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Vana Chiou, Asimina Tsibidaki

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The Use of Digital Technologies in Inclusive Geography Classrooms in Primary Schools: First Results

Vana Chiou¹, Asimina Tsibidaki²

b.xiou@aegean.gr, tsibidaki@aegean.gr

¹Department of Geography, University of the Aegean

²Department of Primary Education, University of the Aegean

Abstract

The aim of this study was to explore the role of digital technologies in inclusive mainstream geography classes in primary education. The participants were seven primary education teachers, employed at schools on Lesbos Island and teaching in inclusive mainstream geography classrooms where students with and without special educational needs (SEN) are educated together. Data were collected through semi-structured interviews, and thematic analysis was employed. The analysis revealed four main themes: a) content, b) digital infrastructure, c) digital learning tools, and d) the role of digital technologies. Results are discussed in relation to the benefits of digital technologies for students in inclusive mainstream classrooms.

Keywords: digital technologies, geography, inclusive classrooms, special educational needs

Introduction

Digital technologies refer to "the use of electronic tools, systems, devices, and resources that generate, store, or process data" (Zboreanu, 2024, p. 48). In education, various types of digital technologies are utilised to facilitate and promote learning (Anderson & Dron, 2011; Chiou & Cerquetti, 2025; Fokides, 2017) through the creation or management of information.

Contemporary educational policies have promoted digital technologies as a powerful tool to support teaching and learning. Recent systematic research has underscored the positive impact of digital technologies in teaching and learning processes in inclusive classes, including geography. For instance, the integration of new technologies and authentic learning activities helps address the diverse students' needs, enhancing both the academic and practical life skills of students with special educational needs (SEN) and preparing them for community and work life (Karagianni & Drigas, 2023). Web-based game learning and apps have been shown to improve students' critical thinking, creativity, language and literacy skills (Jodoi et al., 2021). For example, gamification was found to help students with SEN to do better academically than with teacher only (Chan et al., 2022). Digital technologies can also contribute to enhancing the self-learning capacity of students with learning disabilities (Al-Motrif, 2025).

Specifically, in geography classes, the use of ArcGIS Online, a web-based program that allows the creation of digital maps and applications utilising geospatial information, contributed to the development of geospatial thinking in students with special educational needs in inclusive classrooms (Loux, 2022). In another study, the same tool was found to significantly boost students' collaborative skills and academic performance compared to traditional media (Asmororini et al., 2024). This underscores the value of geospatial technology in such settings. Recently, research indicated that digital tools, including augmented reality, interactive maps, and 3D simulations, significantly enhanced the academic performance and engagement of students with SEN in a high school geography class compared to more traditional tools and methods (Zboreanu, 2024). Geo-comics, designed using the "storyboardthat" platform, were found to slightly improve students'

academic skills in an inclusive mainstream classroom compared to students who used traditional written texts, while they seemed more enthusiastic with the lesson (Alpochoritis et al., 2023). Additionally, the use of Google Maps and generative AI was found to benefit students with special needs by enhancing their engagement in learning activities and improving their spatial reasoning (Lestyono et al., 2024). Nevertheless, the enhancement of digital skills and teachers' preparedness are considered crucial factors for effectively promoting digital education and transformation in schools (Karagianni & Drigas, 2023).

In the European context, the Digital Education Action Plan 2021-2027 (European Commission, 2020) represents an educational policy initiative that has set the goal for resetting European education into an inclusive digital education for the new digital era. By prioritising the development of a high-performing digital education ecosystem and the enhancement of digital skills among students, the Action Plan aspires to transform classrooms across European Union member states into high-performing digital learning environments. The Action Plan underscores the significant role that digital technologies can play in various sectors of our lives in a digital transformation society, such as education, the green economy, and climate neutrality. In regard to education and training, digital technologies, including apps, platforms and software programs, can facilitate the implementation of contemporary didactics and assessment and promote inclusive education by supporting student-centred learning and personalised learning and ensuring equal participation in learning activities for all learners. Notably, it states that "*students with disabilities, for example, need tools that are fully accessible if they are to benefit from digital transformation*" (p. 1), as the experience from the COVID-19 period showed that "*not all tools or content were accessible, and learners with disabilities faced particular challenges*" (p. 2). The digital transformation promoted by the Digital Education Action Plan requires strategies and policies in various areas such as infrastructure, content, and teachers' and students' skills.

Focusing on the case of Greece, the educational reform of 2021, which introduced the new curricula for both primary and secondary education, aims to align the national educational policies with the European ones. The new curricula, currently under pilot testing in all experimental schools in Greece, are orientated to utilise digital technologies as tools for research and learning (Institute of Educational Policy, n.d.). Thus, the new curricula are focused on promoting digital technologies in Greek classrooms, transforming them into digital learning environments that will help in equipping students with digital skills. Nevertheless, digital technology is not a new trend in education. Its added value has long been recognised in supporting teaching and learning, and Greek curricula of previous reforms had proposed the utilisation of digital technologies in their content. However, the rapid changes in digital technologies and the need to prepare students to use them effectively and enhance their digital literacy skills have highlighted the orientation of European curricula towards a digital educational transformation.

This study, although not primarily orientated toward digital transformation in education, will present primary education teachers' practices as well as their perceptions of the role of digital technologies in inclusive mainstream geography classrooms where students with and without SEN are educated. In primary education, geography is taught as a stand-alone subject in the fifth and sixth grades by primary education teachers. Additionally, it is worth noting that the Greek state has committed to providing persons with disabilities and special educational needs with equal opportunities for full participation in education and society by voting for the law 3699/2008. Therefore, all learners should be provided with equal opportunities for full participation in the learning process.

Methodology

The focus of this research

This study is part of wider post-doc research investigating the teaching and assessment practices of teachers in inclusive mainstream classrooms of primary and secondary education. The current work presents the first research results regarding the use of digital technologies in inclusive mainstream geography classes in primary education. Therefore, the research questions addressed in this study are:

- What digital technologies do primary education teachers use in their inclusive mainstream geography classes?
- What is the role of digital technologies in inclusive mainstream geography classes?

Procedure

Initially, the first author contacted all primary and secondary education schools on Lesbos Island through email, outlining the study's purpose and inviting teachers who teach geography in inclusive mainstream classes to take part voluntarily. Teachers were assured of the confidentiality of their data. They were also made aware of their right to withdraw from the interview and its recording at any point. Thirty interviews were conducted by the first author. The interviews were transcribed in Greek. The study received ethical approval from the Ethics Committee of the University of the Aegean (Approval No. 5/6.12.2024).

Participants

This paper presents the first results on the use of digital technologies in inclusive geography classrooms in primary schools, based on the analysis of interviews with seven primary education teachers. To be eligible for participating in the interview, teachers had to meet the following criteria:

- Be employed at a primary school on Lesbos Island
- Teach geography during the 2024-2025 school year in a mainstream classroom
- Have at least one student with SEN in their geography class(es)
- Agree and consent to the terms of the interview process.

Participants were seven primary education teachers, two men and five women, with a mean age of 50.6 years (min. 38, max. 59). Four of them had a bachelor's degree, and three had a master's degree. Six participants had completed their studies at a Greek university and one at a foreign university. Out of the participants, five declared that their bachelor's study included lesson(s) focused on inclusion and special educational needs, while four of them had attended complementary training seminar(s) on special education.

The mean of total years of teaching experience was 25.4, and of teaching geography, it was 14.9. The average years of teaching in inclusive mainstream classrooms where students with SEN are included was 15.3 years. The mean of total number of students in their geography classes was 19.7 students, while an average of 2.8 students with SEN per teacher was also reported. Five teachers declared that there are integration classes in their school, while two were teaching in co-taught classes. Various types of SEN were reported in teachers' classes, including ADHD, dyslexia, autism, emotional difficulties, and general learning difficulties. Notably, one teacher mentioned Roma students' difficulties with the Greek language as SEN.

Research tool

For the purposes of this study, a semi-structured interview was used as a method of data collection, including two sections. The first section included questions focused on the socio-demographic characteristics of the participants, such as age, gender, education, years of teaching experience and of teaching the geography lesson, and teaching experience in inclusive mainstream classrooms, as well as the characteristics of their classes, including the total number of students, number of students with SEN, types of SEN, etc. The second section of the questionnaire contained questions regarding geography teachers' views and pedagogical practices within inclusive mainstream settings organised in six axes: a. diversity and inclusive education - teachers' views and experiences, b. teachers' readiness, c. teaching in inclusive mainstream classes: supporting all students, d. student and learning assessment, e. cooperation with others, and f. reflections - recommendations.

Method of analysis

A qualitative research approach was employed using thematic analysis (Braun & Clarke, 2006). The authors meticulously reviewed the interview transcripts three times to gain an in-depth understanding of the qualitative data. Initial codes were generated manually and matched with relevant extracts. These codes were later organised into broader themes recurring "patterns of meaning" (Clarke & Braun, 2017, p. 297). The final themes were determined following a collaborative discussion between the two authors.

Results

The thematic analysis of the interviews revealed four themes: a) content, b) digital infrastructure, c) digital learning tools, and d) the role of digital technologies.

Content

Out of the participants, six teachers discussed the use of various types of digital material in their teaching.

One teacher referred broadly to online material: "*They (the students) show interest because there is material that attracts you, attracts your interest*" (P1). The same participant later highlighted the importance of audio-visual resources to support inclusive practices: "*(I suggest) the use of audio and visual material*" (P1).

Similarly, participant 13 emphasised the value of engaging audio-visual material: "*If I can find a video or an application on the interactive board, that is more interesting for the children, or that allows them to be more active and engaged, then that's a good thing*" (P13). Participants 14 and 15 also referred to videos as useful digital learning content. For example, P14 noted: "*I show them a video about America, which they also have the opportunity to watch, and they feel good watching it – learning about the life, about the people, about the mountains, about the valleys, about the highlands.*" P15 added: "*We have touch maps, interactive boards, videos.*"

Two teachers made specific reference to digital geography maps. Participant 6 stated: "*I have digital maps.*" Notably, a teacher stated that "*I created a project with comics, and each student had their own comic*" (P6).

Digital Infrastructure

One teacher talked about the software he uses in his geography inclusive classes. He said, "*How powerpoint can be used to prepare projects...We made a very large presentation about the planet*" (P6).

The majority of the teachers referred to the hardware as an integral part of the digital technologies they use in their classrooms, placing particular emphasis on interactive boards, which are relatively new additions to Greek schools. "*Now, we have the interactive boards,*" said participant 1, while another teacher noted: "*The interactive board really helps. It does help. It helps in the sense that I mostly use it like a computer*" (P13). Similarly, participant 14 remarked: "*Of course, the interactive board helps a lot, and I use it very often [...] I believe it is a good tool, especially for these subjects.*"

The use of computer was also mentioned. One teacher stated: "*I created a project with comics...We created it on the computer*" (P6). Participant 12 reflected on classroom technology, noting: "*... three years ago we had the computer and the projector, so you could immediately show an image which for a child with learning difficulties - and not only - the image grabs their attention. Now we have the interactive board, which is even easier.*"

Digital learning tools

Two teachers referred to the open educational resource of *Photodentro*, the Greek National Aggregator of Educational Content. One participant stated: "*We use many resources, in the web. Especially for primary schools. The most used, the Photodentro*" (P6). Another teacher specifically mentioned: "*The maps, I mean the ones available on Photodentro*" (P15).

One participant referred to educational technologies and specifically to Scratch, a free programming platform that allows students to create their own interactive stories and games. She explained: "*With Scratch, especially, you can integrate it... You can integrate it, so you can get away from the same old, same old. Especially to create games, to make a lesson*" (P6).

Two participants referred to web.2.0 tools in the context of digital technologies used in the classroom. Participant 12 mentioned interactive activities: "*And they also like quizzes...not just crosswords but also multiple choice ones.*" Another teacher added: "*And we use various quizzes that we find and play on the interactive board, and everyone can access them - they get up and touch the images easily with their fingers*" (P13).

The role of digital technologies

The majority of participants highlighted the significant role of digital technologies in supporting learning in inclusive classrooms. Participant 12 emphasised the value of visuals, stating: "*You could immediately show an image which, for a child with learning difficulties - and not only - grabs its attention.*" She further explained how technology can enhance subject-specific learning: "*... you can use technology to captivate the child with something you're doing in geography.*" The same participant expressed a broader perspective on inclusion, stating: "*Let it be about technology - that you can include them.*"

Participant 13 added, "*If I can find a video or an application on the interactive board, that is more interesting for the children, or that allows them to be more active and engaged, then that's a good thing.*"

Participant 15 discussed the *immediacy* that digital technologies offer in teaching process. "*There is an immediacy - you talk to the child about a country, a custom, people, [...], by googling it, the children open, open a window in their mind, and pictures are worth a thousand words. No matter what you say, if they don't see it, they don't... they don't really understand it either*" (P15). The same

participant added later: *"Whether we use maps, or any kind of games that can help the children, especially children with ADHD or autism, they can be greatly supported and participate in the lesson to a large extent, which also boosts their self-confidence"* (P15).

Discussion and conclusions

The findings of this study shed light on how digital technologies are experienced and utilised by primary school teachers in inclusive geography classrooms in Greece.

Participants consistently described how digital content—particularly visual and audio-visual material—supports student engagement and accessibility. The use of videos, digital maps, and comics was added to support teaching. Participating teachers described this material as a facilitator to promote inclusive and student-centred learning experiences. This aligns with relevant research highlighting the significant role of visual and interactive digital content in addressing the diverse learning needs in inclusive classrooms, especially for students with SEN (Al-Motrif, 2025; Karagianni & Drigas, 2023). The visual immediacy provided by visual content makes geography lessons more than just a subject, transforming it into an experience of the world. As participant 15 notably mentioned, "...opens a window in their mind."

In classrooms, hardware, particularly interactive boards, emerged as a transformative tool. Interactive boards are a relatively new addition in many Greek classrooms. As teachers repeatedly mentioned, interactive boards allow real-time interactions and hands-on learning. The use of the new interactive boards and teachers' positive comments around them suggest a shift in Greek classrooms and alignment with the new educational policies that promote digital transformation in Greek education.

Notably, teachers underscored the important role of software, platforms, and open educational resources such as Scratch, Photodentro, and Web 2.0 tools like quizzes and crosswords in inclusive classrooms. The use of different tools may reflect varying levels of digital skills and confidence among teachers. Yet when used, these tools were seen as promoting the students engaging with content in playful, personalised ways and supporting teachers. These examples offered by teachers are aligned with the broader European policies that encourage the use of digital tools for differentiated instruction and inclusion in classrooms (European Commission, 2020). Relevant research in this areas has shown the benefits of using various types of digital technologies in geography lessons, especially for students with diverse needs and SEN (Alpochoritis et al., 2023; Asmororini et al., 2024; Lestyono et al., 2024; Loux, 2022; Zboreanu, 2024).

One of the most important findings across interviews was the human element behind the technology and teachers' perceptions about the role of the digital technologies. Teachers recognised the significant role of digital tools in supporting all students in inclusive mainstream classrooms. They underscored the notable impact of these technologies in supporting the learning and the understanding of geography among students with SEN. They used these tools to address the diverse needs of students and to include every learner in the process. As Participant 12 noted, "Let it be about technology - that you can include them." Teacher voices reflect that digital tools are used with the perspective to respond to the diverse needs of students.

However, the findings also point to some gaps. Teachers offered limited references to specific software tools and programming tools may reflect the need for more professional development focused on inclusive digital pedagogies. Additionally, while teachers valued the inclusive potential of digital technologies, they did not extensively discuss challenges which would offer us a better picture of their needs.

This paper presents the first results of a wider post-doc research on teachers' inclusive teaching and assessment practices in mainstream classrooms. Therefore, the small sample size (seven teachers) from a single geographical area (Lesvos Island) limits the generalisability of the findings to other contexts in Greece. Second, the study primarily investigates teachers' perceptions and experiences, without systematically examining the challenges they face, such as technical, pedagogical, or organisational obstacles. Third, the study does not provide direct evidence of the learning outcomes or the impact of digital technologies on students with SEN. We assume that the analysis of all interviews (n=30) will offer a clearer picture of the use and the role of digital tools in inclusive classrooms in Greece, at both the primary and secondary levels. Future research should focus more on the use and the role of these technologies in Greek classrooms, teachers' practices, professional needs, and challenges encountered while also examining the learning outcomes of students with SEN. Such an approach would provide a fuller understanding of the impact of digital technologies on inclusive education.

To conclude, this study contributes to our understanding by offering a first picture of how digital technologies are being used within natural classrooms in primary schools in Greece. Although the main aim of this research was not to explore the use and the role of digital technologies in inclusive mainstream geography classrooms, the repeated references of interviewees provided us with important information regarding the use of digital technology.

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