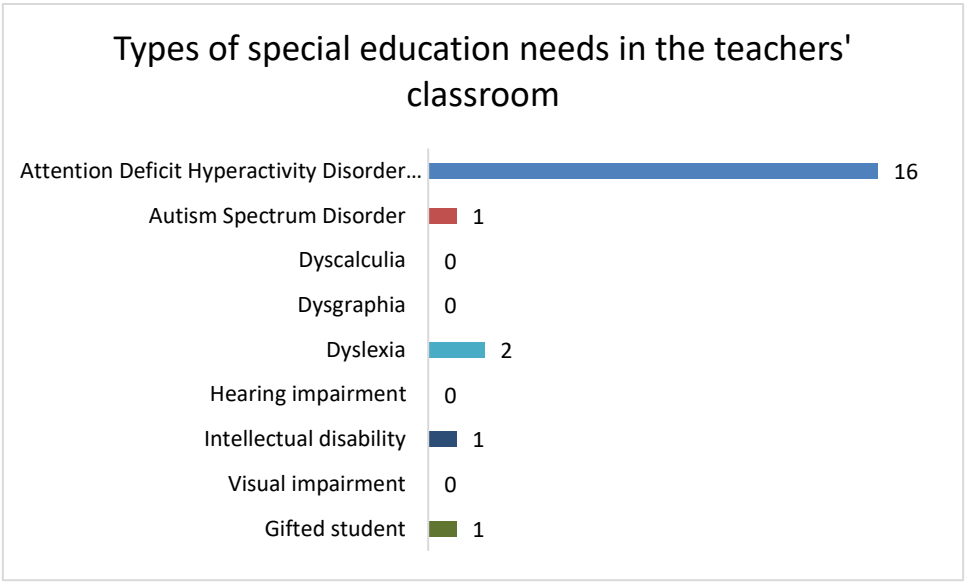

Figure 9 Types of special education needs in the teachers' classroom

When asked about the impact on special education needs (Table 4), teachers mentioned that it motivated weaker students, gave students more confidence and helped them participate more actively, comments suggesting that the robot has the potential to promote inclusion in the classroom. One teacher mentioned there were no students with SEN in the implementation, but commented that VinciBot can also help lower achieving students, not only students with special education needs:

> *In the classroom there were no SEN as such. I would say that with the weakest students (who share common traits with some SEN types) motivation was also higher than during the average lessons. More input and more directed work was needed by these students. The fact that we worked collaboratively helped them get the help they needed from peers.*

VinciBot might also facilitate communication, because one teacher commented that it helped a student who has difficulties with the local language. A teacher from Israel explained that students also reflected on how the robot could offer solutions for special education needs:

> *We have an integrated child in the class with special needs. When the children proposed ideas for scenarios they thought about how the robot could help children with special needs. The robot responded to what they wanted to do. The boy integrated into the group with them as much as possible.*

Table 4 Teachers' views about the impact of VinciBot on students with special education needs or disadvantaged students.

The impact on special education needs	Number of mentions
Helped them participate more actively	3
Motivated weaker students	2
Gave them more confidence	2
Helped with behaviour management	1
Helped them learn math	1
Helped students who have difficulty with the local language	1
Helped students stay focused for longer	1

The impact on special education needs	Number of mentions
It was difficult for them to use it	1
Made the material more visible/hands-on	1

Suggestions by teachers

Teachers were asked to make technical and content-related suggestions for improving VinciBot (Table 5). Overall, there were more comments regarding technical than content-related improvements. The type of suggestions was also quite diverse; therefore, there aren't any suggestions that particularly stand out above others. Suggestions were also diverse in terms of specificity. Two teachers mentioned that they would like the robot to have a built-in pincer arm and another one mentioned improvements regarding the lateral servomotors. A teacher from Spain suggested "the use of Artificial Intelligence", but since this function is already built into the VinciBot, it is not clear whether the teacher refers to making it easier to use or something else.

Table 5 Technical and content-related improvements suggested by teachers.

What technical improvements are needed?	Number of mentions
Include a robotic arm that can grab things/move in two coordinates.	2
Improve the design/appearance	2
Add more sound/vocal capabilities to the robot	2
Improve connection to bluetooth	2
The use of Artificial intelligence	1
Better colour recognition	1
Recognition of sound patterns, music notes	1
Improve accessibility for students	1
That the lateral servomotors were differentiated from the wheels.	1
Ability to draw dashed lines	1

What content improvements are needed?	Number of mentions
Nothing to add	3
The resources are sufficient and good	3
Include more tasks/activities	2
Challenges booklet translated to French	1
More sustainable workbook	1
Translating blocks to French	1
More abilities in other areas	1

The impact of VinciBot according to students

Students overall enjoyed using VinciBot, as seen in the overall positive attitude towards it (Figure 10). Most importantly students agree that it raised their interest in programming and that it made it easier to understand programming. Interestingly, around half of the students agreed that it helped them clarify their career choices. This could either mean that they understood that they want to pursue a career that involves programming or no programming. Regardless, the VinciBot shows students a hands-on application of programming and can help them make up their mind about their future career choices. An interesting point to consider is the challenge of collaboration. Only a few students agreed with the statement that VinciBot improved collaboration with their classmates. This does not mean that VinciBot poses a challenge to collaboration. On the contrary, 16 students commented that collaboration was the thing they enjoyed the most about VinciBot. There were other times collaboration was mentioned, which we will explore later. It could be that students perceived VinciBot more as a coding/robotics tool than a tool to develop collaboration. It could also be that students need more time to establish a modus operandi with their classmates and need to get more practice in collaboration and sharing the robot. It is clear from the comments that not every student was happy to share the robot; therefore, more robots and smaller groups can maybe improve their experience of collaboration.

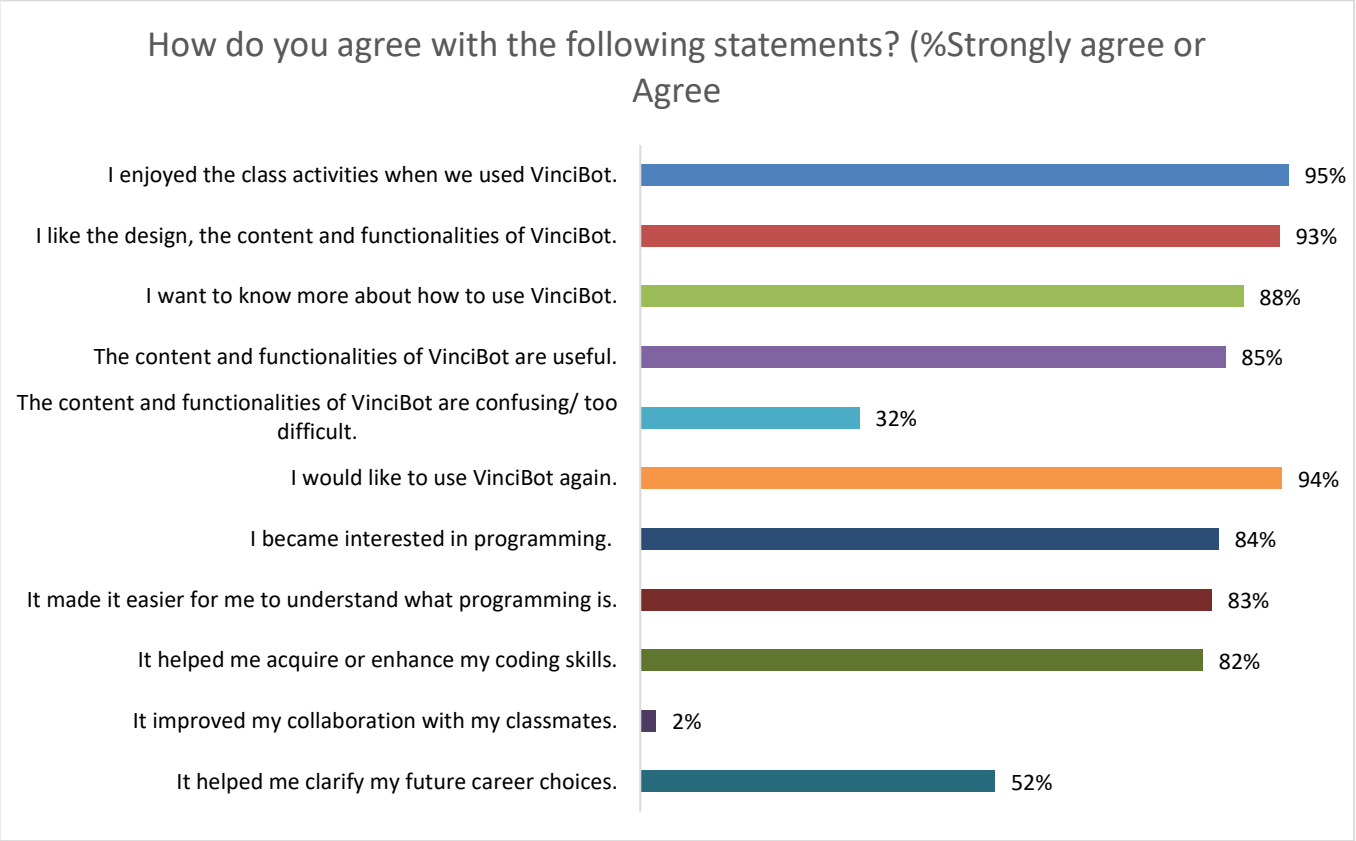

Figure 10 Students' impressions about Vincibot. Percentages indicate proportion of students who either agree or strongly agree with the statement.

Students' views about VinciBot

Students were asked three open-ended questions in the survey: (1) what they thought they learned using the VinciBot; (2) what they liked the most and the least; and (3) whether they have any additional remarks.

By asking about what they learned, we tried to capture students' reflection on their own learning triggered by the use of VinciBot. Since the activities might differ according to age level, we compared comments of primary school and secondary school students (Table 6). There were more primary school students (n = 208 than secondary school students (n = 61). Therefore, there is more diversity in the answers of primary school students. It is perhaps not surprising that the first thought that came to mind for both groups is that they learned how to program/code a robot. "Learning about technology" and "Learning to use a website/software" can be considered as similar answers. This is followed by content-related thoughts, but also more interesting, nuanced thoughts about the learning process rather than the content. Working in collaboration with classmates appear 10% of the times in the comments by primary school, and 7% for secondary school students. This suggests that students had the chance to collaborate, a very important skill for lifelong learning and problem solving. An interesting theme was "to persist and keep trying". Although mentioned by a few students only, this indicates another important skill being performed. We also saw that there were a few high-level students in terms of programming who didn't think they learned something new. On the other hand, others commented that they learned an application of coding that goes beyond using Scratch and involves controlling a hands-on robot with sensors and lights that can do many things. Furthermore, this comment suggests that even students with more advance knowledge of coding had the chance to develop other skills such as collaboration:

> *The truth is that I already knew about technology and I didn't learn anything about technology but I learned to be in a group with my classmates.*

Another comment from a student illustrates how they had fun while learning about coding and that they learned by trial and error:

> *When I used VinciBot with my colleagues, we learned a lot of fun things like when VinciBot drew everything we put in... It's been a lot of fun, although we've made a lot of mistakes we've learned a lot.*

Table 6 Students' answers concerning what they learned using the VinciBot. Primary school students on the left and secondary school students on the right.

Primary school students	% over total comments
How to program/code a robot	52%
That a robot can do many things (e.g., open drawers, dance, talk…)	10%
How to work collaboratively	7%
That robots are fun/cute/interesting	6%
Learned about (new) technology	4%
Learn math/geometric shapes, angles, distances	4%
How to use a website/software	3%
How sensors work	3%
That coding/technology is fun/interesting	2%
Learned more about the lesson content	2%
To persist and keep trying	2%

Secondary school students	% over total comments
How to program/code a robot	50%
Learned about (new) technology	8%
How to assemble a robot	7%
How to work collaboratively	10%
That robots are fun/cute/interesting	5%
That a robot can do many things (e.g., draw, dance, talk…)	3%
How to use a website/software	3%
Learned more about the lesson content	2%
Haven't learned new things about programming	2%
How sensors work	2%
How to build an airplane	2%

Primary school students	% over total comments
Haven't learned new things about programming	2%
Learned that I was good at technology	1%
I've gotten better at Scratch	1%
Learned English	1%
You can do anything with programming	1%
How to assemble a robot	1%

Secondary school students	% over total comments
Create paths	2%
That there is more to coding than Scratch	2%
Learned to think more and read	2%
Using the remote control	2%

Students were asked to write down what they liked the most and the least about VinciBot. A categorization of their answers by theme is provided in Table 7. It is clear from the comments that the dancing, singing and music production of the robot is appealing to students. The second most frequently mentioned aspect is that they like the robot in general and the fact that it can draw. In line with the previous question about what they learned, "collaborating with classmates" was also among the top 5 things mentioned in the comments. Students also seem to enjoy the fact that they can "control" the robot (tell it what to do). One student says:

> *I liked the most about this robot, which is like a little kid and if you don't tell it what to do, it will just stay put. There's nothing I didn't like!*

Another student (French, lower secondary school)'s comment suggests have students can get attached to the VinciBot emotionally:

> *For me VinciBot is a person even if it is a robot.*

The numerical data are also in line with the comments. Dancing and drawing are the most liked features by students (Figure 11). Close to half of the students said they liked music creation (46%) and around one third of the students liked the lights (on top and the LED matrix), the free coding platform and compatibility with Lego, technic motors and other third-party modules. Perhaps in line with student comments, the battery life and the remote control were selected as favourite options by fewer students.

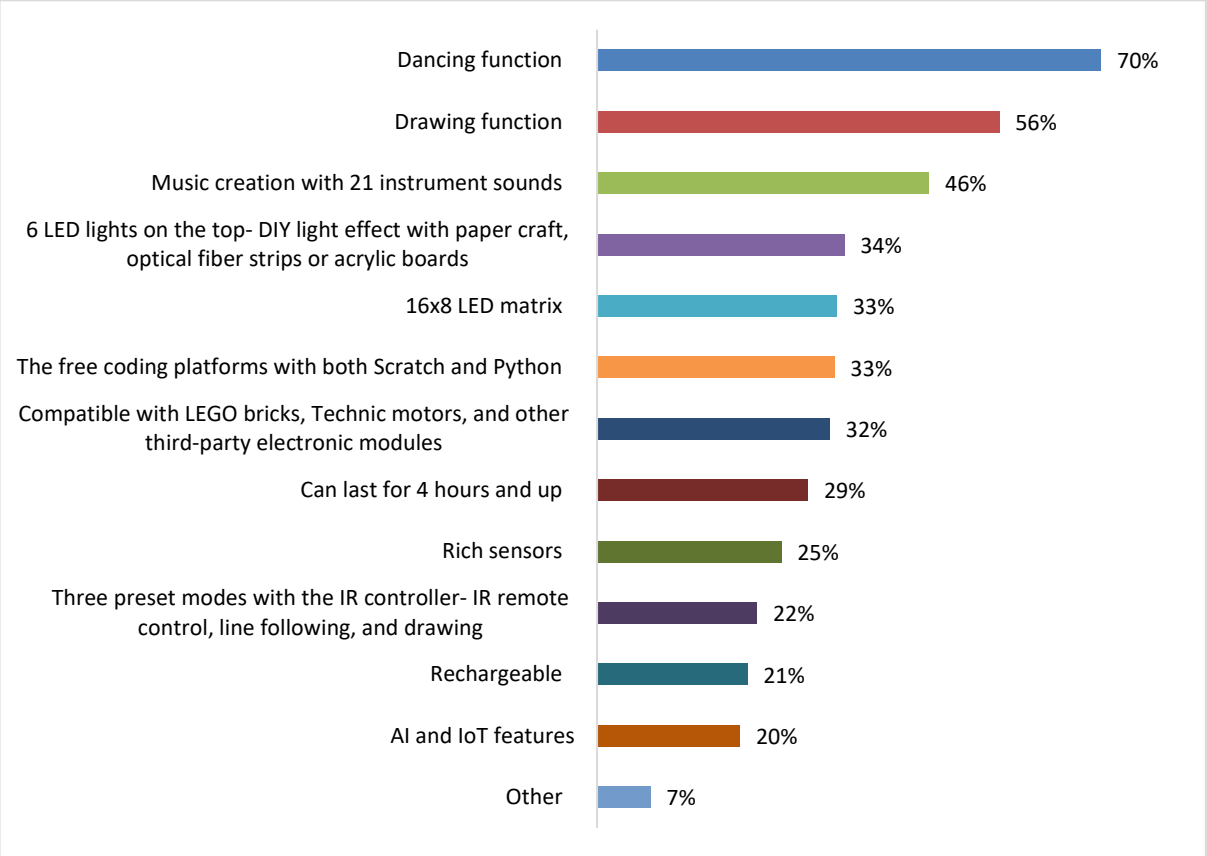

Figure 11 The favourite functions/features of VinciBot according to students. Multiple selections were possible.

It can be said that working with a robot made it more engaging to learn coding. This being said, the most frequently mentioned least-liked aspect was that it is difficult to code the robot. The comments suggest that students were sometimes frustrated when they made mistakes; "to have mistakes in my coding" was a common theme in students' comments. This is not necessarily a negative point; on the contrary, some level of challenge is considered good for learning[5].

[5] Bjork, E. L., & Bjork, R. A. (2011). Making things hard on yourself, but in a good way: Creating desirable difficulties to enhance learning. *Psychology and the real world: Essays illustrating fundamental contributions to society*, 2(59-68).

Table 7 Students' answers categorized under common themes for the question "Please write what you liked the most and what you liked the least when you were using VinciBot.". Based on answers from 260 students who provided answers to this question.

What they liked the most	% over total comments
Dancing/singing/making music	24.7%
The robot in general	13.4%
Drawing	13.0%
Coding the robot	9.6%
Collaborating with classmates	6.8%
LED lights	5.1%
The robot does what it's told	4.5%
Eating	2.7%
Doing challenges/tasks with the robot	2.7%
Playing with the robot	1.7%
Using legos	1.7%
How the robot looked	1.7%
Sounds	1.7%
Changing the face of the robot	1.4%
Moving it around	1.4%

What they liked the least	% over total comments
Difficult to code the robot	16.5%
Difficult to collaborate/having to share the robot	10.7%
To have mistakes in my coding	10.7%
Classes were short/not enough time for tasks	9.7%
That it was in English	5.8%
Sounds/music	5.8%
Battery/having to recharge it	4.9%
The remote was hard to use/not working	3.9%
Drawing	3.9%
Constructing the robot (e.g., takes time)	3.9%
The challenges/assignments	3.9%
Didn't like the robot's design	2.9%
Having to turn it upside down (to use with legos/motors)	1.9%
Couldn't see the colours when we put a hat on the robot	1.9%
The robot was too small	1.9%

What they liked the most	% over total comments
Using the computer	1.0%
The integrated AI voice	1.0%
Sensors	1.0%
It has many functions	1.0%
Ease of use	0.7%
Building the robot	0.7%
Making the plate	0.7%
It's like Scratch	0.3%
Robot warfare	0.3%
The claw	0.3%
Parts and motors	0.3%
Doing math with it	0.3%

What they liked the least	% over total comments
Lights	1.0%
That there are limitations to what it can do	1.0%
Same as Scratch	1.0%
Police sounds	1.0%
Walking	1.0%
Dancing	1.0%
Putting personal info didn't have an effect	1.0%
Tasks were unclear	1.0%
Didn't like losing the race	1.0%
Internet connection issues	1.0%
The robot was slow	1.0%
"My blocks" feature	1.0%

The last question in the survey asked whether students would like to add anything. Students did not provide many comments here. Other than thanking the project, several comments that can be considered as suggestions are listed in Table 8.

A Finnish student summarized the impact of VinciBot well:

> *I liked VinciBot because he brings good mood and good study skills to children in the future. At least in my opinion, VinciBot is intelligent and developmental.*

Table 8 Further suggestions from students.

Theme	Number of mentions
More dance moves	3
Include more activities	2
Put a camera on the robot	1
Add more languages than English	1
Time display	1
To build houses with it	1

Supporting actions to the pilot

During the pilot run

In the beginning of the action and before the pilot implementation started in schools, EUN established a dissemination strategy, developed the programme identity, and created communication material.

As part of this task, EUN developed a webpage related to the project on the FCL website: MatataStudio-VinciBot Pilot Project (eun.org).

The project implementation was showcased through a series of communication campaigns. These campaigns highlighted different project phases:

- Project Launch: Introducing the initiative.
- Classroom Implementation: Integrating robots into educational settings.
- Results Dissemination: Sharing project outcomes.

The communication channels used for these purposes included:

- A dedicated webpage on the Future Classroom Lab site. The webpage includes information about the pilot, the infosheet created for the project and this report.
- Social media posts on platforms like Scientix, STEM Alliance, Future Classroom Lab, and European Schoolnet, beginning of the actions and throughout the implementation.
- A news article on the Scientix portal.

These efforts aimed to engage educators and promote best practices in science education across Europe.

Apart from the webpage dedicated to the project and for dissemination purposes, EUN created:

- a visual and a
- presentation template.

After the pilot completion

This report will be shared with the Ministries of Education. Moreover, it will be published in the dedicated webpage on Future Classroom Lab website and on Scientix and its STE(A)M partnerships webpage, thus reaching thousands of stakeholders worldwide. In a third round of dissemination actions, results of the pilot will be shared with social media posts on Scientix, STEM Alliance, Future Classroom Lab, and European Schoolnet respective platforms.

Conclusions

With an average of 17.7 hours of implementation, 21 teachers from 19 different classes and 303 students from Finland, France, Israel, and Spain engaged with the MatataStudio VinciBot coding exploring its pedagogical utility. Feedback on the use of the robot and its impact on students is multi-dimensional. This feedback was acquired both during the implementation process through feedback meetings and after it through structured surveys administered to teachers and students.

Several conclusions can be drawn regarding the use of VinciBot in educational settings. First, analysing both teachers' and students' input, there has been positive impact on student engagement and learning. Most teachers reported that VinciBot positively impacted student motivation, engagement, and learning. Students were motivated and engaged, enjoying the hands-on experience of coding, and seeing tangible results. This is something that teachers shared also during the pilot implementation, mentioning that students were motivated and eager to start the lesson where the VinciBot would be used. Moreover, VinciBot facilitated collaboration among students, fostering an environment of teamwork and peer support. There is a consensus among all pilot participants on this, as both teachers and students referred to the development of a collaborative environment and relevant skills through the use of VinciBot.

In addition, teachers generally found VinciBot easy to use, with both technical and pedagogical aspects being manageable. The user-friendly nature of VinciBot contributed to its successful implementation across diverse educational contexts, with teachers from various countries and backgrounds utilizing it effectively. Students expressed enthusiasm for VinciBot, particularly appreciating its interactive features such as dancing, drawing, and music production. While students enjoyed using VinciBot, some found coding challenging, suggesting a need for additional support and guidance in mastering programming skills.

Teachers employed VinciBot for a variety of pedagogical purposes, including supporting the learning process, encouraging collaboration, and introducing concepts such as coding and programming. The versatility of VinciBot allowed teachers to integrate it into different subjects, ranging from mathematics to road safety education, enhancing its applicability across the curriculum.

VinciBot showed potential in promoting inclusion in the classroom, with teachers noting its positive impact on students with special educational needs (SEN) and disadvantaged backgrounds. Teachers agreed that all students, stronger, average, and weak ones benefited greatly from the VinciBot. While the agreement score was relatively a bit lower for the weak students, it seems that the use of VinciBot motivated them, increased their confidence, and facilitated their active participation in learning activities, highlighting its role in catering to diverse learning needs. Both during and after the implementations, teachers highlighted the high level of motivation and engagement developed among students, even among those who have some difficulties in concentration.

Throughout the implementation, teachers shared positive impact on some technical aspects of the robot as well. They mentioned that the fact that the battery can last 7 hours is great as it allowed them to use the robot without disruptions the whole school day. Moreover, they mentioned that the Creator kit is a great asset.

In the cases of teachers who did not receive the Creator Kit, some mentioned that it would be great to have them, though they perceived it as an opportunity to focus on the use of the robot and its different aspects and features. Therefore, the lack of the Creator Kit did not hinder the implementation of the pilot.

The FCL Ambassadors, who were coordinating the process in their countries mentioned that no technical issues were reported to them, and teachers were able to use the robot effortlessly. Some teachers found the robot robust and flexible, and they liked the fact that it is adaptable to different levels, while also that younger students can use it. On the other hand, some teachers referred to difficulties when using the Double-sided map as it is made of paper and in some cases, it broke quite quickly.

While VinciBot received overall positive feedback, teachers identified areas for improvement, including the need for enhancements in technical features such as sound capabilities and Bluetooth connectivity. Moreover, the language of the building blocks and/or the Activity Cards was also mentioned as one of the least desirable traits of the VinciBot and adding more language versions was suggested. Suggestions for content-related improvements were relatively fewer, indicating general satisfaction with the educational resources provided.

In some cases, it was stated that the work in groups was challenging, as a whole group of students should use the same robot. Nevertheless, checking the survey responses one can argue that the outcome was quite beneficial in the end, as a collaborative environment was developed.

In addition, a few teachers were initially demotivated because of some delays on the delivery of the equipment, and they were concerned about how they are going to implement the pilot later than they had initially planned, a fact that also led to one dropout from the project. Nonetheless, when teachers started using the robot in class, they expressed positive feelings.

Finally, many of them stated that they will continue using the robot even after the end of the pilot either in class or outside school. Some teachers and FCL Ambassadors are planning to train colleagues and other interested stakeholders on the use of the robot.

Recommendations for future research

Future research could explore the long-term effects of VinciBot on student learning outcomes and skill development, including its impact on higher-order cognitive abilities and STEM interest. Addressing technical limitations and expanding language support could further enhance the accessibility and usability of VinciBot in diverse educational settings.

Moreover, future research could also investigate the impact on students when smaller groups of them are formed and students will have the chance to use it both individually and in small groups, such as

pairs. In addition, the period of pilot implementation can be longer, so that teachers will have the chance to design more activities to use and code with the VinciBot and students will have the opportunity to delve more into its features and content and potentially develop further their programming skills. Moreover, both pre and posttests could be included in a future pilot to assess the effectiveness of the program and measure any changes or improvements over time. What is more, future studies could employ interviews from small groups of students and teachers after the testing period to gather more in-depth information, understand participants' opinions and perspectives and explore their experience in more detail. In addition, a study with another target group, namely teachers with no technical experience, could be conducted and then investigate the impact on their skills as well. Finally, a more extensive study could be employed, thus involving more teachers and students, to have more reliable data.

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Annex

Teachers' Questionnaire

MatataStudio-VinciBot pilot project-Teachers

Dear Teacher,

Thank you for your interest in the MatataStudio VinciBot pilot project. In the following section, you will find the evaluation survey regarding the use of the MatataStudio VinciBot Coding Robot in your classroom. Please fill in all questions honestly and completely to ensure a comprehensive and significant evaluation.

If you proceed with filling in the survey, you acknowledge that: this survey, which is conducted through MS Forms, is anonymous and does not include any personally identifiable question. The ''Anonymous Responses'' setting has been turned on, and therefore personal information including name, surname, email address are excluded from respondents' results, which means that no personally identifiable respondent information will be collected or stored by European Schoolnet as the owner of this survey

- your participation in the survey is voluntary and you can withdraw at any time;
- you have received adequate information about your participation in this survey.

If you have questions regarding this survey, please contact the coordinator of the programme at European Schoolnet, Elisavet Vlachou: elisavet.vlachou@eun.org.

For any questions regarding how your data is handled, please contact: privacy@eun.org

This survey is conducted through MS Forms which processes this survey and may therefore collect, store and/or transfer respondents' IP addresses in accordance with its own terms and conditions which can be found at:

https://privacy.microsoft.com/en-us/privacystatement.

Thank you!

* Required

Personal information *

1. What is your country of residence?

- ○ Finland
- ○ France
- ○ Israel
- ○ Spain

Teacher experience *

2. What is your main position?

- ○ Primary school teacher (ages 5-11)
- ○ Secondary school teacher - lower (ages 12-14)
- ○ Secondary school teacher - upper (ages 15-19)

Your class

Please describe your project class.

*3. Which grade is this class in? **

The value must be a number

*4. Please write the age range of the students. **

*5. How many students are there in this class? **

The value must be a number

6. Please select below any types of students' special education needs of students in your class. *

- [ ] Attention Deficit Hyperactivity Disorder (ADHD)
- [ ] Autism Spectrum Disorder
- [ ] Dyscalculia
- [ ] Dysgraphia
- [ ] Dyslexia
- [ ] Hearing Impairment
- [ ] Intellectual Disability
- [ ] Visual Impairment
- [ ] Other

7. How many academic hours per week do you teach this class for? *

The value must be a number

8. In which subject did you implement VinciBot in your class? *

9. How long did you use VinciBot in this class? *

Total hours

10. How long did you use VinciBot in this class? *

Over the course of how many weeks

Experience with using digital technologies for teaching

11. How often are you currently using digital technologies for instructional purposes with your students?

- ○ Everyday
- ○ At least once a week but not everyday
- ○ At least once a month but not every week
- ○ Less than once a month
- ○ Never

*12. To what extent do you agree with the following statements? **

	Strongly disagree	Disagree	Agree	Strongly agree
I am comfortable with when using digital technologies as tools for teaching educational content.				
I believe I am capable of effectively using digital technologies to deliver educational content in my teaching				

*13. Have you used VinciBot before? **

- ○ Yes
- ○ No

*14. Please describe where you used it, how and for what purpose. **

Your experience using the VinciBot coding robot

In the following, you will find a number of questions about your experience with VinciBot. Of course, all students are individual and different from each other. Please relate your answers to the majority of your students and ex-press the views that apply to most of them.

*15. When did you and your students use VinciBot? **

- ○ Students used it in formal/school lessons only.
- ○ Students used it outside normal school hours mainly/only.
- ○ Other

*16. How did you use VinciBot in your class? **

(Tick all that apply)

- ☐ To present tasks to students
- ☐ To provide information/content to students
- ☐ To have students practice material already learned
- ☐ To trigger and support learning processes.
- ☐ To provide a tool for students to use to acquire knowledge.
- ☐ To provide a tool for the processing and analysis of data
- ☐ To give students material for their self-organized work

- ☐ To give students a tool to collaborate and communicate with peers.
- ☐ To provide a tool to students to record and present learning results.
- ☐ To give students a break activity
- ☐ To assess students' knowledge
- ☐ Other

17. Which barriers, problems or difficulties did you face? *

(Select all that apply)

- ☐ Insufficient time in planning activities using VinciBot
- ☐ Lack of tech resources and infrastructure in school
- ☐ Not sure how to integrate the solution into my lessons.
- ☐ My students are generally unfamiliar with technology.
- ☐ VinciBot did not fit my curriculum.
- ☐ VinciBot did not provide sufficient opportunities for personalized learning.
- ☐ Problems with the content of VinciBot
- ☐ My students were not interested enough in using VinciBot
- ☐ My students had difficulty getting VinciBot to work.
- ☐ Lack of administrative support (at school)
- ☐ Lack of parental support
- ☐ Low quality in graphics or audio effects of VinciBot
- ☐ There are no barriers.
- ☐ Other

18. How easy was it: *

	Very easy	Easy	Hard	Very hard
...for you as a teacher to operate VinciBot (technically)?				
…for your students to operate VinciBot (technically)?				
…for you as a teacher to integrate VinciBot into your lessons (pedagogically)?				

… for your students **to use** VinciBot for completing their lesson tasks (pedagogically)?				

Impact of the VinciBot coding robot

In the following, you will find a number of statements on the **impact that VinciBot had on your students**.

Read and answer each item carefully because not all items have been worded the same.

19. How do you agree with the following statements? *

	Strongly disagree	Disagree	Agree	Strongly agree
VinciBot had a positive impact on my students' motivation.				
My students found the interface design of VinciBot eye-catching.				
My students found the design of VinciBot dry and unappealing.				
My students enjoyed learning with VinciBot so much that they wanted to know more about it.				
My students lost interest in using VinciBot during the implementation of the programme.				
My students were demotivated when using VinciBot.				
My students found the contents and functionalities of VinciBot useful to themselves.				
My students found the contents and functionalities of VinciBot irrelevant to what they are doing.				

My students acquired social/communication skills from using VinciBot.				
My students liked using VinciBot.				
Weaker students benefited greatly from VinciBot.				
Average students benefited greatly from VinciBot.				
Stronger students benefited greatly from VinciBot.				

20. How do you agree with the following statements concerning student engagement? *

	Strongly disagree	Disagree	Agree	Strongly agree
VinciBot had a positive impact on mystudents' behavioural engagement (e.g., they showed high on-task attention and concentration, high effort, and high persistence, especially on difficult tasks).				
VinciBot had a positive impact on my students' emotional engagement (e.g., they showed frequent and strong positive emotions (interest, joy and curiosity) and infrequent negative emotions (anger,boredom and discouragement).				
VinciBot had a positive impact on my students' cognitive engagement (e.g., they used sophisticated learning strategies, were planful and strategic learners, and monitored,checked and evaluated their work).				
VinciBot had a positive impact on my students' agentic engagement (e.g., they offered suggestions, asked questions,expressed interest, preferences, and likes vs.dislikes).				

21 Please describe the impact of the use of VinciBot on students' engagement and knowledge acquisition. *

22 Please describe the impact of the use of VinciBot on students' engagement and knowledge acquisition among students with special education needs. *

Future perspectives, expectations and overall rating

23 What do you think regarding future perspectives? *

(Select all that apply)

- ☐ I would recommend VinciBot to a colleague.
- ☐ I intend to use VinciBot again.

24 I would like to see the following improvements to VinciBot (technically): *

25 I would like to see the following improvements to VinciBot (regarding contents): *

26 Before the piloting, you had certain expectations related to your students, e.g., in terms of studentmotivation, learning outcomes etc. Please explain how far these expectations were met. *

27. Before the piloting, you had certain expectations related to yourself as a teacher. Please explain how far these expectations were met. *

28. Whilst implementing VinciBot, which unexpected reactions, changes and surprises occurred? *

29. How do you rate the overall success of VinciBot in your class or classes? *

☆ ☆ ☆ ☆

30. Please explain your rating: *

31. Is there anything else you would like to add? *

Students' Questionnaire

MatataStudio VinciBot pilot project-Students

Dear Student,

Thank you for being a part of the MatataStudio VinciBot pilot project. In the following section, you will find a survey about your experience with using the MatataStudio VinciBot Coding Robot in your classroom. Please answer all questions

honestly and completely. Remember that there are no right or wrong answers. We just want to know your thoughts about the use of the robot in your class.

We assure you that your answers will only be seen by the EUN team working on this project, and they will not be shared with anyone else. We will use your data for research only. We will only use overall data from all students. If we use some quotes from students in the report, we will keep it anonymous. This means that nobody will know it was you who said it, not even your parent or guardian. You will notice in the questionnaire that we do not ask for your name, last name or email address. We only need the name of your country.

If you continue to complete the survey, you understand and agree that:

- all of your answers are completely anonymous– nobody will know it was you who said it, not even your parent or guardian;
- EUN, as the organizer of the survey, does not collect any personal data from you, like name, surname, email address, age, gender, etc.
- your participation in the survey is voluntary and you can stop participating at any time;
- you have received all the necessary information about your participation in this survey.

We use MS Forms to collect your answers. MS Forms is owned by Microsoft, and you can see how this website collects, handles and processes data following this privacy policy link: https://privacy.microsoft.com/en-us/privacystatement or ask your teacher.

If you have any questions about this privacy document, you can contact us at: privacy@eun.org or ask your teacher to get in touch with us.

If you have questions regarding this survey, please let your teacher know. Thank you!

* Required

Personal information

1 In which country do you live? *

- ○ Finland
- ○ France
- ○ Israel
- ○ Spain

Level of education

2 You are a student in: *

- ○ Early primary education (ages 5-7)
- ○ Late primary education (ages 8-11)
- ○ Lower secondary education (ages 12-14)
- ○ Upper secondary education (ages 15-19)

Experience with using digital technologies

3 How often are you currently using digital technologies in class? *

- ○ Everyday
- ○ At least once a week but not everyday
- ○ At least once a month but not every week
- ○ Less than once a month
- ○ Never

4 How often are you currently using digital technologies at home? *

- ○ Everyday
- ○ At least once a week but not everyday

- ○ At least once a month but not every week
- ○ Less than once a month
- ○ Never

*5 To what extent do you agree with the following statements? **

	Strongly disagree	Disagree	Agree	Strongly agree
I like it when we are using digital technologies in class.				
I believe I am good when we are using digital technologies in class.				
It is easy for me to understand how technology that we use in class works.				

Your experience using the VinciBot coding robot

Below, you will find a number of questions about your experience with VinciBot.

*6 How easy was it... **

	Very easy	Easy	Hard	Very hard
…for you to understand how VinciBot works (technically)?				
…for you to operate VinciBot (technically)?				
…for you to collaborate with your classmates when you were using VinciBot?				

*7 Which problems or difficulties did you face? (Select all that apply) **

- ☐ I am not used to handling this kind of technology.
- ☐ Problems with time (e.g., I would need more time to understand how VinciBot works and how I can code it).
- ☐ We had a lack of technical resources in the classroom (e.g., internet access, digital devices).

- ☐ I am not excited about using this kind of technology.
- ☐ There are no barriers.
- ☐ Other

8 To what extent do you agree with the following statements? *

	Strongly disagree	Disagree	Agree	Strongly agree
I enjoyed the class activities when we used VinciBot.				
I like the design, the content and functionalities of VinciBot.				
I want to know more about how to use VinciBot.				
The content and functionalities of VinciBot are useful.				
The content and functionalities of VinciBot are confusing/ too difficult.				
I would like to use VinciBot again.				

9 To what extent do you agree with the following statements? *

When I used VinciBot …

	Strongly disagree	Disagree	Agree	Strongly agree
I became interested in programming.				
It made it easier for me to understand what programming is.				
It helped me acquire or enhance my coding skills.				
It improved my collaboration with my classmates.				

It helped me clarify my future career choices.				

10 Which is (are) your favorite function(s)? *

- ☐ The free coding platforms with both Scratch and Python
- ☐ Dancing function
- ☐ Drawing function
- ☐ Rich sensors
- ☐ 16x8 LED matrix
- ☐ 6 LED lights on the top- DIY light effect with paper craft, optical fiber strips or acrylic boards
- ☐ Music creation with 21 instrument sounds
- ☐ Compatible with LEGO bricks, Technic motors, and other third-party electronic modules
- ☐ AI and IoT features
- ☐ Rechargeable
- ☐ Can last for 4 hours and up
- ☐ Three preset modes with the IR controller- IR remote control, line following, and drawing
- ☐ Other

11 Please write what you learnt using VinciBot. *

12 Please write what you liked the most and what you liked the least when you were using VinciBot. *

13 Is there anything else that you would like to add? *

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European Schoolnet (EUN Partnership AISBL)
Rue de Trèves, 61 – 1040 Brussels, Belgium
+32 (0)2 790 75 75