Atollo Project

Breaking barriers through education

D2.3 Transfer of good practice

WP2 – Programme Analysis and Framework Development for Inclusive Digital Education

30/04/2024 | NOLA SANTINI

Co-funded by the European Union

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About the Atollo project

Atollo (Building Digital Education Environment for Learners with Special Education Needs) aims to empower learners with disabilities by creating inclusive digital educational materials. With funding of more than one million euros from the European Union (EU), this 32-month-lasting project has garnered support from Consortium comprising 11 partners spanning 7 countries. We are in the process of including 12th partner into the consortium which will result in consortium spanning 8 countries. Within a consortium of partners from Croatia, Bulgaria, Austria, Iceland, Norway, Ireland and Australia (and joining partner from Germany), including an EdTech company, universities, schools for children with special educational needs (SEN), public authorities, SME and NGO, we will develop innovative digital tools and create high-quality digital educational content and an inclusive digital education toolkit that will contain advice and instructions for everyone who works with it, and uses digital educational materials for children with SEN.

This document represents the D2.3 Transfer of good practice, deliverable of the Building Digital Education Environment for Learners with Special Education Needs (Atollo) project no. 101132759, financed under ERASMUS-EDU-2023-PI-FORWARD call, topic: ERASMUS-EDU-2023-PI-FORWARD-LOT1.

Transfer of good practice in the context of the Atollo project refers to the process of sharing successful strategies, methodologies, and approaches developed across the participating countries: Croatia, Bulgaria, Austria, Iceland, Norway, Ireland, and Australia (and joining partner from Germany). Germany was included as well as they are in the process of reintegration to the project. This transfer aims to ensure that the innovative digital tools and high-quality educational content created for learners with Special Educational Needs (SEN) are effectively utilized and implemented in diverse educational settings. All partners countries presented in Reykjavik 10-12th of April, during Think Tank workshop, their example of good practice when it comes to teaching children with SEN mathematic and ICT. By sharing experiences and lessons learned from various countries and partners, stakeholders can capitalize on each other's strengths and address common challenges more effectively.

The target audience of the Atollo Transfer of good practice consists of educators, school administrators, policy makers, academics, EdTech companies, NGO, parents and guardians etc. Educators gain valuable insights into effective teaching methodologies. Administrators can allocate resources more effectively, policymakers can develop evidence-based policies, and researchers can evaluate practices for further improvement. Parents and guardians receive support to advocate for their child's education. Collaboration among stakeholders fosters the sharing of expertise and the creation of empowering learning environments for learners with SEN.

The Atollo Consortium

Atollo consortium is an international collaboration between 11 organisations from 7 countries from across Europe and beyond, each bringing a unique set of skills and experiences. We are in the process of including 12th partner into the consortium which will result in consortium spanning 8 countries. The Consortium unites practitioners, policymakers and digital content experts, with a shared goal of effecting real, systemic change in inclusive education.

No	Partners	Acronym
1	PROFIL KLETT D.O.O.	PK
2	SVEUČILIŠTE U ZAGREBU	UNIZG ERF
3	HOGSKOLEN I INNLANDET	INN UNI
4	REGIONALEN TSENTAR ZA PODKREPA NA PROTSESA NA PRIOBSHTAVASHTO OBRAZOVANIE SOFIA GRAD	RCSIE
5	ŠKOLA ZA ODGOJ I OBRAZOVANJE PULA	STE Pula
6	HASKOLI ISLANDS	UI
7	MATRIX INTERNET APPLICATIONS LIMITED	Matrix
8	PADAGOGISCHE HOCHSCHULE OBEROSTERREICH	PH OOE
9	MINISTARSTVO RADA, MIROVINSKOGA SUSTAVA, OBITELJI I SOCIJALNE POLITIKE	MROSP

No	Associated Partners	Acronym
1	CENTRAL QUEENSLAND UNIVERSITY	CQU
2	NATIONAL ASSOCIATION OF RESOURCE TEACHERS	NART

No	Joining Partners	Acronym
1	STADT FRANKFURT AM MAIN DER MAGISTRAT, CHARLES HALLGARTEN SCHULE IN GERMANY	CHS

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Cross-Country Transfer of Good Practices and Insights from Study Visits

This report provides a summary of the presentations delivered at the Think Tank workshop, held in Reykjavik from April 10th to 12th. During the workshop, partner countries showcased their good practices in teaching mathematics and digital competencies to children with Special Educational Needs (SEN). It also includes an overview of the study visits to Arnarskóli and Klettaskóli in Reykjavik.

All beneficiary partners participated in person. Associate partners from Central Queensland University in Australia contributed with a pre-prepared video presentation that was showcased during the event, and the National Association of Resource Teachers from Bulgaria was represented in the presentation of RCSIE.

Our colleagues from Charles-Hallgarten-Schule in Germany were also present, continuing their reintegration as a partner and demonstrating their commitment to active involvement in the project.

The presentations from the workshop are included as Annex 1 of this report.

Iceland

In Iceland, the subject area of Information and Communication Technology (ICT) is integrated across various disciplines, including media studies and computer use. The focus is on fostering information and media literacy among students, which involves critical analysis, ethical information use, and effective communication through various media. The overarching goal is to equip students with the skills to acquire, process, create, and communicate information effectively in the digital age.

Key objectives of ICT education in Iceland include promoting information and media literacy, fostering general technology skills and literacy, and encouraging active participation and creativity among students in transforming the world through their own meaning-making processes.

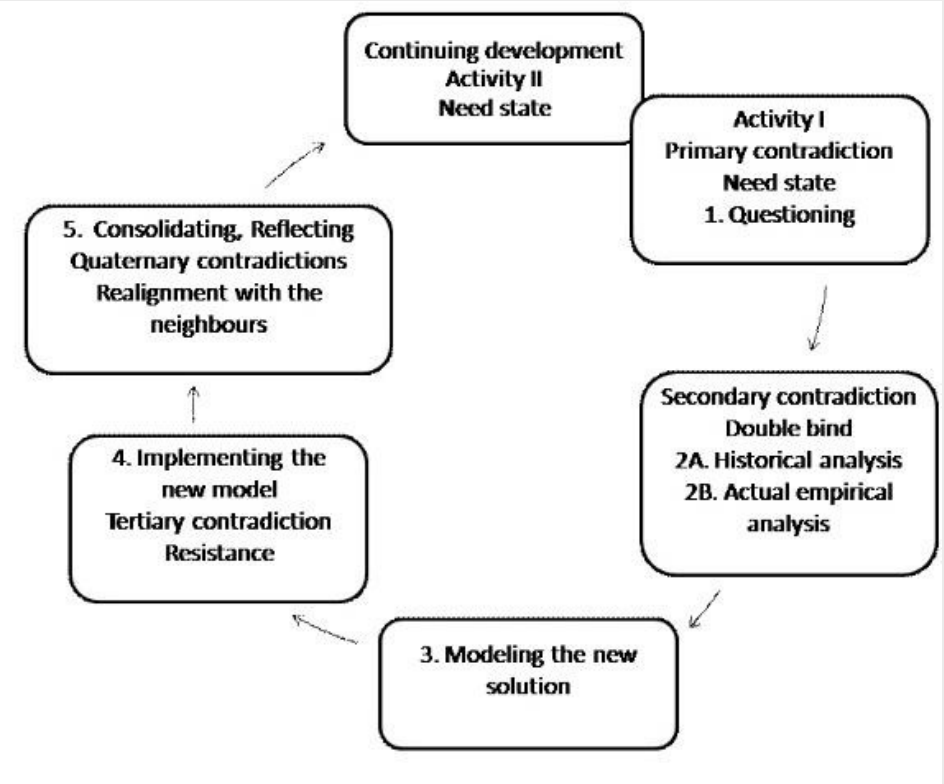
One of the main actions of Iceland's Education 2030 policy is the development of integrated school services based on tiered support, aimed at providing equal opportunities for all students. The policy emphasizes lifelong learning and rests on pillars such as equal opportunities, teaching excellence, competence for the future, well-being, and quality education. In terms of inclusive education, there is a strong emphasis on continuous reflection, assessment, and innovation to ensure that all students, including those with additional learning needs, are supported effectively. Teachers play a central role in this endeavour and require support from system structures, governance, and policies.

Psychological analyses and support services are integral parts of Iceland's social and health system, divided into three levels based on specialization. These services encompass basic analysis and response to common problems, advanced intervention by specialized experts, and specialized services provided in specialized institutions.

Furthermore, Iceland has established institutions and centres, such as the Diagnostic and Advisory Centre and the Computer Centre, which offer specialized support, education, and courses in information technology for individuals with disabilities, their families, and educational staff.

Case study – Exploring the Impact of Tablet Use on Education

This research aims to understand how the integration of tablets influences students and educators. Specifically, we assess student satisfaction, interest in learning, personalization of learning experiences, responsibility, and empowerment. We also examine the development of skills such as information literacy, technology literacy, media literacy, and digital competences, and their impact on learning achievements. Additionally, we explored changes in teachers' digital competence, teaching methods, collaboration, and the involvement of schools and parents in facilitating learning through tablet use.



Expansive learning cycle, adapted from Engeström (2001) by Jóhannsdóttir (2010)

Challenges and Solutions (in relation to the expansive learning cycle)

Initial studies, including EU research and the SHK/SJ study on the Icelandic early tablet project at Nordlinga School, suggest a range of positive impacts and possibilities for learning through tablet integration. The Nordic research network (NordLAC) highlights key themes such as agency, participatory pedagogy, learner empowerment, connected learning, and learning across contexts.

Aligning Education with Global Changes:

Efforts to educate learners in accordance with global and societal changes are underscored by the imperatives of national laws and curriculum frameworks. Yet, challenges persist, including outdated computer equipment and learning materials, alongside reliance on traditional instructional methods.

Policy and Implementation:

Political will is evident in initiatives aiming to provide tablets to students at the lower secondary and primary levels. A model for this includes the establishment of steering groups and "Tablet teams," with advisory support and leadership teams in all schools. Special emphasis is placed on fostering digital citizenship and providing information to both parents and students.

Challenges and Tensions:

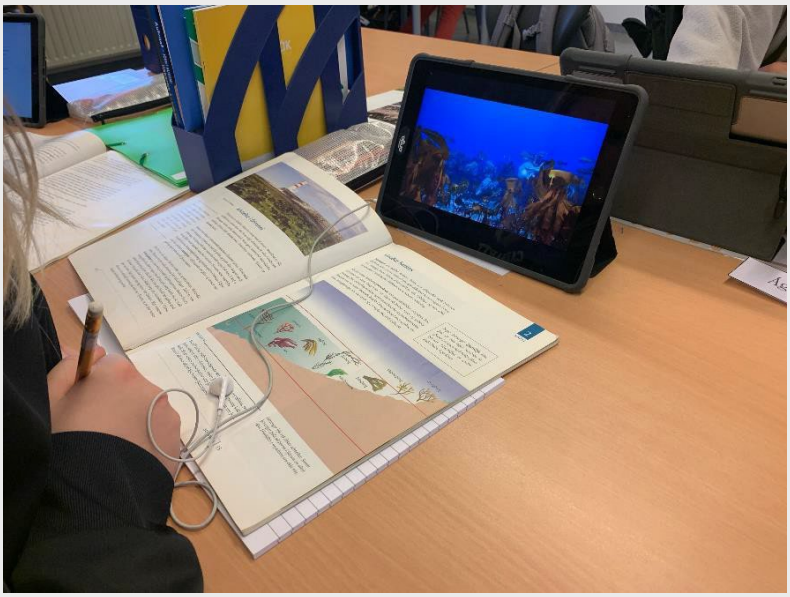
However, the top-down decision-making process has generated challenges. While students and teachers had near-unlimited access to apps and social media, tensions have arisen. Critical voices from educators and parents question aspects such as gaming, the utility of iPads, and concerns regarding digital rights and citizenship.

Adapting to the Technological Wave:

The emergence of a new technological wave, spurred by the Fourth Industrial Revolution, underscores the need for increased emphasis on multimedia, digital fabrication, and coding. Embracing this wave fosters a learning community marked by the sharing of experiences, heightened creativity, and diverse educational outcomes for students.

Continual Reflection and Adaptation:

A key to success lies in consolidating achievements, reflecting on practices, and regularly renewing school visions and curricula. This ongoing process ensures that educational institutions remain agile and responsive to evolving needs and opportunities in the digital age.



Teaching, teaching methods & learning

In order to foster a dynamic and engaging learning environment, it is imperative to continuously innovate teaching methods and leverage digital technologies effectively. By creating a diverse array of digital learning materials, educators can cater to various learning styles and preferences, ensuring that students remain actively engaged in their learning journey.

Furthermore, inviting creative project work aligned with students' interests not only cultivates a sense of ownership and enthusiasm but also encourages deeper exploration and understanding of the subject matter. Emphasizing collaboration among students through group work enhances teamwork skills and promotes peer-to-peer learning, fostering a supportive and inclusive classroom atmosphere.

Incorporating real-world relevance into the curriculum by integrating traditional school subjects with thematic projects and realistic topics pertinent to students' daily lives enriches their learning experiences and enhances their understanding of the practical applications of their studies.

Moreover, providing increased support for students with Special Educational Needs (SEN) and offering professional development opportunities for their teachers in utilizing digital technologies ensures that every student receives the necessary support and resources to succeed academically.

Targeting Information and Communication Technology (ICT) opportunities specifically for improving the teaching of students with Icelandic as a second language facilitates language acquisition and integration, catering to the diverse linguistic needs of the student population.

Increasing the visibility of school projects and showcasing innovative student work within the community not only celebrates students' achievements but also fosters a sense of pride and belonging within the school community.

Furthermore, strengthening student participation in the evaluation of school activities promotes a student-cantered approach to assessment and feedback, empowering students to take ownership of their learning outcomes.

Manifesting the use of formative evaluation techniques, such as assessment for learning and inclusive assessment, enables educators to provide timely feedback and support tailored to individual student needs, fostering continuous improvement in student learning outcomes.

Regularly monitoring the progress of individual schools and teachers in implementing formative evaluation practices and leveraging these insights for school development ensures that educational practices remain responsive to evolving student needs and pedagogical trends.

Ultimately, by moving support and teacher advice directly into the schools, educators can ensure that resources and expertise are readily accessible, facilitating effective teaching practices and promoting student success.

More examples:

Björk: Biophilia (2013) – The Biophilia Educational Project (2016)

https://www.stjornarradid.is/media/menntamalaraduneyti-media/media/frettatengt2016/Biophilia-Educational-Project-Evaluation-Attentus-2016.pdf

Hanna Rún Eiríksdóttir – Receiver of the Icelandic Education Awards 2021

https://www.youtube.com/watch?v=kDkA1R19NSA

Piotr Loj: Virtual Dream Iceland Opening! Sunna's Dream made real in VR!

https://www.youtube.com/watch?v=ET8SEzV6V_I&t=6s

Norway

Norway stands at the forefront of digitalizing education, with substantial investments made by the government in digital infrastructure and resources for schools. The curriculum places a strong emphasis on digital competence, ensuring that students are equipped with essential skills for the digital age.

In line with its commitment to inclusive education, Norway ensures that students with Special Educational Needs (SEN) receive suitable and adapted education as guaranteed by the Education Act. Assistive technology plays a crucial role in supporting students with SEN, providing tools such as text-to-speech software, augmentative and alternative communication devices, and adapted hardware to overcome barriers to learning.

In 2021, approximately 9,700 children received special educational assistance, comprising 3.6% of children in kindergarten, alongside nearly 5,100 children with disabilities in kindergarten. Most kindergarten owners facilitate cooperation with educational and psychological counselling services, child welfare services, and health centres.

With a right to ten years of primary and lower secondary education, over 60,000 six-year-olds begin school each autumn. Private primary schools, accounting for 10% of schools, have seen an increase, with close to 5% of students attending private schools. Approximately 8% of primary school pupils receive special education, with half receiving it in their regular class.

Furthermore, over 6% of pupils in primary and lower secondary schools receive special Norwegian language instruction. Despite this, on average, girls tend to achieve higher grades than boys across most subjects.

In terms of adult education, there is lower participation, with close to two-thirds of adult participants being women. In the 2021-2022 school year, there were 635,000 primary school students, spread across 2,761 elementary schools, with an average of 230 students per school. Approximately 10% of primary schools are private, attended by 4.6% of students, and mostly approved based on beliefs or recognized educational direction. Public schools, including municipal, state, or county schools, comprise 2,484 municipal primary schools and 8 state or county schools.

Norway's educational landscape reflects a commitment to digitalization, inclusivity, and continual improvement to ensure quality education for all.

In Norway, inclusive digital resources form an essential part of educational policy and practices, particularly for students with Special Educational Needs (SEN). The nation's commitment to digital inclusivity is founded on the principle that every student is entitled to adaptive education within a supportive learning environment.

Norway has taken significant steps to ensure all digital learning resources are accessible to students with SEN. The Norwegian Digital Learning Arena (NDLA) is a notable example, offering open educational resources tailored for upper secondary education. These resources include texts, images, audio, and video content that can be modified to meet diverse learning needs. Specific adaptations include video captions for students with hearing impairments and alternative texts for images to aid visually impaired students.

The use of assistive technologies is vigorously promoted to support students with various disabilities. These technologies range from screen readers and speech recognition software for students with visual impairments or learning difficulties to customizable educational software that adapts to individual learning levels.

To maximize the effectiveness of digital resources, Norwegian teacher training frequently incorporates modules on digital skills and inclusive education strategies. This ensures that educators are well-prepared to employ digital tools in enhancing educational outcomes for students with SEN.

Integrating digital resources in special education

Integrating digital resources into special education involves a multi-faceted approach tailored to enhance learning for students with Special Educational Needs (SEN).

Digital tools are instrumental in creating individualized learning pathways. They allow students to progress at their own pace in a way that best suits their unique learning styles, offering significant benefits for students with SEN who may require more tailored educational approaches.

A core component of best practices in special education is ensuring that all digital learning resources are accessible to students with SEN. This includes practical adaptations such as adding captions to videos for students with hearing impairments and providing alternative text for images to aid visually impaired students.

The deployment of assistive technology is vital in supporting students with SEN. This technology ranges from text-to-speech software and augmentative and alternative communication (AAC) devices to specially adapted keyboards and mice, each designed to facilitate easier access to educational content.

Utilizing digital platforms like Google Classroom, Microsoft Teams, or Showbie enhances communication and collaboration. These tools enable students with SEN to interact more effectively with their peers and teachers, sharing resources, assignments, and receiving feedback in a more inclusive environment.

Equipping teachers with the skills to use digital tools effectively in special education settings is crucial. Proper training ensures that educators are prepared to implement these technologies to support diverse learning needs.

Digital tools also bridge the communication gap between schools and parents. They help keep parents informed about their child's educational progress and provide them with the resources needed to support learning at home.

Finally, digital resources such as educational games and interactive exercises are used to make learning more engaging for students with SEN. These tools not only help maintain students' interest but also significantly enhance their educational outcomes by making learning enjoyable and more accessible.

Case Study/Example Description: "I Want to Participate in Society Like Everyone Else"

This case study focuses on a video presentation aimed at highlighting the challenges and aspirations of individuals with disabilities who strive to participate fully in society. The video, titled "I Want to Participate in Society Like Everyone Else," showcases personal stories from individuals discussing their daily experiences, the barriers they face, and their success in overcoming these challenges.

Jeg vil delta i samfunnet som alle andre - tolket

The utilization of digital learning resources in special education in Norway is a testament to the commitment to inclusivity and accessibility in educational practices. The array of tools available—from interactive apps and thematic boards that facilitate the learning of fundamental literacy skills, to specialized software and devices supporting reading and writing—illustrates a robust framework designed to meet the diverse needs of students. Digital resources like Office 365, iPads, and

Chromebooks, as well as audiobooks and alternative communication tools, ensure that students with various learning challenges can engage fully in their educational journey.

Moreover, the adoption of methodologies such as flipped classrooms further underscores the flexibility and adaptability of digital tools, creating structured and predictable learning environments that cater to individual learning styles. These digital strategies not only empower students with special needs but also equip educators with effective mechanisms to deliver personalized and effective instruction.

In conclusion, the comprehensive integration of digital tools in Norway's special education sector significantly enhances learning opportunities for students with special needs, paving the way for a more inclusive and equitable educational landscape.

Croatia

In Croatia, the attainment of mathematical and digital competencies is outlined by three fundamental documents: the Curriculum for Mathematics, the Curriculum for Informatics, and the Curriculum for the interdisciplinary theme of Information and Communication Technology use, all applicable in primary and secondary schools across the Republic.

Case Study 1: Centre for Education and Upbringing Šubićevac

Located in Šibenik, the Centre for Education and Upbringing Šubićevac is a public institution that falls under the Social Welfare Home governed by the Ministry of Labor, Pension System, Family, and Social Policy. It provides both elementary and high school education specifically tailored to students with developmental difficulties, as well as social care services. The centre caters to 217 beneficiaries, including children, youth with developmental challenges, and adults with disabilities, supported by 75 employees.

The education programs at the centre are highly specialized, offering:

- Elementary education through a special program with individualized approaches from grades 1 to 8.
- A special program aimed at developing competencies for daily life activities and work, suitable for ages 7 to 21.
- Vocational high school education for auxiliary occupations, also featuring specialized, individualized programs.

The Project ATTEND, titled "Enhanced Tools for Creating Equal Opportunities in Education for Pupils with Disabilities," is a pivotal initiative running from 2021 to 2024. The project's primary goal is to equip centres for the education and upbringing of students with disabilities in Croatia with assistive technology, thereby enhancing the quality of education provided. The key beneficiary of this project is the Croatian Academic and Research Network – CARNET, with partners including the Faculty of Education and Rehabilitation Sciences, Faculty of Electrical Engineering of the University of Zagreb, and the City of Reykjavik, Iceland (Department for Education and Youth).

The project focuses on students with a range of disabilities including intellectual disabilities, mental health issues, autism spectrum disorders, speech-language communication disorders, specific learning difficulties, neurological impairments, behavioural disorders, Down syndrome, physical disabilities, visual impairments, and epilepsy. A total of 34 educational institutions across Croatia are participating, involving 73 students across 19 classes.

The use of assistive technology in the educational process is diverse, covering:

- Communication aids like touch screen communicators (e.g., Tobii Dynavox TD I-110, Smartbox Touch Pad) and devices for music and communication with multiple buttons.
- Digital tools for time and space orientation, scheduling activities, and aiding in cognitive and social skills development.
- Software solutions for creating picture communication symbols (BOARDMAKER 7), text-to-speech (TTS MAESTRO), managing PODD communication books, and educational games and tools designed to improve calculation, writing, typing, reading, and memory skills (e.g., LITTLE BANK PRO, ARCHIMEDES, ABC MAESTRO PRO, MEMORY LITTLE EXPERT PRO).

The project also emphasizes the importance of teacher training to adapt both school and home environments for the successful introduction of assistive technology. Equipment is delivered in phases

and distributed among teachers who receive training through webinars. The application of this technology in daily teaching processes aims to improve teaching quality, enhance student understanding and participation, and increase motivation among students, particularly those facing specific challenges.

Implementing Assistive Technology in Education: Challenges, Solutions, and Recommendations

Educational settings face significant challenges when integrating assistive technology to support students with developmental disabilities. One of the primary obstacles is the lack of sufficient knowledge among teachers regarding the types and applications of assistive technologies. Preparation time, sensitivity to sensory inputs like sounds, diverse student needs, teacher workload, motivation levels of educational staff, frequent technical issues, and the absence of systematic educational programs on assistive technology use further complicate the implementation process.

To overcome these challenges, several practical solutions and strategies are recommended. Firstly, technical support roles, such as assistive technology technicians, are essential to maintain and troubleshoot equipment. Adjustments to existing equipment can make them more suitable for diverse learner needs, and fostering a community of mutual support and experience exchange among educators can provide valuable insights and encouragement.

Strategic suggestions for more systemic improvements include the creation of a new job position: an assistive technology expert. This role would involve assessing needs, training staff, monitoring technology use, educating school staff, and involving parents. Training programs specifically designed for students to learn how to utilize assistive technologies effectively are also crucial.

Adapting educational materials and environments to be developmentally appropriate is vital. Tools and approaches should match the students' perceptual behaviours, interests, and educational goals. Information should be presented in a straightforward manner with repetitive, predictable content, using simple vocabulary and clear formatting. Visual materials should include clear, contrasting illustrations or photographs, and auditory materials should feature clear pronunciation with moderate volume and proper pacing.

Software solutions need to be user-friendly, especially for students with intellectual disabilities, ensuring that they are not overwhelmed by complex functionalities. Examples of effective assistive technology use are demonstrated in two videos, which showcase practical applications and the positive impact of such technologies in educational settings. These examples can be viewed here:

YouTube video example: https://youtu.be/O1lsM4YLObM

Case Study 2: School for Training and Education-Pula During the COVID-19 Pandemic

When the COVID-19 pandemic prompted school closures and the shift to online learning in 2020, the School for Training and Education in Pula encountered several challenges:

- The absence of experts trained in creating online content.
- Unpreparedness of parents and students for the transition to online schooling.
- A lack of specialized online content for students with developmental challenges.

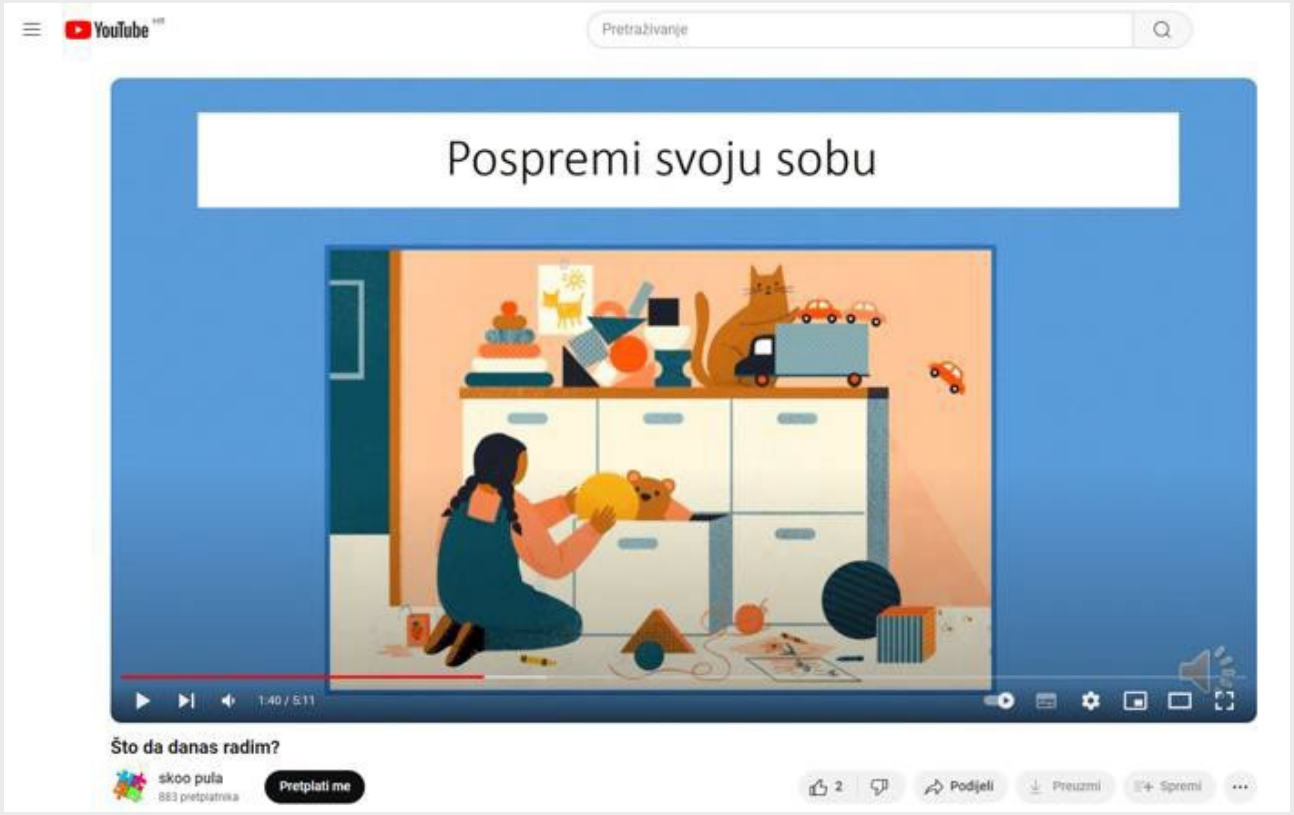
In response to the closure on March 13, 2020, the school took immediate action:

- The school initiated the creation of online content and learned recording and editing techniques.
- They established communication with parents and teachers.
- They provided education for parents and students on how to engage with online resources.
- The school developed 122 pieces of online content and launched its own YouTube channel to host the materials.
- Published their educational content on the Edutorij platform.
- Conducted online classes through MS Teams.

The content created by the school received over 7000 views and was utilized by educators both regionally and nationally. Among the YouTube videos produced were practical instructions such as:

- Using COVID-19 antigen tests.
- Correct handwashing techniques.
- Activities like "What should I do today?" and educational topics such as "Metals" and "What is Coronavirus?"
- Physical activities such as strength exercises using a towel.
- Pronunciation and writing of the Croatian letter "Š."

The experience of the School for Training and Education-Pula underscores the necessity for quality traditional and digital materials to educate students with developmental challenges. It highlights the critical need for initiatives like the Atollo project to facilitate the creation and accessibility of these educational resources. This case study demonstrates the potential for rapid adaptation and the importance of digital resource development to meet the diverse needs of students, especially in times of crisis.


YouTube
Pretraživanje
Pospremi svoju sobu
1:40 / 5:11
Što da danas radim?
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883 pretplatnika
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2
Podijeli
Preuzmi
Spremi

Bulgaria

Support for Students with Special Educational Needs (SEN)

In Bulgaria, the majority of students with SEN, approximately 25,000 per year, are enrolled in mainstream schools. However, some, particularly those with hearing or visual impairments, attend specialized schools, while more complex cases receive support in centers for special educational assistance.

General learning programs in Bulgaria are adaptable and can be individualized to meet the unique needs of each student. Additionally, specialized programs are available for students with hearing and visual impairments to ensure tailored support and learning experiences.

Despite the absence of a specific focus on digital education for SEN students at the national level, various resources and initiatives are available to support their educational journey. These include online platforms such as Podkrepi.me, which provides resources and support for inclusive education, and educational kits like those developed under projects such as SEN-Power and STEAM4SEN.

Furthermore, the use of digital tools and resources is facilitated through platforms like the Digital Backpack (Edu.mon.bg), which provides a centralized hub for educational materials and resources for both teachers and students.

While there is room for further development in the realm of digital education for SEN students, ongoing initiatives and collaborations are working towards ensuring inclusive and accessible learning environments for all learners in Bulgaria.

Some examples

- https://podkrepime.mon.bg/
- https://www.rcpppo-tg.com/%d1%83%d0%b5%d0%b1-%d1%80%d0%b5%d1%81%d1%83%d1%80%d1%81%d0%b8-2/
- https://www.unicef.org/bulgaria/%D0%BF%D1%80%D0%B8%D0%BB%D0%BE%D0%B6%D0%B5%D0%BD%D0%B8%D0%B5-cboard

- https://sen-power.eu/activities/
- https://www.steam4sen.eu/en/work-packages/io1-educational-kit.html
- https://ucha.se/
- https://edu.mon.bg/ – the digital backpack

Ireland

Introduction

Special Needs Education (SEN) encompasses the educational provisions designed for children with disabilities. It's important to note that not all children with disabilities necessarily have special education needs. In Ireland, a child is considered to have special educational needs if their ability to participate in and benefit from education is hindered by a lasting physical, sensory, mental health, or learning disability.

The policy of the Irish Department of Education is to ensure that SEN is provided within mainstream settings to the greatest extent possible. The aim is for children to be educated inclusively unless it is deemed not to be in the best interests of the child or the effective provision of education for other mainstream students. Moreover, all children, including those with special educational needs, have a constitutional right to free primary education until the age of 18.

The Education for Persons with Special Educational Needs Act of 2004 plays a pivotal role in shaping SEN provisions in Ireland. It mandates that individuals with special educational needs should be educated inclusively wherever possible, ensuring equal access to education. The Act also emphasizes the involvement of parents in the education of their children and decision-making processes.

Establishing the National Council for Special Education (NCSE) on a statutory basis, the Act empowers the NCSE to collaborate with the Irish Department of Education to enhance the delivery of special needs education. The NCSE's multifaceted roles include coordinating education and support services for children with special educational needs, planning the implementation of the Education for Persons with Special Needs Act, providing resources and information to parents and educational institutions, monitoring and assessing progress and resources for individuals with special educational needs, and advising the Minister for Education on special education matters.

In essence, Ireland is committed to ensuring that individuals with special educational needs have equitable access to education and support services, fostering an inclusive and supportive learning environment for all.

Case Study

Assistive Technology Implementation in the Mainstream Classroom to Support Students with Learning Difficulties

This case study, conducted by Alexandra Corr as part of a master's thesis published by Tampere University of Applied Sciences in November 2021, delves into the implementation of assistive technology (AT) in the mainstream classroom to cater to the needs of students with learning difficulties (LD).

Over the years, the Irish education system has transitioned from a focus on making students 'fit' into the environment to adapting the environment to meet the needs of the student, a shift that began in the 1980s. However, Ireland still lags in restructuring the curriculum, and a truly inclusive model remains lacking.

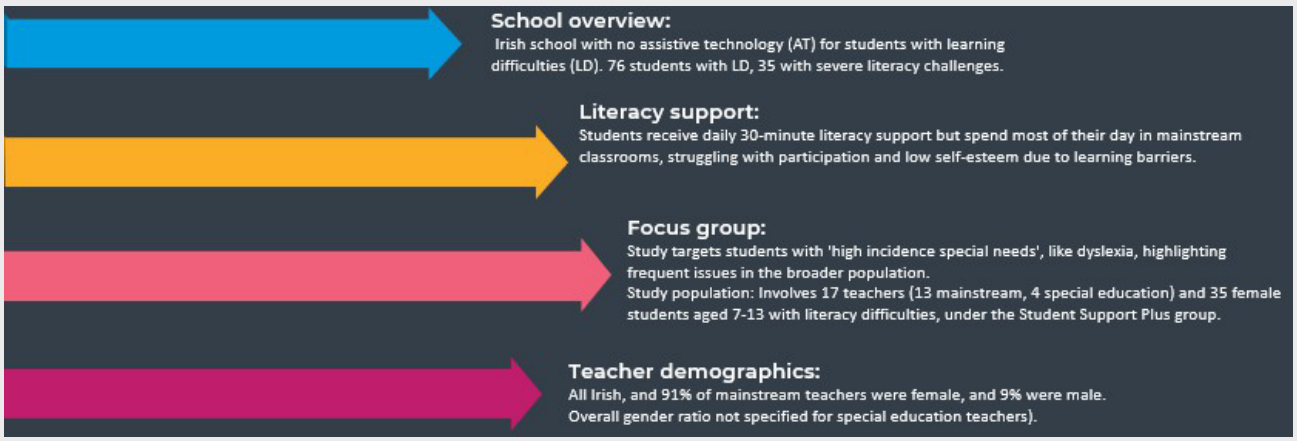
The central research question guiding this study is: "How can assistive technology (AT) be implemented in the mainstream classroom to support the needs of students with learning difficulties (LD)?"

The study primarily focuses on the utilization of 'high-tech' AT, specifically iPads, exploring their features, accessibility options, and applications within the educational context. The identified uses of iPads as assistive technology include:

1. **Text-to-Speech:** Enabling students to listen to text read aloud, facilitating comprehension and access to written content.
2. **Speech-to-Text:** Allowing students to dictate their ideas verbally, which are then transcribed into written text, aiding in writing tasks and expression.
3. **Screen Readers:** Assisting students with visual impairments by audibly describing on-screen content, enhancing accessibility to digital materials.
4. **Word Processing and Word Prediction:** Supporting students in writing tasks by providing word suggestions and predictive text features, promoting fluency and accuracy.

By exploring the implementation of such assistive technology tools in the mainstream classroom, this study contributes valuable insights into enhancing support for students with learning difficulties. It underscores the importance of leveraging technological advancements to create inclusive learning environments that cater to the diverse needs of all students.

Study Design



In this study, the primary focus revolves around the strategic planning and effective implementation of Assistive Technology (AT) within mainstream classrooms to cater to the needs of students with Learning Difficulties (LD). Conducted by Alexandra Corr as part of a master's thesis at Tampere University of Applied Sciences in November 2021, this research seeks to bridge the gap between theory and practice in the realm of inclusive education.

Methodology: Employing a meticulously crafted blend of qualitative and quantitative research methods, the study encompasses various approaches to gather comprehensive data. These methods include surveys, interviews, document reviews, observation, and autoethnography, which combines personal experience with cultural analysis to understand the intricate dynamics of AT implementation.

Data Collection and Participant Selection: Data collection involves administering surveys to teaching staff and selected students, coupled with in-depth interviews conducted with five classroom teachers directly engaged with the student participants. Ten students with literacy difficulties are chosen for surveys and AT usage, with two students from each of the five classes (ranging from second to sixth class) selected to utilize AT.

AT Implementation and Researcher's Role: The implementation of AT is strategically integrated into English lessons with the flexibility to extend its usage across various subjects. Alexandra Corr, in her role as the facilitator, adopts a constructivist learning approach, empowering students to build on existing knowledge to better comprehend and apply new concepts.

Support and Monitoring: The researcher provides ongoing guidance and support to both teachers and students to navigate challenges related to the adoption and utilization of AT. Daily teacher observations ensure effective integration and assess the overall effectiveness of AT in the classroom setting.

Student Survey and Accessibility Features: A meticulously designed nine-question closed-ended survey, complemented by an open-ended question, is administered to students using natural reader technology. The survey is tailored to be dyslexia-friendly, with provisions for questions to be read aloud. Moreover, responses are made accessible through shared notes.

Pre-test Survey and Teacher Interviews: A pre-test survey is conducted with additional students from a broader cohort, allowing for comparative analysis. Furthermore, end-of-term semi-structured interviews are conducted with teachers, providing invaluable insights recorded and transcribed for detailed analysis.

Through this comprehensive study, Alexandra Corr endeavors to contribute significantly to the advancement of inclusive education practices, particularly in the effective utilization of AT to support students with learning difficulties within mainstream classroom settings.

Results

The qualitative analysis of this study identified and structured the results under six key themes:

1. **Importance of High-Quality AT Training:** Teaching staff's minimal knowledge and training in AT highlighted the critical need for comprehensive and relevant training programs.
2. **Benefits of AT Implementation and Usage:** Successful implementation of AT in mainstream classrooms demonstrated significant benefits in supporting the needs of students with Learning Difficulties (LD).
3. **Challenges and Barriers to AT Use:** Despite its potential benefits, challenges and barriers to AT use were identified, emphasizing the importance of careful planning and consideration during integration.
4. **Importance of Careful Planning for AT Integration:** Findings underscored the necessity for meticulous planning and thoughtful integration strategies to maximize the effectiveness of AT in educational settings.
5. **Users' and Facilitators' Attitudes towards AT:** Both students and facilitators exhibited positive attitudes towards AT, emphasizing the importance of collaborative efforts and mindful utilization.
6. **Recommendations for Future AT Plans and Implementations:** Key recommendations included the need for ongoing support for teachers, early intervention for technological upskilling among students, and broader application support beyond English lessons.

Key findings from the study revealed:

- Initial AT training sessions were adequate for most students, but younger students required additional technological skill development.
- Assessing actual technological competencies of students was crucial, dispelling the myth of 'digital natives' and highlighting the need for targeted interventions.
- Despite successful AT implementation primarily in English lessons, students expressed uncertainty about its broader application, signaling the need for additional support.

- Teaching staff's limited understanding and experience with AT underscored the necessity for further assistance and professional development.
- Approximately 70% of students and all teachers demonstrated proficiency with AT, predominantly in English lessons.
- AT played a crucial role in enabling students with LD to keep pace with their peers, emphasizing the importance of inclusive technology in fostering equitable learning environments.

Challenges and suggestions

The study uncovered several challenges that must be addressed to facilitate a more successful implementation of Assistive Technology (AT) on a larger scale:

1. **Planning and Training Transition:** Moving from non-AT to AT environments necessitates meticulous planning and comprehensive training programs to ensure smooth adoption and integration.
2. **Resource Accessibility:** Post-training, the implementation of AT was hindered when accessible resources were unavailable, underscoring the importance of ensuring adequate resources to support AT usage.
3. **Limitations of iPad 'Notes':** The use of iPad 'Notes' posed limitations for homework continuation and parent engagement, highlighting the need for alternative solutions to enhance communication and collaboration.
4. **Teacher Concerns and Training Needs:** Teachers expressed initial concerns about AT due to lack of experience, indicating the necessity for ongoing dialogue and training initiatives to build confidence and proficiency.
5. **Student Concerns and Communication:** Student concerns about using AT could impede adoption without supportive communication. Encouraging students with Learning Disabilities (LD) to share how AT aids their learning can foster positive attitudes towards its usage.
6. **Enhancing Home-School Connection:** Increased support is requested for AT planning, and the development of a new program for storing school work can enhance the home-school connection, facilitating parental involvement in students' learning journeys.
7. **Integration with Curriculum:** With the Irish curriculum incorporating Universal Design for Learning (UDL), AT research becomes imperative for promoting inclusive education practices and ensuring equitable opportunities for all students.
8. **Emphasizing Wellbeing:** During the transition to AT use, it is crucial to prioritize supporting the wellbeing of both students and teachers, recognizing the potential challenges and stressors associated with technological adaptation.

9. **Effective Implementation:** Effective AT implementation relies on comprehensive teacher and student training, along with meticulous planning to address individual needs and ensure successful integration into classroom practices.

10. **Promotion of Inclusion:** AT promotes inclusion, equal opportunities, and comprehensive student development, underscoring its significance in fostering inclusive learning environments.

Suggestions for Further Research:

- Revision of AT training programs to improve approach, content, and resources.
- Consideration of early ICT skill interventions for younger students to enhance technological proficiency and readiness for AT usage.

Addressing these challenges and implementing the suggested strategies and recommendations can significantly enhance the effectiveness and impact of Assistive Technology in supporting students with Learning Difficulties in mainstream educational settings.

Conclusion

In Ireland, the pursuit of inclusive education remains a paramount goal, tailored to accommodate individual children's needs while prioritizing the efficacy of mainstream education. While specific policies and support organizations exist, there is a continued need for concerted efforts to harness technology effectively for addressing special educational needs.

The study underscores the significant advantages of Assistive Technology (AT) for students with special educational needs, emphasizing the importance of thoughtful classroom implementation. However, it is evident that both students and teachers require additional training to integrate technology effectively into educational practices, ensuring its seamless incorporation into daily learning activities.

Moreover, there is a pressing need for additional resources to support independent learning at home, thereby benefiting pupils, teachers, and parents alike. By facilitating access to resources and promoting collaborative learning environments, schools can enhance the educational experience for students with special educational needs.

Encouraging open dialogue about Assistive Technology can play a pivotal role in alleviating anxieties and fostering a more welcoming attitude towards its use. Through ongoing communication and support, stakeholders can work together to create inclusive educational settings where all students have the opportunity to thrive and succeed.

Australia

Introduction

Central Queensland University acknowledges Traditional Owners and Custodians and pays respect to the Elders of all First Nations peoples of Australia.

In Australia, laws mandate that students with disabilities have the fundamental right to access and actively participate in education. Educators are legally obligated to provide necessary adjustments to ensure that students with disabilities are afforded the same learning opportunities as their peers.

While the Australian Government provides funding for both government and non-government schools, the responsibility for school education primarily lies with the six state and territory governments. This decentralized approach allows for tailored support and interventions to meet the diverse needs of students across different regions.

One significant initiative in Australia's landscape of supporting students with autism is the Autism Cooperative Research Centre (CRC). Established in 2013, the CRC serves as the nation's independent

national source of evidence for best practices related to autism spectrum disorder across the lifespan. More information can be found on their website at autismcrc.com.au.

Additionally, Australia boasts the presence of inclusionED, an online professional learning community specifically designed for educators. This platform offers evidence-based teaching practices and tools to support diverse learners in inclusive classrooms. As an initiative of the Autism CRC, inclusionED plays a vital role in equipping educators with the necessary resources to foster inclusive learning environments. For more details, visit inclusioned.edu.au.

Through these initiatives and ongoing efforts, Australia strives to ensure that all students, including those with disabilities, receive equitable access to quality education and the necessary support to thrive in their educational journey.

Case study – Secret agent Society

Secret Agent Society is an innovative program designed to provide structured social and emotional learning for children aged 8 to 12. Developed and distributed by Social Science Translated, a wholly-owned subsidiary of the not-for-profit Autism CRC, this program offers espionage-themed learning resources to help students recognize and understand their own emotions.

For children with autism, recognizing and understanding emotions can be challenging due to difficulties in interpreting facial expressions, body language, and tone of voice. Secret Agent Society addresses this by helping children recognize emotions from body cues and effectively manage them.

The program utilizes game-based learning with an espionage theme, allowing students to take on the role of secret agents as they learn to decode how others feel and behave. Weekly meetings provide students with the opportunity to collect secret gadgets (skills) and engage in special missions to practice using their new skills.

Key areas of focus in the program include emotion recognition (in self and others), emotion regulation (particularly anxiety and anger), problem-solving (especially for social and emotional problems), and social skills (for friendship and teamwork).

Students typically participate in a series of weekly group meetings led by a trained facilitator, where they practice their skills. Prior to each meeting, students engage with a computer game that teaches skills corresponding to the group meeting's focus. After each session, students apply their skills in real-life missions and practice.

Parent and teacher engagement are integral components of the program, which spans over 6 to 8 months. Research studies, including four randomized controlled trials, have demonstrated the effectiveness of Secret Agent Society in improving children's emotion regulation and social skills across clinic, school, and telehealth contexts.

Since its launch in 2021, Secret Agent Society has seen participation from over 7,000 children. The program has also generated over 20 refereed publications, highlighting its evidence-based approach and impact.

Studies of Secret Agent Society emphasize the positive correlation between parent engagement and the quality of children's participation in the program, underlining the importance of collaborative involvement in supporting children's social and emotional development.

For more information and access to evidence-based resources, visit the program's website at secretagentsociety.com.

Challenges

One of the challenges identified in studies of the Secret Agent Society (SAS) program is a relatively high attrition rate, with approximately 32% of participants discontinuing the program. Parents cited various reasons for this, including time commitments, life events such as illness, and difficulties in engaging or motivating their child to complete the program.

Recommendations

1. **Life Skills Focus:** Digital learning resources tailored for children with Special Educational Needs (SEN) should not only address academic curriculum but also emphasize the development of life skills. By incorporating life skills into digital learning resources, students can gain practical knowledge and abilities that are essential for their everyday lives.
2. **Integration with Multi-Dimensional Programs:** Digital learning resources should not operate in isolation but should be integrated into a broader, multi-dimensional program. By complementing traditional teaching methods with digital resources, educators can create a more comprehensive learning experience that caters to the diverse needs of students.
3. **Effective Game-Based Learning:** Game-based learning has shown promise in engaging students and facilitating learning. However, to maximize its effectiveness, it must be executed thoughtfully and skillfully. Designing engaging and educational games that align with learning objectives can enhance student motivation and participation.
4. **Manageable Parental Engagement:** While parental engagement in social skills training is valuable, it's essential to set realistic expectations for parents. Recognizing the challenges parents face in implementing programs like SAS, educators should provide manageable strategies and support systems to facilitate parental involvement without overwhelming them.
5. **Collaborative Approach:** Adopting a collaborative "team around the child" approach can help alleviate the burden on both parents and teachers. By fostering a supportive environment where parents and teachers work together towards common goals, stress levels can be reduced, and the effectiveness of interventions can be enhanced.

Implementing these recommendations can contribute to the development of more effective and sustainable digital learning resources for children with SEN, ultimately promoting their holistic growth and development.

Austria

Introduction:

In the contemporary educational landscape, there's an increasing emphasis on equipping students with future-ready skills, ensuring inclusivity, and embracing digitalization. One such innovative approach is the integration of coding into primary education, serving as a methodical tool to foster digital literacy and prepare students for the evolving technological landscape.

Austria recognizes the importance of digital literacy and has incorporated digitalization into its primary education curriculum. This inclusion acknowledges the significance of aligning education with students' everyday experiences while leveraging digital tools to enhance teaching methodologies. By integrating coding into the curriculum, Austria aims to provide diverse learning opportunities, cater to various learning styles, and nurture the talents of all students.

The integration of coding into primary education is guided by key didactical principles that emphasize its pedagogical value. By utilizing media and digital devices in the classroom, educators can bridge the gap between traditional teaching methods and students' digital-native experiences. This approach not only enriches the learning environment but also offers new avenues for engagement and skill development.

Moreover, contemporary teaching and learning necessitate digitally supported approaches that empower students to navigate the digital realm effectively. While digital media supplements traditional teaching materials, it does not seek to replace them entirely. Instead, it complements existing resources, providing educators with a diverse toolkit to cater to the needs of all learners.

Integrating coding into primary education represents a forward-thinking approach to education in Austria. By embracing digitalization and leveraging coding as a methodological tool, educators can cultivate digital literacy skills, foster inclusivity, and prepare students for the demands of the digital age. This best practice approach not only enhances teaching and learning but also equips students with the essential skills needed for success in the 21st century.

Case study

Incorporating coding into primary education offers an exciting opportunity to engage students and develop essential digital literacy skills. BeeBots, programmable robotic toys, provide a hands-on learning experience that relates to children's everyday experiences while teaching fundamental coding concepts.

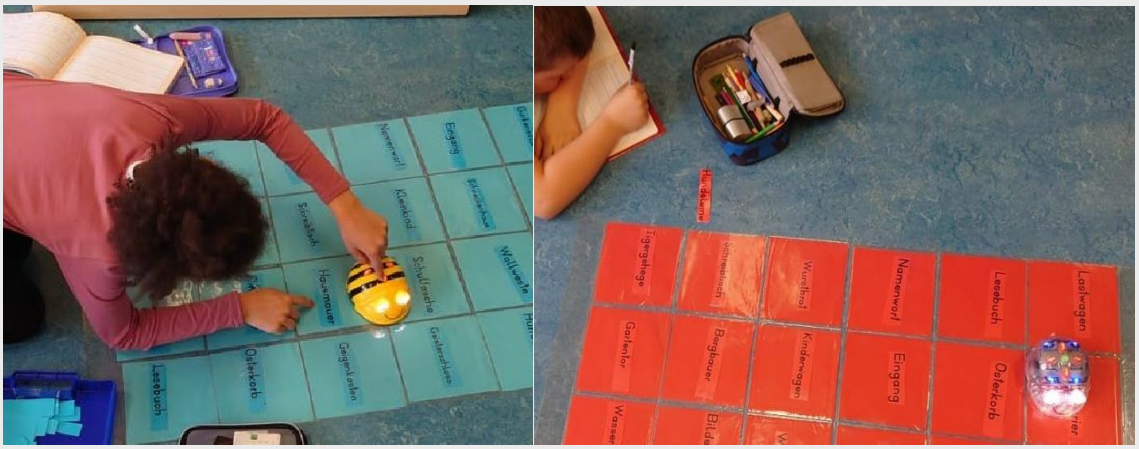
Implementation:

1. Relating to Children's World of Experience:
    - Start by discussing where children have seen robots and their typical uses.
    - Introduce basic commands such as "forward," "backward," "turn right," and "turn left" through mutual analogue coding activities.
2. Exercise:
    - Program a virtual BeeBot to navigate from the start (e.g., "beehive") to the finish (e.g., "flower").
    - Navigate around various obstacles within themed worlds of increasing difficulty.
3. Utilizing BeeBot Mats:
    - Use BeeBot mats with spaced fields to simulate movement.
    - Focus solely on coding without linking to other topics initially.
4. Progressive Challenges:
    - Roll dice to determine movement steps, gradually increasing the number of fields.
    - Introduce tools such as bees and flowers, linking coding activities with other subjects.
    - Implement colour coding to represent different levels of difficulty.
5. Task Cards and Language Development:
    - Use task cards to guide students in coding BeeBots' paths.
    - Incorporate language development by reading and searching for simple, short words.
    - Progress to more complex tasks such as searching for and copying multi-syllable words and transferring them from block letters to cursive writing.

Conclusion:

Implementing BeeBots as a methodical tool in primary education facilitates engaging and effective learning experiences. By integrating coding activities with hands-on exploration and language

development, educators can foster digital literacy skills while catering to students' diverse learning needs. BeeBots offer a dynamic platform for teaching coding concepts in a fun and accessible manner, preparing students for success in an increasingly digital world.



Germany

In Germany, the focus is on students with developmental delay and limited cognitive resources, particularly those who struggle with abstract thinking and planning actions in advance. These students often rely on concrete materials and familiar situations and may experience difficulties in language, working memory, and sensory perception.

To address the needs of these students, Germany utilizes the Diagnostic Inventory for Promoting Mathematical Basic Competencies (DIFMaB). This assessment tool is designed to evaluate students' current proficiency in various mathematical concepts, including pre-numeracy, numerical concepts, and arithmetic operations. By identifying areas of strength and weakness, educators can tailor interventions to enhance students' mathematical proficiency.

The primary purpose of DIFMaB is to determine the most suitable intervention measures for each student based on their individual needs. Through targeted interventions, educators can provide tailored support to help students overcome challenges and develop essential mathematical skills.

Best practice examples

Body schema

Body schema encompasses our mental and subconscious understanding of the positions of body parts, crucial for maintaining movement and balance. Participating in exercises such as human body puzzles leverages this schema to correctly position body parts. Likewise, dressing a figure aids in utilizing body schema to recognize the spatial connections between clothing and body parts. These activities not only educate about body anatomy but also demonstrate their real-world relevance in tasks like dressing oneself and understanding spatial orientation.

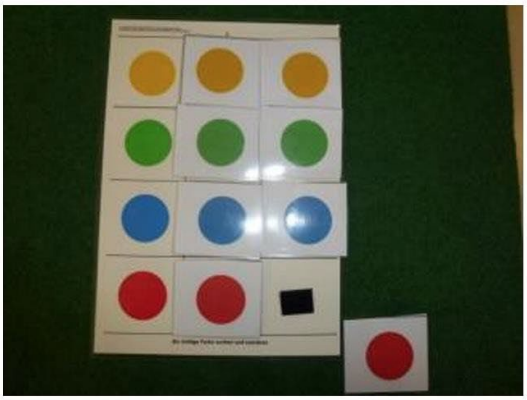
The task of 'Recognize Identical Hands' serves to reinforce this learning process. Children engage in observing, identifying, and matching hand positions, essential activities that enhance their grasp of body schema and spatial orientation.

Interactive activities such as songs and games, which involve movement and interaction with space, enhance body awareness and orientation.

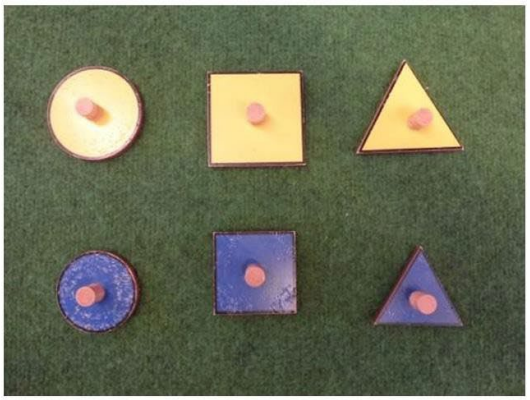
Comparing objects - colour

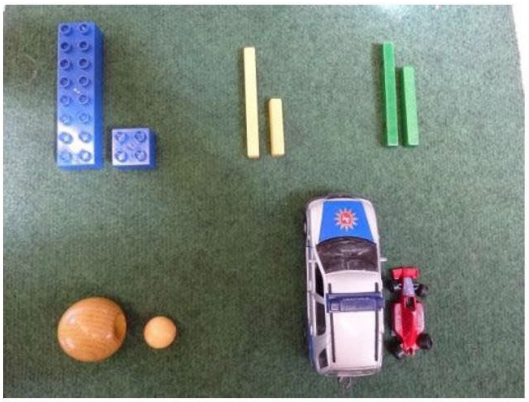
The first task involves using everyday items like Lego bricks. Learners are prompted to match these objects with their corresponding colors, enhancing their ability to recognize and categorize colors in items encountered in daily life. The second task presents a more structured approach, featuring a grid with colored circles. Learners are challenged to match colored tokens with those of the same color on the grid. This task focuses on refining visual discrimination skills by requiring learners to concentrate solely on color, disregarding shapes and objects. Both tasks prioritize hands-on learning, requiring

learners to physically manipulate objects. This active participation aids in reinforcing knowledge, moving beyond passive observation to foster deeper understanding.



This activity centers on discerning objects based on shape characteristics, such as angular versus round or short versus long. Qualitative comparisons rely on observations of appearance and texture, while quantitative comparisons involve measurements and counting. The task underscores the connection between different shapes and promotes interactive learning. On the right side, a collection of objects in various sizes facilitates size assessment, thereby improving quantitative evaluation skills. Comparing sizes, along with self-comparison tasks where learners physically compare their own size, aids in grasping the concept of size and highlights language's role in expressing the dimensions of the world.

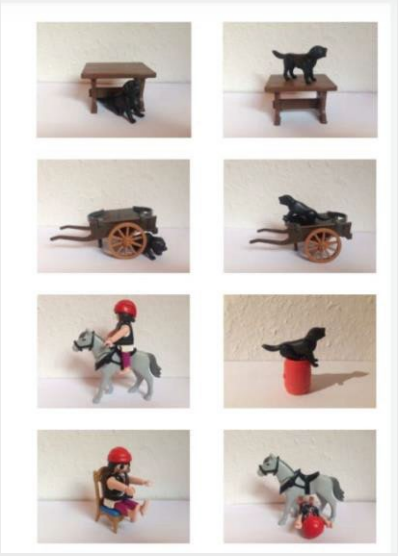




Spacial orientation

The activity is centered on spatial orientation, employing visual aids to teach object positioning through scenarios featuring a dog and a pirate. For instance, "The dog stands on the table" aids in visualizing the concept of "on," while "The pirate sits on the horse" illustrates a different spatial relationship using the same preposition. The objective is to match the image with the appropriate spatial term, utilizing either concrete materials or pictures, or verifying the solution with real objects using the cards.

This activity not only strengthens language skills but also enhances spatial awareness. It revolves around establishing connections between language, cognition, and the physical world.

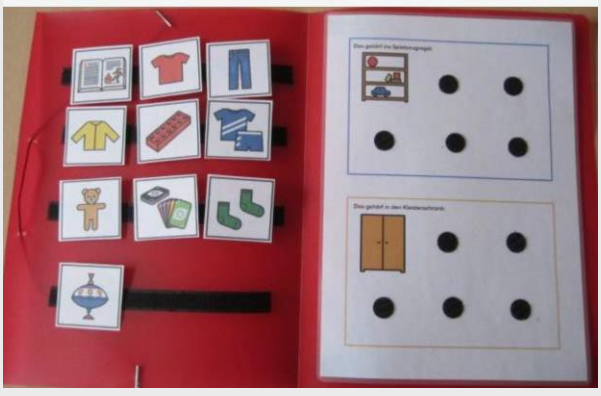


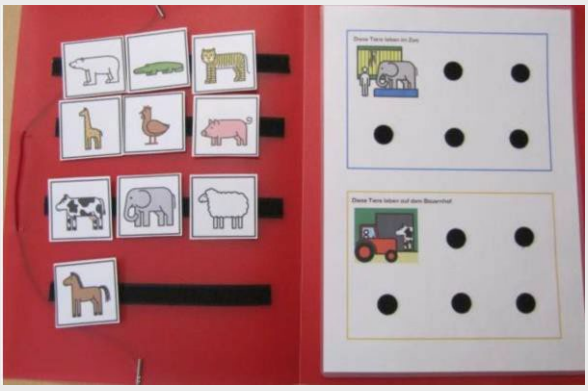
Classification

Classification involves organizing items based on shared characteristics. For instance, toys and kitchen utensils serve as broad categories that can be further divided into subcategories like Legos and cars, or cutlery and cooking tools. Interactive activities utilize the counting rhyme "Eeny, meeny, miny, moe" to facilitate a dynamic group-forming exercise. These matching exercises are part of a TEACCH workbook designed to aid in category formation with items such as clothes, toys, and animals.

On the left side, cards depicting various items are matched to their corresponding categories on the right—clothes are placed in the wardrobe, toys are arranged on the shelf, zoo animals are sorted into the zoo, and farm animals are grouped with the farm.

This activity helps enhance numerical understanding and fosters the development of categorization skills, which are essential for mathematical competencies.

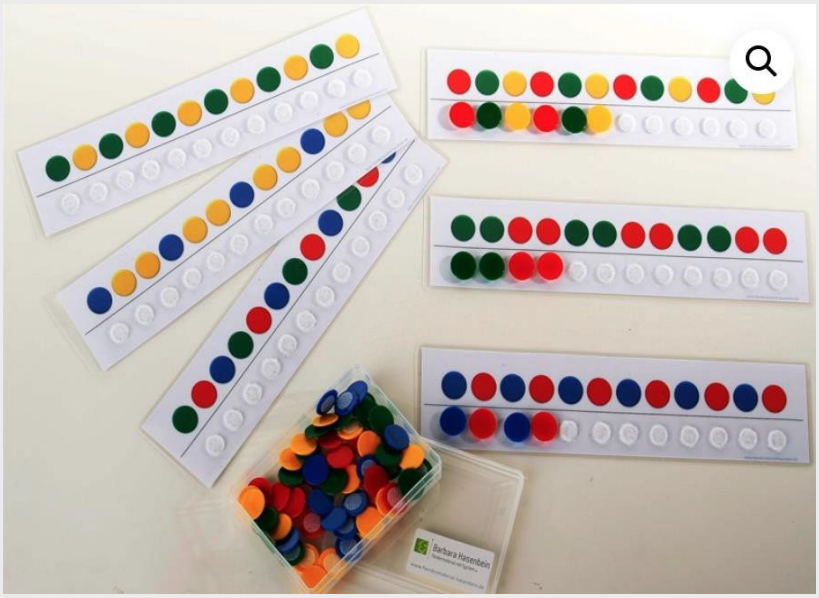




Seriation

Seriation involves arranging items in a logical order, aiding in the comprehension of quantities and concepts such as more, less, and equal. This process may include ordering objects based on size, color, or other attributes, often practiced through tasks involving patterns or sequences with items like beads

or pegs. To enhance the learning process, rhythmic patterns and clapping sequences are utilized to reinforce these concepts. For instance, a task may involve arranging tiles in rows by color, allowing learners to improve their seriation skills and color recognition as they create and continue sequences while recognizing quantities and order.



Comparison of quantities

One-to-one correspondence teaches the pairing of items, which is crucial for developing math skills such as matching a spoon to each bowl. Invariance refers to understanding that the quantity remains the same regardless of the arrangement; for example, five spoons are still five spoons regardless of how they are arranged. Activities like setting a table demonstrate this concept and encourage questions about qantity, which fosters a deeper understanding of number invariance beyond simple counting.

Interactive activities, like arranging blocks or building towers, facilitate the learning of quantity differentiation by providing visual comparisons of quantities. These hands-on tasks reinforce fundamental math concepts, enabling learners to understand concepts such as 'more, less, or equal' by

actively manipulating objects and comparing the length of rows or the height of towers. Each element or block serves as a unit of quantity, contributing to the concrete understanding of numerical relationships.

Concept of numbers

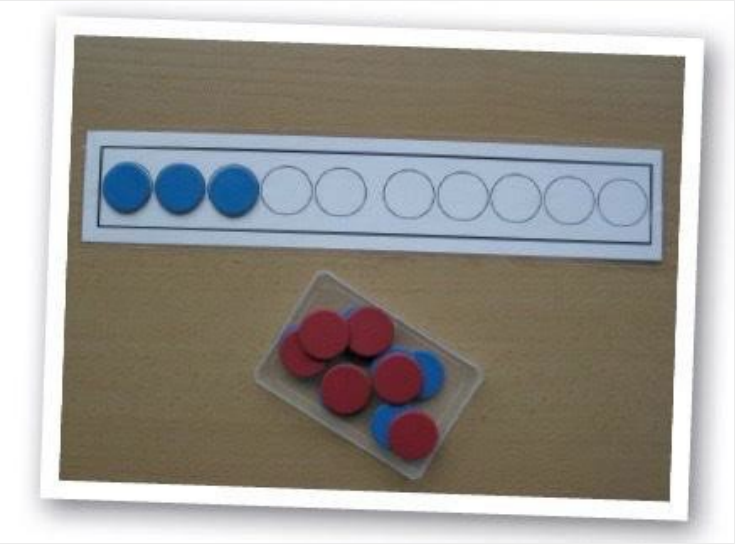
The program aims to teach the correlation between numbers and quantities, helping pupils develop a solid mathematical understanding.

Key Goals:

1. Mastering Counting Sequence: Students learn to count from 1 to 10, laying a strong foundation for numerical comprehension.
2. Ordering Numbers: Through structured activities, learners practice ordering numbers sequentially, enhancing their understanding of numerical progression.
3. Object-Number Association: Activities encourage students to match objects with their corresponding numbers, boosting confidence in numerical identification.
4. Conversion Skills: Learners develop the ability to convert between different representations of quantity and numbers, fostering versatility in mathematical understanding.
5. Number Line Comprehension: Visual aids like number lines help students understand that segment size represents quantity, reinforcing numerical relationships.

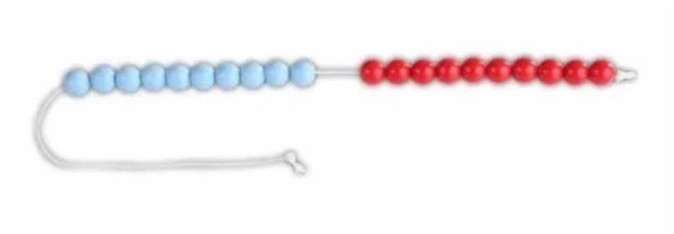
Cardinality of sets

Utilizing a segmented horizontal line portraying digits 0-9, the number line aids in teaching fundamental mathematics. Aligning objects with specific line positions assists learners in grasping set sizes. Encouraging hands-on engagement through physical manipulation of items streamlines the visualization and interaction with numbers up to 10. Furthermore, it serves as a visual aid for demonstrating mathematical operations such as addition, subtraction, and tens carrying.



Concept of numbers

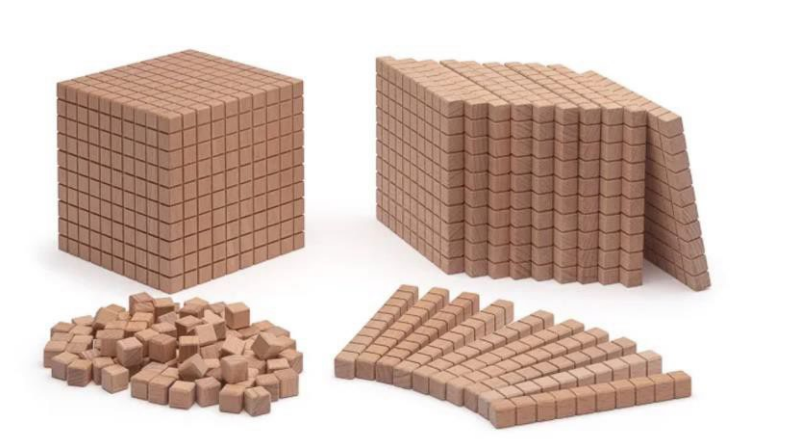
The Counting Chain is a tangible resource designed to teach numbers up to 20, reinforcing the base-ten system. Consisting of uniformly colored bead sets, it aids learners in grasping the concept of tens. Objectives encompass building numeracy for numbers up to 20, refining counting abilities through bead manipulation, and fostering visualization to bolster mental math skills. Error checking plays a vital role in ensuring accuracy, and the tactile counting method with the beads enhances comprehension.



The Mathematical Cube serves as a tactile educational aid aimed at elucidating the decimal system by dissecting numbers into units, tens, hundreds, and thousands.

Its learning objectives encompass:

- Transitioning from abstract to tangible representations of numbers up to 1000 through block utilization, promoting visualization skills.
- Employing the blocks for fundamental mathematical operations like addition, subtraction, division, and multiplication.
- Utilizing the blocks to teach estimation, underscoring its significance in mathematics.



Study visits to Arnarskóli and Klettaskóli, Iceland

As part of the Think Tank workshop held from April 10th to April 12th, 2024, at the University of Iceland – School of Education, project partners convened to explore and discuss various educational strategies and innovations. The workshop culminated in a field visit on the last day, where participants had the opportunity to visit two notable schools in Reykjavik: Arnarskóli and Klettaskóli.

The visits to Arnarskóli and Klettaskóli were instrumental in understanding how specialized education can be effectively tailored to meet the diverse needs of students with developmental disabilities. These institutions exemplify the potential of dedicated educational frameworks and the profound impact of specialized staff and facilities on the quality of education for students with special needs.

School Visits Overview

Arnarskóli

Established in 2017, Arnarskóli began as a primary school dedicated to children with developmental disabilities, addressing the needs of students requiring multifaceted support. By 2018, it became the first independent school in Iceland specifically for children with developmental disabilities. Arnarskóli is distinguished not only by its year-round operation, which supports continuous daily routines for the children and relief for their parents, but also by its tailored approach to education. Each student benefits from individualized plans and one-on-one support structured around their unique needs. This method involves collaboration among parents, various professionals, and therapists to ensure comprehensive and adaptive educational strategies. The school's staff includes a wide range of specialists from behaviourists to psychologists, all committed to providing an integrative support system. Additionally, Arnarskóli extends opportunities for interns and student practitioners, enhancing their educational mission.

We are immensely grateful for the openness and hospitality shown by Arnarskóli, allowing us to witness their commendable approach to education and the dedication evident in their work with students who have multiple disabilities.

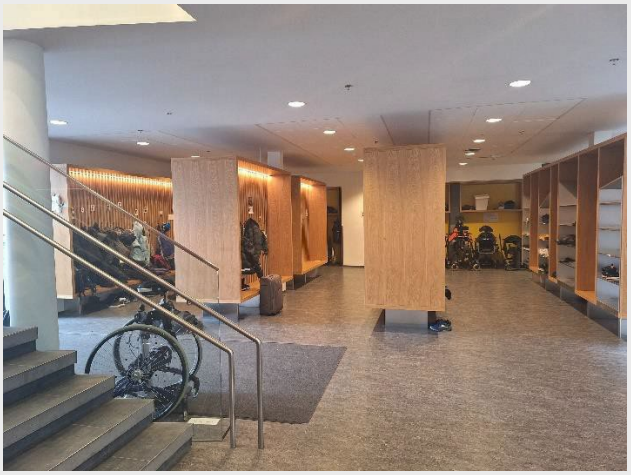
Study visit – Arnarskóli, Reykjavík

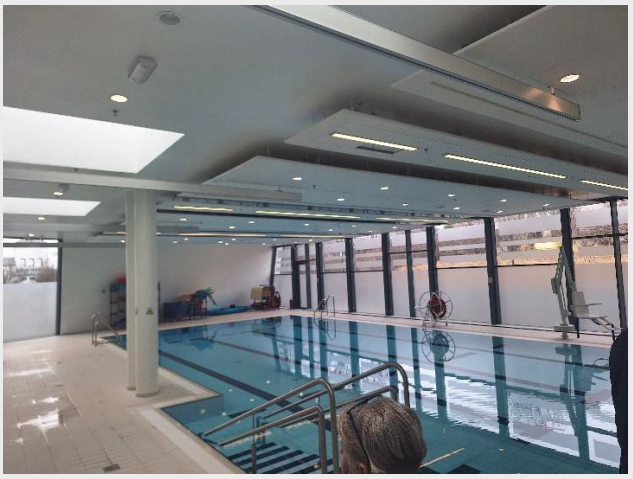
Klettaskóli

Klettaskóli, established in 2011, stands as the largest special education school in Reykjavik, catering to students with a spectrum of intellectual disabilities, including those with additional disabilities such as autism, blindness, and severe mobility impairments. This institution evolved from the merger of Safamýrarskóli and Öskjuhlíðaskóli and serves as a pivotal resource for the entire country, operated by the City of Reykjavik. Klettaskóli's educational model is inspired by the principles of Ralph Tyler, focusing on individual development, core curriculum, and life skills.

The school's facilities are particularly notable, featuring specialized classrooms and equipment that cater to a diverse range of needs—from music and sensory integration to physical education with two swimming pools and a large sports hall. The school's advisory role extends beyond its immediate community, providing pedagogical support to other schools across Iceland.

Our visit to Klettaskóli left us deeply impressed by the meticulous organization, the quality of the educational environment, and the warm reception provided by the staff.




Study visit – Klettaskóli, Reykjavík

Annex1 – Country presentations

Atollo Project
Breaking barriers, building futures

ANNEX 1

Co-funded by the European Union

Atollo Project
Breaking barriers, building futures

Transfer of good practice

Atollo Project
Breaking barriers, building futures

ICELAND

Anna Magnea Hreinsdóttir
Skúlína Hlíf Kjartansdóttir

Co-funded by the European Union

Introduction - Digital landscape in education
Core curricula subject: Information and Communication Technology (2014) – 2,68%

- The subject area of information and communication technology includes media studies, computer use and information and communication technology. The concept ‘information and media literacy’ may be defined as the ability to analyse what information is necessary, search for it, evaluate it critically and in this way increase one’s knowledge and use it through various media to accomplish a certain goal… it also involves the ability to find and use information in accordance with ethical criteria for copyright. In this way, pupils can acquire the competence to adopt, rewrite and create knowledge, and communicate it in various ways in accordance with the nature of technology and the digital environment.
- The main objective of education in information and communication technology is to encourage the information and media literacy of pupils and to assist them in obtaining sound general technology skill and literacy.
- The main objective of literacy is for pupils to become active participants in transforming and rewriting the world by creating their own meaning and responding in a personal and creative manner to what they read with the aid of the media and technology that is available.
- Information and communication technology is an interdisciplinary subject area. The assignments are concrete and can be integrated with most subjects and subject areas. The emphasis is on introducing pupils to technology and methods for acquiring, processing, creating and communicating information in relation with other studies.

Ministry of Education Science and Culture (2014). The Icelandic National Core Curriculum Guide for Compulsory Schools. Reykjavík, Ministry of Education, Science and Culture.

Introduction - Digital landscape in education: 2030 Policy

- One of the main actions of the Education 2030 policy is the development of integrated school services throughout the country based on tiered support.
- The point of the policy is Excellent lifelong education and it rests on five pillars: equal opportunities for all, teaching at the forefront, competence for the future, well-being at the forefront, and quality at the forefront.
- Each school and each teacher need to reflect on their practices and set their course in shouldering the responsibility to educate all students, ensure their participation, and that they belong in school. Teacher education at the university level will need to be responsive and reflect on how inclusive education pedagogy is presented in its courses and study lines.
- Consideration is how young people with additional learning needs graduate from comprehensive education to the upper secondary level and how this will be resolved. Progress needs to be constantly reviewed and assessed, demanding reflection, introspection, open-mindedness, optimism, flexibility, and innovative thinking of all stakeholders.
- Teachers will need to be supported in their effort to shoulder responsibility for developing inclusive education by the system structure, governance, and policies (Guðjónsdóttir & Óskarsdóttir, 2024).

An overview of the support system for children with Special Educational Needs (SEN), with an emphasis on digital inclusivity

Atollo Project
Breaking barriers, building futures

- Psychological analyses are part of public services in the social and health system. The service is divided into three levels depending on how specialized it is:
- The first level refers to basic services that include analysis and response to common problems or solutions that are normally at a mild level. That service is now provided at the level of local social services and health care. The special teachers of the schools belong to the first level.
- Second-level services, and advanced services, refer to the analysis and intervention of various experts in the field of disabilities where some specialization is required. Those who manage such services limit it only to certain types or categories of cases, to create a specific type and content of intervention for a specific problem. Social work, physical and developmental therapy, and psychological counseling can be mentioned.
- Third-level services, specialized services, are those provided in specialized institutions. It is intended to care for those who need more specialized diagnosis or services than can be provided at the first and second levels due to developmental disorders, disabilities, or multifaceted social problems. Such services are generally provided nationwide or across service areas. Examples include the government's Diagnostic and Advisory Center, Service and Knowledge Center for the Blind, Visually Impaired and Deafblind, and Communication Center for the Deaf and Hard of Hearing, and the Audio Library of Iceland (formerly the Library of Iceland for the Blind). The Computer centre is an independent organization that offers advice, education, and courses in the field of information technology. Those who apply to the Center are, among others, persons who need support, parents, and staff of schools and institutions.

Co-funded by the European Union

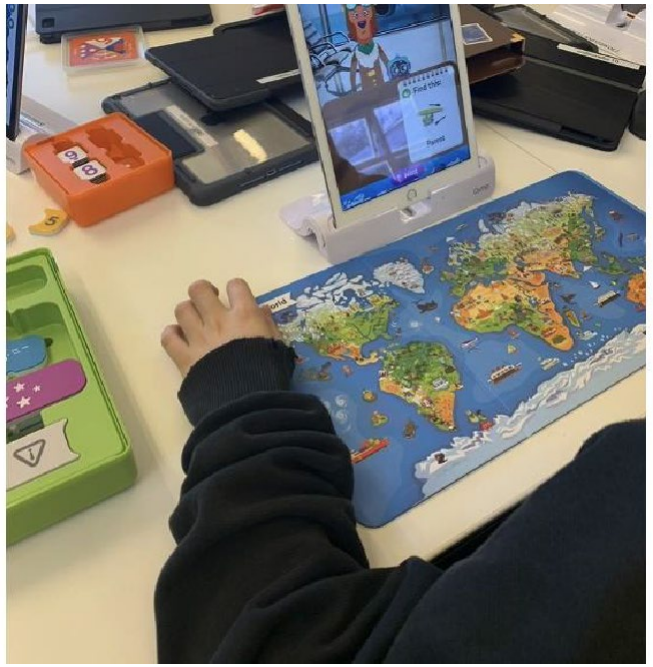
Evaluation study 2021-2022

Kópavogur Municipality 9 schools: Tablets for 1:1 learning grades 5-10, 2015+

Evaluation study 2021-2022: Effects of tablet integration on teaching & learning

Surveys in 9 schools - teachers (425), students (2513) and parents (1046); SELFIE survey – all schools

Classroom **observations** - **3** schools: photos, recordings, stories; Interviews - principals, students (36), teachers (50)

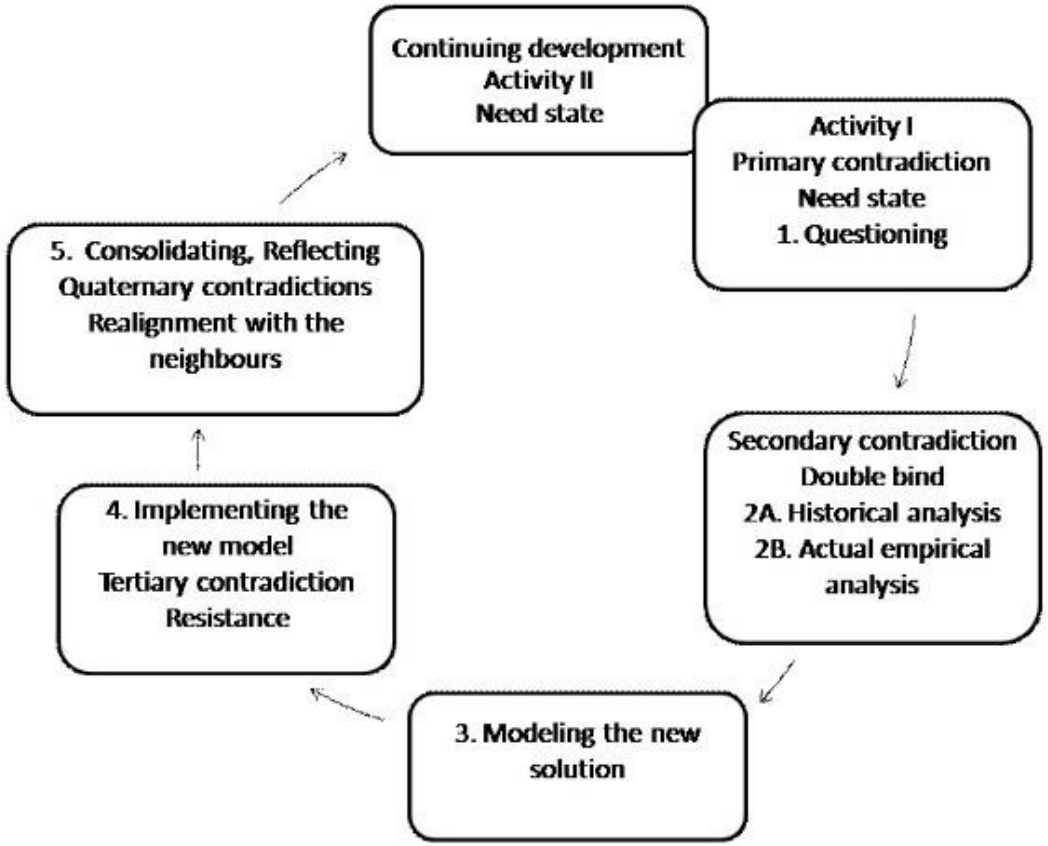


Aim of the research

- Main aim to explore the impact of tablet use on students, regarding:
- Satisfaction and interest in learning, personalisation of learning, responsibility in learning and empowerment.
- Information literacy, technology literacy, media literacy, digital competences and learning achievements.
- Other aims were to explore the changes to teachers' digital competence, professional development, organisation of teaching, variations in teaching methods, teachers' collaboration, as well as the cooperation of schools and parents on aspects of learning.

Expansive learning cycle (Engeström, 2001)

1. **Collective, artifact-mediated and object-oriented activity system**: is the unit of analysis
   - seen in its network relation to other activity systems
2. **Multi-voicedness of activity systems:** is characteristic of the system
   - Different opinions, traditions and interests at play
3. **Historicity**: activity systems take shape and get transformed over lengthy periods of time.
   - Problems and potential – can only be understood against their own historicity.
4. **Contradictions**: as source of changes and development
   - they cause **friction and tensions** inside and between activity systems
5. **Expansive transformations**: are achieved when participants reconsider the objectives of the activity systems to obtain a wider perspective on the potential of the activity, that were not possible before.



Expansive learning cycle, adapted from Engeström (2001) by Jóhannsdóttir (2010)

	Year	Education emphasis	Implementation in schools
Micro computers	1983	Computer Lit. Tech. Lit.	Educational software, User software - office suite
Internet, laptops, ICT	1990	Media and informaition lit. Multi-modal lit.	Communication projects, Kidlink, Jason, eTwinning Laptops, 1:1 (Upper sec schools) DE, online and blended learning New curriculum, policy, teacher ed..
Social media Smart devices	2007	Share, participate	Teacher PD, digital habits e.g. via social media; Educamps/teachmeets
4th Industrial revolution		Digital citizenship	Research on T&L primary/lower secondary level: Limited ICT Mobile learning & tablets in schools 1:1 **Tablets in Kopavogur**
New net wave	2016	Maker literacy Dig. competence Pers...protection	Coding in schools STEM/STEAM Makerspaces
	2020	Online literacy Data literacy Algorithm lit. Health and wellbeing	Schools closing - because of COVID Increase of distance and online learning at all school levels Personal protection - software evaluation!

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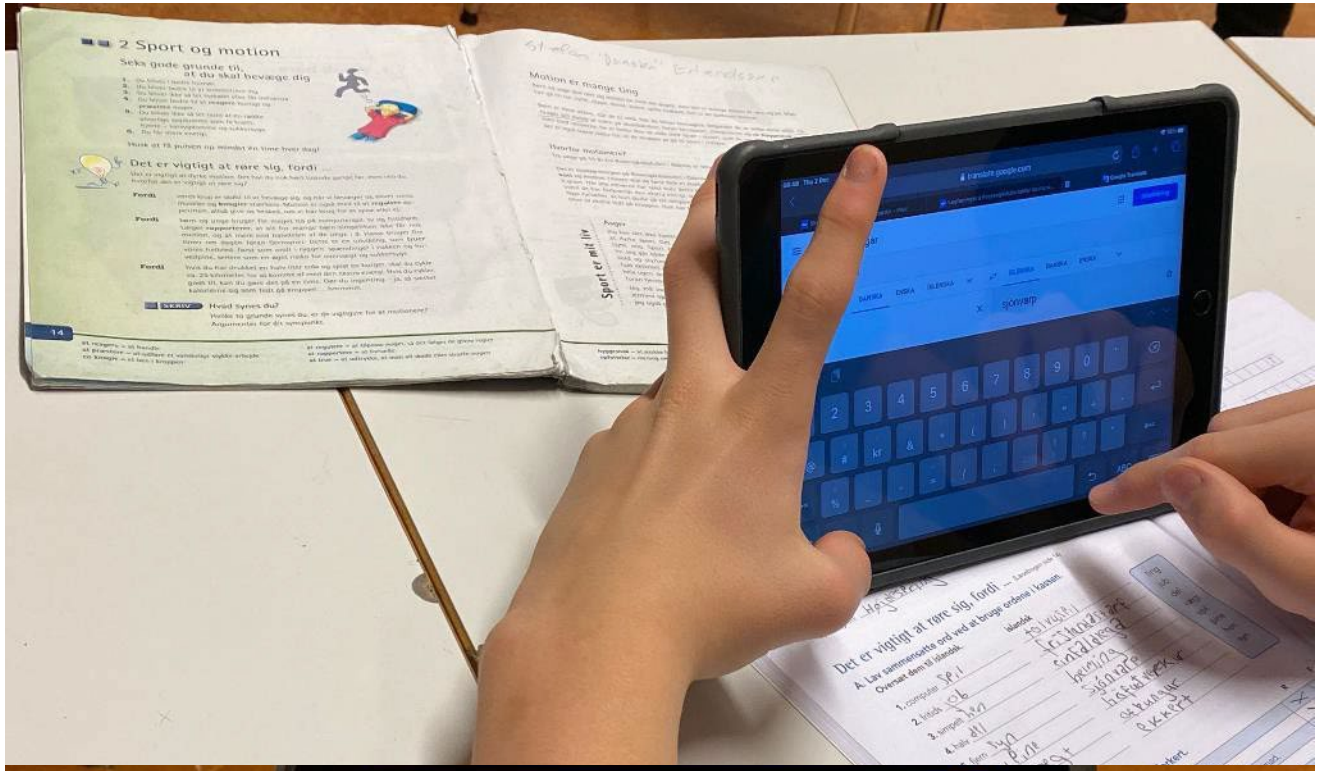
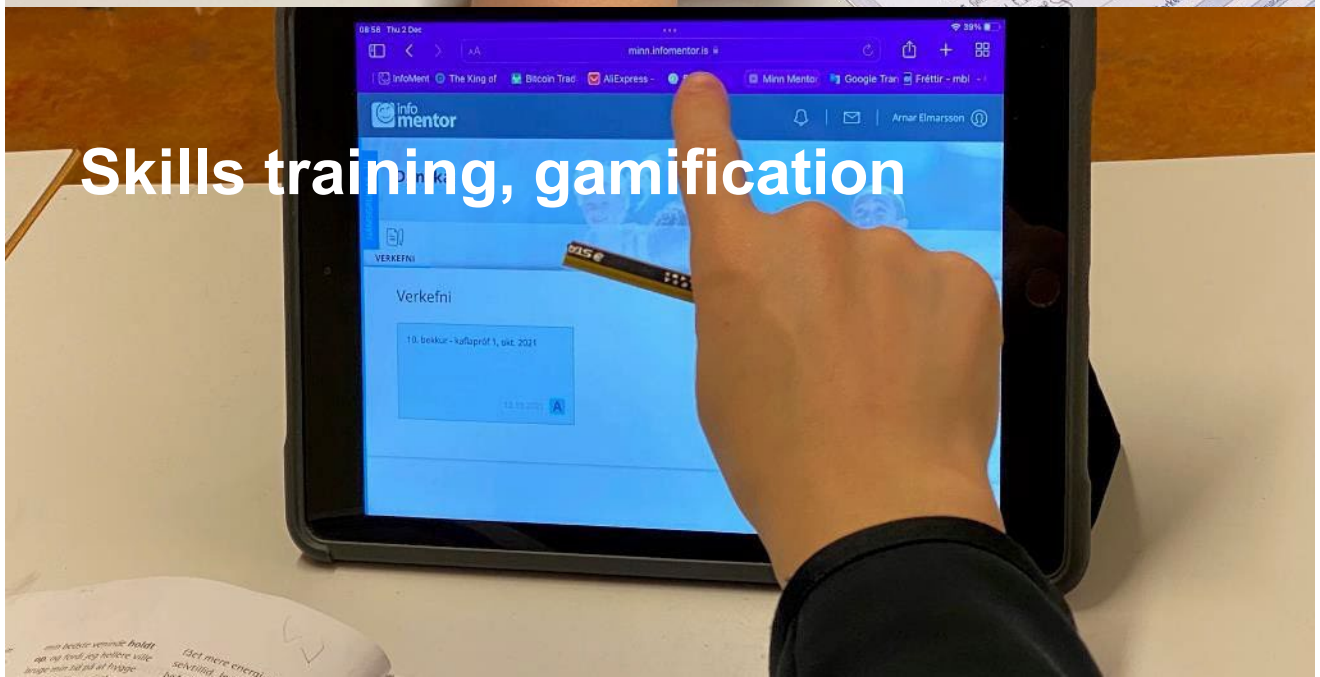
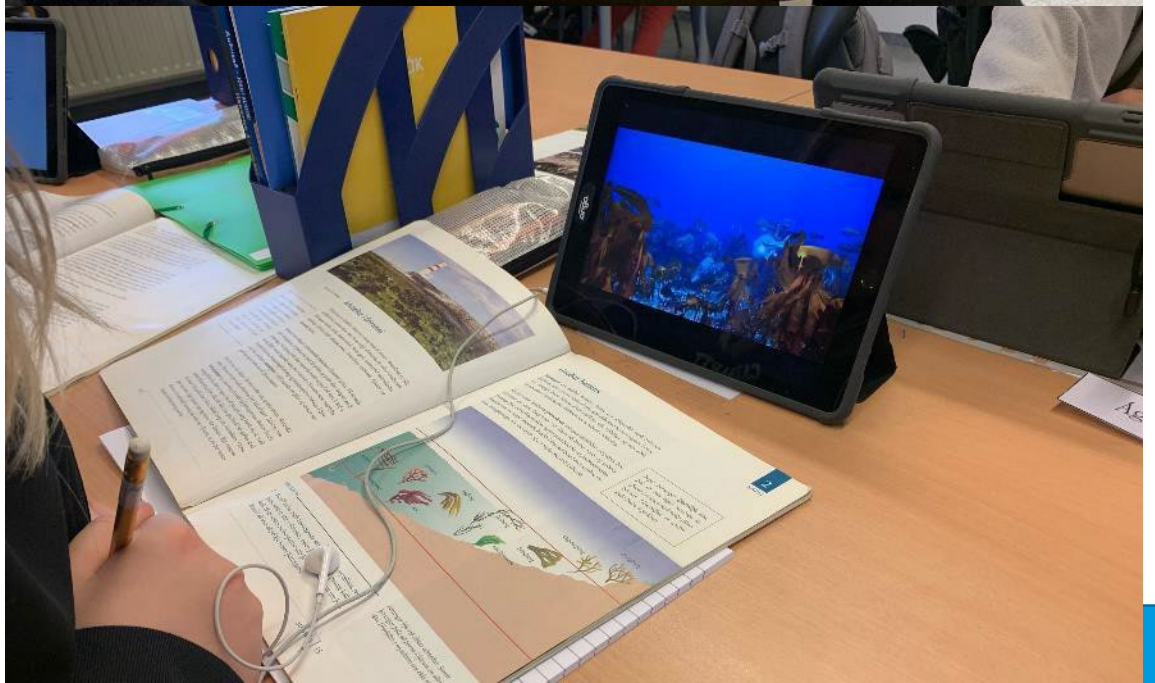
Challenges and Solutions (in relation to the expansive learning cycle)

- Tablets & 1:1 learning - first studies indicate various positive effects and posibilities for learning (EU studies, SHK/SJ study on Icelandic early tablet project Nordlinga School). Nordic research network (NordLAC) emphasises agency, participatory pedagogy, learner empowerment, connected learning and learning across contexts.
- Educating learners in accordance with global and societal changes and the basis in our laws and national curriculum? Outdated computer equipment and learning materials; traditional instruction. Political will to provide students with tablets at the lower secondary/primary level.
- Modelling a new solution: Steering group and "Tablet team“, advisors, leadership teams in all schools. Special emphasis on digital citizenship and information for parents and students
- Top-down decision. Parents and teachers: almost unlimited access to apps and social media causes tension. Critical voices from teachers and parents about gaming, usefulness of iPads, digital rights and citizenship.
- New tech wave – 4th industrial revolution – Increased emphasis and multimedia, digital fabrication and coding. Learning community, sharing of experience, increased creativity and varied school outcomes, content students.
- Consolidating, reflecting, regular renewal of school vision and school curricula


2 Sport og motion
Det er vigtigt at røre sig, fordi


EVRÓPA
VINNUBÓK
Academic studies, learning enquiries, graphic design, mediation
digita


Skills training, gamification
info mentor
Verkefni



Digital storytelling in the makerspace: 7.grader

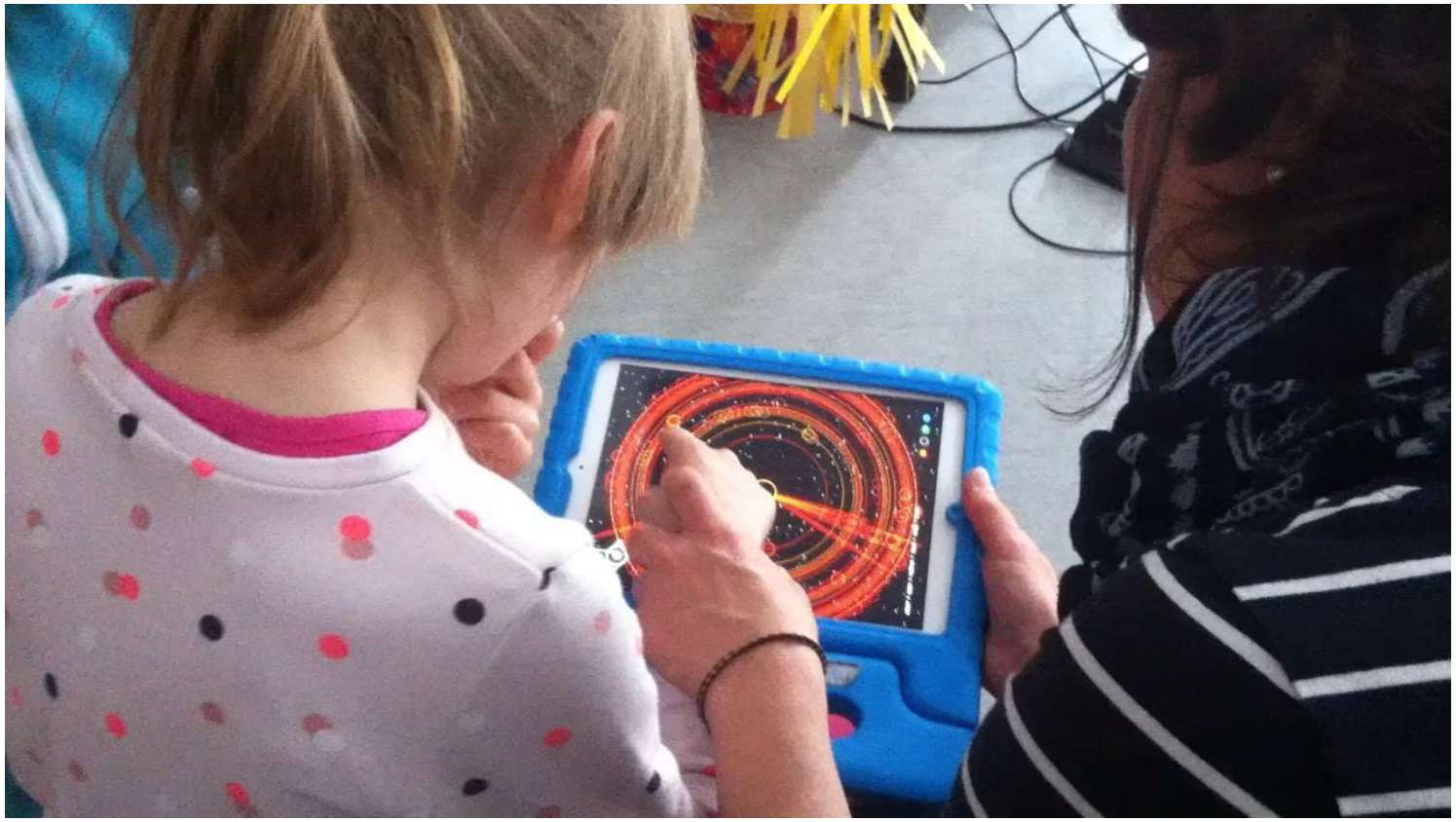
- Stories and storylines
- Characters made of clay
- Movie-making in Stop-Motion

Makerspace: robotics, coding &

Teaching, teaching methods & learning

- Create more variety of digital learning materials and develop teching methods using digital technologies.
- Invite creative project work, with relevance to students' interests
- Increase the collaboration of students and group work
- Encourage the integration of traditional school subjects, thematic projects and work on realistic topics with relevance to studens' daily life
- Increase support for SEN childrens' learning and offer more opportunities of professional development to their teachers with digital technologies
- Target ICT opportunities and technologies, for improving teaching of students with Icelandic as a second language
- Increase the visibility of school projects and innovative work of students in the community
- Increase or strengthen student participation in evaluation of school activities within each of the nine schools
- Manifest the use of formative evaluation (assessment for learning, inclusive assessment) and enable its implementation
- Regularly follow up on the developments of individual schools / teachers of formative evaluation and harness these in school development
- Move support and teacher advice into the school themselves

Björk: Biophilia (2013) – The Biophilia Educational Project (2016)



Attentus (2016). "The Biophilia Educational Project: Evaluation." 1–32. https://www.stjornarradid.is/media/menntamalaraduneyti-media/media/frettatengt2016/Biophilia-Educational-Project-Evaluation-Attentus-2016.pdf

Hanna Rún Eiríksdóttir
Receiver of the Icelandic Education Awards 2021

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Framúrskarandi kennari

Hanna Rún Eiríksdóttir, kennari við Klettaskóla, fékk Íslensku menntaverðlaunin 2021, fyrir framúrskarandi kennslu nemenda með fötlun, meðal annars fyrir að þróa nýjar leiðir til tjáskipta.

Sérkennslutorg: http://serkennslutorg.is/about/

Reference: https://youtu.be/kDkAIRI9NSA?feature=shared

Piotr Loj:
Virtual Dream Iceland Opening!- Sunna's Dream made real in VR

"Creating, searching, supporting, and developing ideas that use new technologies to restore social, environmental, and health balance,"

https://www.virtualdream.is/

https://www.youtube.com/watch?v=ET8SEzV6V_I&t=6s

Atollo Project
Breaking barriers, building futures

NORWAY

Lillian Gran

Co-funded by the European Union

Introduction

- Norway is recognized as a leading country in the digitalization of education. In recent years, the Norwegian government has made significant investments in digital infrastructure and resources for schools, with a strong emphasis on incorporating digital competence as a fundamental part of the curriculum.
- Norway has a strong commitment to inclusive education, and this extends to students with Special Educational Needs (SEN). The Education Act guarantees all students the right to a suitable and adapted education. Students with SEN may be provided with additional support or adaptations to their learning environment to ensure they can participate fully in education.

- In terms of digital inclusivity, the use of digital technology is recognized as a crucial part of supporting students with SEN. Assistive technology can provide students with the tools they need to overcome barriers and engage with their learning. This can include text-to-speech software for students with dyslexia, augmentative and alternative communication (AAC) devices for students with speech and language difficulties, or adapted hardware for students with physical disabilities.

	Total Students	Grades 1-7	Grades 8-10	% Special Education Students	Special Education Students Grades 1-7	Special Education Students Grades 8-10
All	637,051	434,422	202,629	8.1%	7.0%	10.2%
Viken	158,340	107,682	50,658	7.5%	6.6%	9.5%
Oslo	69,613	48,532	21,081	7.3%	6.3%	9.6%
Innlandet	39,448	26,542	12,906	7.8%	6.8%	9.7%
Vestfold and Telemark	48,833	33,027	15,806	8.0%	6.8%	10.7%
Agder	39,495	26,735	12,760	9.6%	8.1%	12.7%
Rogaland	65,287	44,709	20,578	7.3%	6.2%	9.7%
Vestland	76,929	52,674	24,255	7.7%	6.9%	9.3%
Møre og Romsdal	31,589	21,480	10,109	9.3%	8.5%	10.9%
Trøndelag - Tröndelage	54,986	37,616	17,370	8.6%	7.6%	10.9%
Nordland - Nordlánnda	26,409	17,923	8,486	10.0%	8.8%	12.5%
Troms and Finnmark - Romsa and Finnmárku	25,902	17,343	8,559	9.8%	N/A	11.8%
Svalbard	220	159	61	N/A	N/A	N/A

(SSB.no table recreated using sikt Ki chat)

Children with special educational assistance

- In 2021, 9 700 children received special educational assistance, which corresponds to 3.6 per cent of the children in kindergarten.
- In addition to children with special educational assistance decisions, there are just under 5 100 children with disabilities in kindergarten.
- The vast majority of kindergarten owners state that they have facilitated cooperation, regularly or as needed, with the educational and psychological counselling service, the child welfare service and the health centre. All municipal, and around 95 per cent of private kindergarten owners, facilitate cooperation with the educational and psychological counselling service, the child welfare service and the child health centre. Private owners have to a greater extent than the public sector planned to cooperate with the NAV supervisor in the municipality

Inland Norway University of Applied Sciences

Primary and lower secondary school

- There is a right and obligation for ten-year primary and lower secondary education in Norway, and every autumn more than 60,000 six-year-olds start school.
- Private primary schools account for 10 per cent, and the number has increased by 84 in the last decade. Close to 5 percent of the students attend a private school.
- Almost 8 per cent of pupils in primary schools have special education. Half of the students receive special education in their regular class.
- More than 6 per cent of the pupils in primary and lower secondary school have special Norwegian language instruction.
- On average, girls have higher grades than boys in most subjects.
- There are fewer adult participants in primary and lower secondary education. Close to 2 out of 3 adult participants are women.

Overview of students

- In the 2021-2022 school year, there were 635,000 primary school students.
- There were 2,761 elementary schools in Norway 2021-2022 school year
- In the 2021–2022 school year, there were an average of 230 students per school
- 277 of the primary schools are private, which represents 10 per cent.
- 4.6 percent of students attend a private school. In the 2021–2022 school year, 29,000 students attended private elementary schools
- A majority of private schools are approved on the basis of beliefs or a recognized educational direction.
- Public schools can be municipal, state or county. There are a total of 2,484 municipal primary schools and 8 state or county schools.

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Private schools

Private schools approved under the Private Schools Act are schools that offer primary and lower secondary education on a special basis. These schools are entitled to state subsidies. In order for a primary school to be approved pursuant to section 2-1 of the Private Schools Act, it must conduct its activities on at least one of the following grounds:

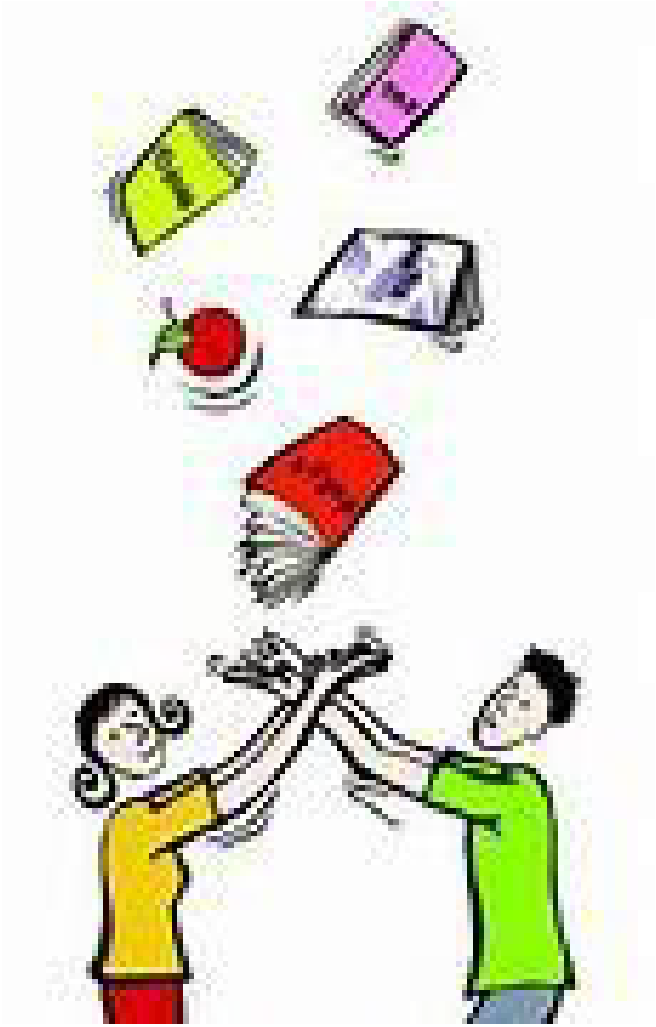
- Spirituality
- recognized educational direction (for example, Montessori or Steiner pedagogy)
- international (by international curricula)
- Norwegian primary and lower secondary education abroad (according to the curriculum for the Knowledge Promotion curriculum)
- specially adapted training for people with disabilities

Employees in primary and lower secondary schools

- In the 2021-2022 school year, just over 70,000 primary school teachers worked. In addition, 22 000 assistants, 1 500 social education advisers and 1 200 educational and vocational advisers worked with student-oriented work
- Many assistants have tasks related to the follow-up of students with special education needs
- In grades 1-4, 90 percent of public elementary schools meet the teacher norm, while 96 percent and 92 percent, respectively, meet the 5th-7th grade and 8th-10th grade norm. Overall, there are 15.5 students per teacher in grades 1-10

Students with special education

- Pupils who do not benefit satisfactorily from the ordinary education offered in a subject are entitled to special education. Normally, schools must map, assess and, if necessary, test new measures within the framework of ordinary training before a decision on special education is made. The total training offered will usually include both special education and ordinary training.
- The proportion of pupils with special education is stable at around 8 per cent
- In total, 10 per cent of boys and 5 per cent of girls receive special education. Boys make up 68 per cent of pupils receiving special education
- The proportion of pupils receiving special education increases throughout the school year. In grade 1, 3.5 percent of students receive special education, while the proportion of 10. grades are 10.5 percent



Before the school can make a decision that a pupil should receive special education, the educational and psychological counselling service must prepare an expert assessment that takes a position on whether the pupil benefits from the ordinary training offered, and which special education offer the pupil should have. The student's degree of benefit will have an impact on how much special education the student receives.

After the decision on special education has been made, the school draws up an individual education plan, IOP. An IOP should show what is the goal of the training, what it should contain, and how the training should otherwise be run.

The proportion of students receiving special education

- More than half receive 190 hours of special education or more during a school year, which means they receive more than 30 percent of their education as special education.
- Among the students who receive special education, 48 per cent receive this mainly in the ordinary class, while 39 per cent receive special education mainly in their own groups. Only 13 per cent have special education mainly alone
- More than 4,400 students attend separate special education schools or schools with their own permanent special education department, representing 9 percent of all special education students.
- There are a total of 49 separate schools for special education and 323 schools with their own permanent departments for special education. Special education schools are more common in lower secondary school than in primary school
- An additional 2,000 students with special education decisions are deployed to alternative training arenas one or more days a week with a lesson related to, for example, outdoor activities or work on a farm or an auto repair shop.
- The proportion of students receiving special education is higher in private schools than in public schools. In private schools, the proportion is 10 per cent, while it is 8 per cent in public schools.

Secondary education (VG)
High school and Vocational education training (VET)

- Norway everyone has the right to upper secondary education after completing primary school. 98 per cent of the students who completed primary school in 2021 started upper secondary education the same autumn.
- In the 2021–2022 school year, students in VG1 could choose from 15 education programmes; 5 preparatory studies and 10 vocational. There are almost as many students who choose vocational subjects as students who prepare for studies in VG1.
- In total, 78 per cent of the applicants received a learning or training contract with a company. There were a total of 46 700 apprentices in Norway autumn 2021.

Fact and numbers

- In total, there were 420 high schools in the 2021–2022 school year; 320 public and 100 private.
- 8 out of 10 complete within two years of the standard time
- Results from primary and lower secondary school have a major impact on whether students complete upper secondary school
- Girls complete their studies to a greater extent than boys
- Students with an immigrant background complete less than other students
- In Norway, 84 per cent of the population have completed upper secondary education by the age of 25.
- In the last ten years, there have been 26 fewer public schools. In the same period, 14 private high schools have been established. More than half of the private high schools are approved based on beliefs or elite sports.
- Only 9 percent of students attend private high schools

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Inclusive Digital Resources

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Inclusive Digital Resources

In Norway, inclusive digital resources are a critical component of educational policy and practice, especially for students with Special Educational Needs (SEN). The country's approach to digital inclusivity is guided by the principle that every student has the right to adapt education and a conducive learning environment.

Various measures are taken

1. **Adapted Learning Materials:** There's a push towards making all digital learning resources accessible to students with SEN. For example, the Norwegian Digital Learning Arena (NDLA) provides open educational resources for upper secondary education, including text, images, audio, and video, all of which can be adapted to suit different learners' needs. For students with hearing impairments, captions can be added to videos. For visually impaired students, alternative texts for images can be provided.

2. **Assistive Technology:** Norway also promotes the use of assistive technology for students with SEN. These technologies can support various needs, from screen readers and speech recognition for students with visual impairments or learning difficulties to customizable educational software that can be adapted to each learner's level.

3. **Teacher Training:** To ensure that digital resources are used effectively to support students with SEN, teacher training in Norway often includes components on digital skills and inclusive education.

4. **Policy and Guidelines:** The Norwegian Directorate for Education and Training provides guidelines to help schools ensure digital resources are accessible to all students. These guidelines cover a range of areas, including web accessibility, the use of assistive technology, and the adaptation of digital teaching materials.

Integrating digital resources in special education

1. **Personalized Learning**: Digital tools can enable individualized learning pathways, allowing students to learn at their own pace and in a manner that suits their specific learning style. This can be particularly beneficial for students with Special Educational Needs (SEN).
2. **Inclusive Digital Resources**: Ensuring that all digital learning resources are accessible to students with SEN is a key part of best practice. This can involve adding captions to videos for students with hearing impairments or providing alternative text for images for visually impaired students.
3. **Assistive Technology**: The use of assistive technology is a crucial way to support students with SEN. This can include text-to-speech software, augmentative and alternative communication (AAC) devices, or adapted keyboards and mice.
4. **Collaboration and Communication Tools**: Digital tools can also facilitate collaboration and communication, enabling students with SEN to interact with their peers and teachers more effectively. Tools like Google Classroom, Microsoft Teams, or Showbie can be used to share resources, assignments, and feedback.
5. **Teacher Training**: Providing teachers with the necessary training to effectively use digital tools in special education is a key aspect of best practice.
6. **Parent Engagement**: Digital tools can also be used to enhance communication between schools and parents, keeping parents informed about their child's progress and enabling them to support learning at home.
7. **Student Engagement**: Digital resources like educational games or interactive exercises can make learning more engaging for students with SEN, helping to motivate them and enhance their learning outcomes.

Case study/example description

Best practice special needs education in Norway

Inland Norway University of Applied Sciences

I want to participate in society like everyone else

Jeg vil delta i samfunnet som alle andre - tolket

Increase attendance with AV1 school robots

- The student can control movement and framing on the robot and communicate with sound via internet access. An example of this type of robot is AV1.

Implementation

- The main goals of the strategy are:

1. Students develop digital competence in line with the curriculum. The digital practice in kindergarten contributes to children's play, creativity, and learning in accordance with the kindergarten framework plan.
2. Employees in the kindergarten and school sector have professional digital competence to fulfill the intentions in the framework plans for kindergarten and after-school care and the school curriculum, with a knowledge-based approach.
3. All children, young people, and adults have inclusive, safe and good digital environments in kindergarten and school.
4. The digital foundation and access to digital solutions are sustainable, of good quality and contribute to an equal kindergarten and education offer throughout the country.
5. The digital services and information management in the kindergarten and school sector have children, students, employees, and parents at the center, and are developed as coherent services.

Inland Norway University of Applied Sciences

Challenges and Solutions

- Gudrund Tegnander, special education
- Dahlske Upper Secondary School is a dyslexia-friendly school, and aim to accommodate you so that you get the learning opportunities you deserve.
- Dahlske videregående skole is not a private school. It is a public upper secondary school located in Grimstad, Norway, and is part of the Aust-Agder county municipality's school system. The school offers various study programs, including general studies and vocational training programs. As a public school, it is funded by the government and free of charge for students to attend.

Conclusion

Digital learning resources for students with special needs:

- Interactive apps and thematic boards to learn about letters, sounds, words, reading and writing
- Tips for digital instruction and video meetings for students with hearing impairments
- Reading and writing support with digital tools like Office 365, iPad and Chromebook
- Use of audiobooks for students struggling with reading
- Use of alternative and augmentative communication (AAC) with digital tools
- Flipped classroom and digital tools for structure and predictability
- This information shows that there are a variety of digital resources and accommodations that can be used in special education in Norway to support students with diverse needs.

Atollo Project
Breaking barriers, building futures

CROATIA

UNIZG:

Antea Šalinović
Natalija Vrbas Novak

Ministry of Labour, Pension System, Family and Social Policy:

Lejla Osmančević Katkić
Katarina Špehar Fiškuš

School for training and education-Pula Republic of Croatia:

Višnja Popović, prof

Co-funded by the European Union

- **Three basic documents in Croatia that define the achievement of mathematical and digital competencies:**
- 1. Curriculum for the subject of Mathematics in primary and secondary schools in the Republic of Croatia
- 2. Curriculum for the subject of Informatics in primary and secondary schools in the Republic of Croatia
- 3. Curriculum for the interdisciplinary theme of the Use of information and communication technology in primary and secondary schools in the Republic of Croatia

- In addition to the mentiond curricula, there is a document in Croatia thet pprescribes **Guidelines for working with students with disabilities**, published on the website of the Ministry of Science and Education

- and now working groups have been formed for the development of **Guidelines for the implementation of special curricula within special educational programs for elemetary and secondary school students with developmental difficulties**.

Center for upbringing and education Šubićevac Šibenik, Croatia

- Social Welfare Home (Ministry of Labor, Pension System, Family, and Social Policy)
- Beneficiaries: Children and youth with developmental difficulties and adults with disabilities (217)
- Employees: 75
- Activities: Elementary and high school education for students with developmental difficulties and social care services

Education:

a) Elementary education - special program with individualized approaches (1st to 8th grade)
b) Elementary education - special program for acquiring competencie activities of daily life and work, with individualized approaches (7 t 21 years)
c) Vocational high school education for auxiliary occupations – specia program with individualized approaches.

Case Study Description / Example Description

- Project ATTEND „Enhanced Tools For Creating Equal Opportunities In Education For Pupils With Disabilities" Croatia, 2021-2024
- **Priority task:** to equip the project beneficiaries – Centres for the upbringing and education of students with disabilities in the Republic of Croatia – with assistive technology.
- **Project objective:** to provide high-quality education to students and training to employees of the project beneficiary institutions for using assistive technology.
- **Project Beneficiary:** Croatian Academic and Research Network – CARNET
- **Project Partners:** Faculty of Education and Rehabilitation Sciences, Faculty of Electrical Engineering of the University of Zagreb, City of Reykjavik, Iceland (Department for Education and Youth).
- **Participants:** Institutions for upbringing and education in Croatia (**34**)

Center for upbringing and education Šubićevac Šibenik, Croatia

Atollo Project
Breaking barriers, building futures

Project ATTEND 2021-2024

- **Students in ATTEND Project**: students with mild, moderate, and severe intellectual and additional disabilities: mental health difficulties, autism spectrum disorders, speech-language communication disorders, specific learning difficulties, neurological impairments, behavioral disorders, Down syndrome, physical disabilities, visual impairment, epilepsy.
- **73 students** (19 classes included in the project)
- Age: **7 to 21 years**

Case Study Description / Example Description

Atollo Project
Breaking barriers, building futures

- **Application of assistive technology in educational process:** communication, time and space orientation, order of steps in an activity, activity scheduling, reading, writing, arithmetic, everyday life activities, cognitive and social skills

- **Computer peripherals and communication equipment:**

- Touch screen communicator – Tobii Dynavox TD I-110
- Touch screen communication device – Smartbox Touch Pad
- Communicator and music device with eight buttons
- Talking schedule/squares/buttons/photo albums
- Smart boards, Weather semaphore, Time counter

- **Software solutions for :**

- creating and working with picture communication symbols - BOARDMAKER 7
- Text-to-speech - TTS MAESTRO
- managing and creating PODD communication books
- practicing calculation and money skills - LITTLE BANK PRO
- practicing calculation up to 100, adapted for preschool and school-age children - ARCHIMEDES
- learning writing, typing, and reading - ABC MAESTRO PRO
- practicing memory skills in a game-like format - MEMORY LITTLE EXPERT PRO.

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Implementation

Expressing the needs for specific equipment based on students' difficulties.

• Teachers education on the importance of achieving equal opportunities in education for students with developmental disabilities, adapting the school and home environment for successful introduction of assistive technology, supported communication, visual support in daily life, educational games, and assessment of assistive technology needs (trainings-conferences)

• Equipment delivery *in phases*: computer peripherals, communication equipment, various software solutions

• Distribution of received equipment (teachers)

• Teacher trainings (webinars)

• Application of received equipment in daily teaching process

• Participation of COO Šubićevac representatives in Reflective workshop (experience exchange), 2024.

Results and Impact

- Appropriate equipment is available to each student according to their difficulty.
- Equipment usage information - available to each teacher (guide, video instructions).
- Teaching quality improvement - students are more successful in achieving educational outcomes, better understanding of content and increased participation
- Students are more motivated to participate in the teaching process when they can overcome specific difficulties.
- Students express satisfaction when using appropriate equipment.

- **Challenges**:
- Teachers insufficient knowledge about types and possibilities of assistive technology application
- Time (preparation)
- Students hypersensitivity (sounds)
- Students number/types of students' difficulties
- Teacher overload
- Motivation of teachers and other staff
- Technical problems
- Lack of systematic education in assistive technology

Solutions:

- Technical support: appointment of assistive technology technicians, equipment maintenance
- Equipment Adjustments
- Mutual support and experience exchange

- **Suggestions**:
- new job position: assistive technology expert for needs assessment, training, monitoring, staff education, parental involvement etc.
- students training for using assistive technology

Adaptation Recommendations

- Developmentally appropriate tools and approaches: physical access, interaction, understanding, motivation.
- Tools and approaches adapted to students perceptual behavior, interests and educational goals
- Adaptation of written, visual, and auditory information according to European standards for creating easily understandable information:
- Content: repetitive, predictable, vocabulary extremely simple, non-metaphorical, appropriate sans serif font, appropriate letter size, spacing, bold letters, left alignment;
- Illustrations: clear and contrasting illustrations, photographs of real objects, animals, people, etc.;
- Voice: clear pronunciation at moderate volume, reduced speech rate, proper logical pauses, etc.).
- Software solutions for students with intellectual disabilities – easy to use (e.g., they cannot use advanced communicators only simpler ones).

Conclusion

- For the transformative and inclusivity role of digital tools in the education of children with developmental it is important to:

- Raise awareness of the importance of assistive technology among teachers, other school staff, and parents.
- Provide systematic equipment training for teachers and parents.
- Secure funding for the assistive technology (in school and at home use)
- Provide a work place position "assistive technology expert" (master of educational rehabilitation with appropriate additional education) for needs assessment, training, monitoring, school staff education, parental involvement.
- Include appropriate digital tools in individual educational plans for students.
- Ensure equipment availability in the institution – equipment lending service.
- Provide technical support for equipment maintenance
- Ensure assistive technology experience exchange among schools (examples of good practice).
- Provide an internet portal for developed educational units.

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Center for upbringing and education Šubićevac, Šibenik, Croatia

Assistive technology application

Elementary school - 1th grade

Atollo Project
Breaking barriers, building futures

Center for upbringing and education Šubićevac, Šibenik, Croatia

Assistive technology application

Elementary school - 4th grade

Sources

- Center for upbringing and education Šubićevac, Šibenik, http://centar-odgojiobrazovanje-subicevac-si.skole.hr/
- Reflective Workshop: Application of Assistive Technology and Educational Games in Everyday Work, 2024 (Consent obtained from the author –Ivana Vrljac and the institution principal)
- Data collected from the Center for upbringing and education Šubićevac, Šibenik March, 2024.
- Project ATTEND : https://www.carnet.hr/en/projekt/attend/

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School for training and education-Pula, Republic of Croatia

Višnja Popović, prof

Co-funded by the European Union

AT THE TIME OF THE CORONA VIRUS PANDEMIC DECLARATION IN 2020, SCHOOL CLOSURE AND THE SWITCH TO ONLINE SCHOOLING WE FOUND OURSELVES:

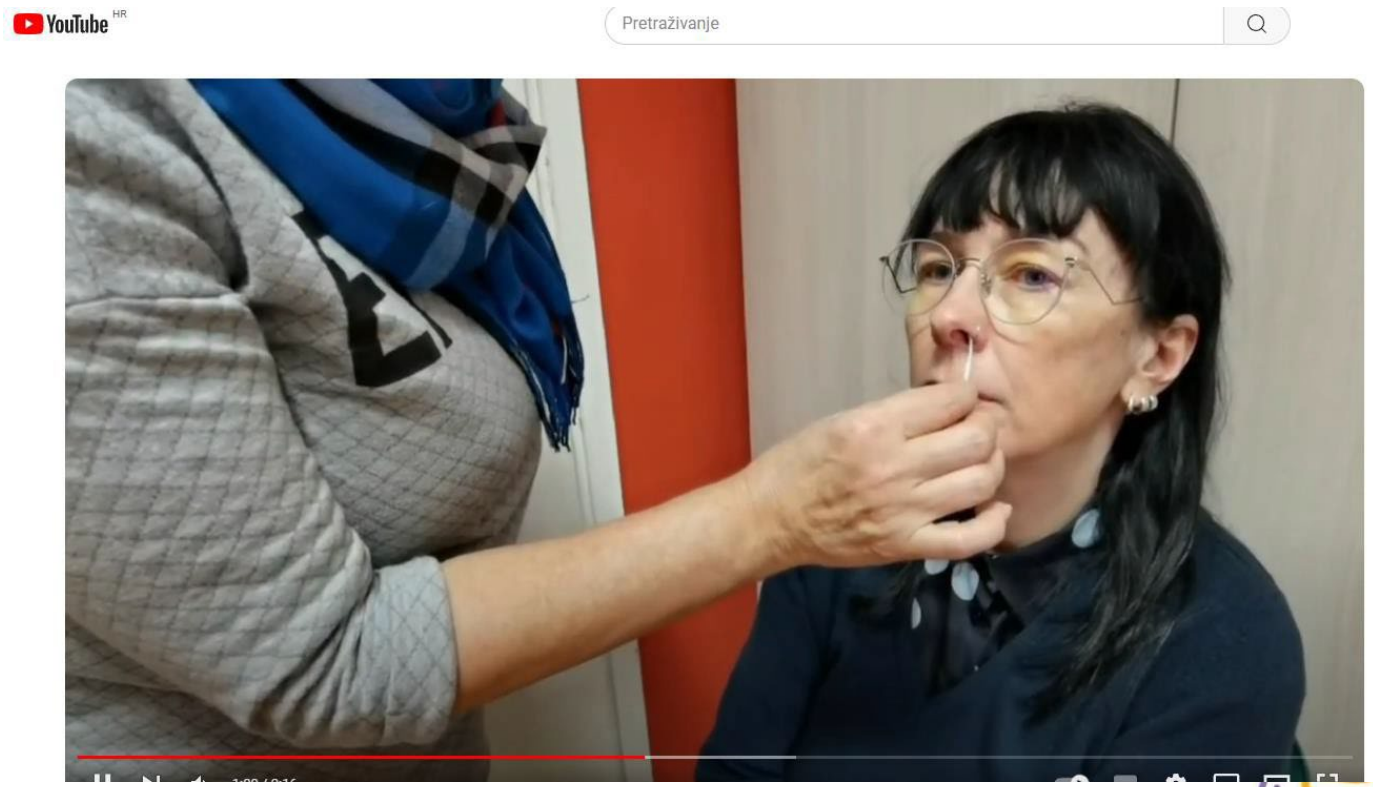
- Without educated experts for the creation of online content
- Without prepared and educated parents and student with regards to online schooling
- Without specific content for students with developmental challenges

Day after school closure in the Republic of Croatia, 13.03.2020, we started with:

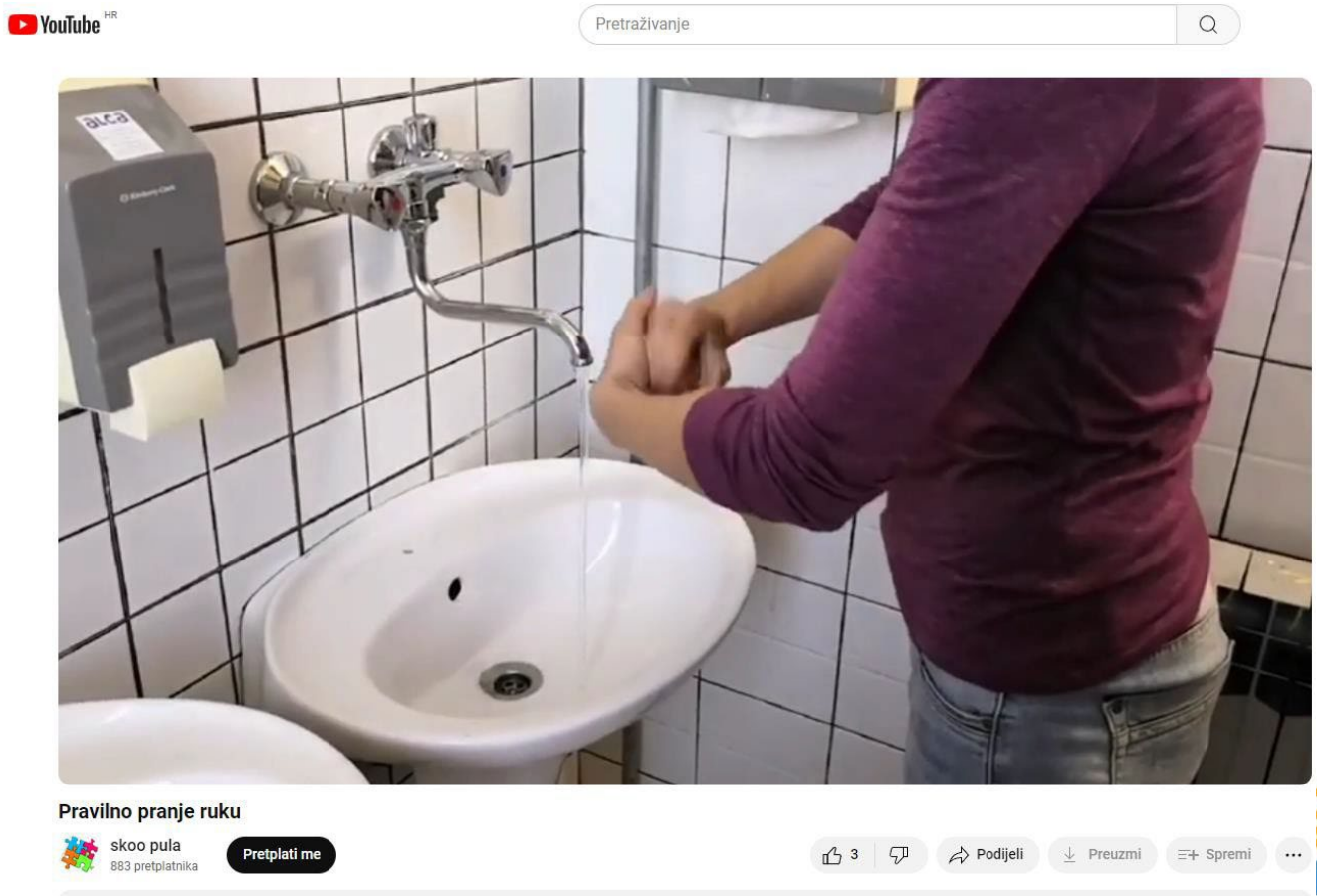
- Creation of the online content
- Learning how to set them up, record and edit
- Establishing contact with parents and teachers
- Education parents and students about working online
- Created 122 pieces of online content
- Opened school YouTube channel: https://www.youtube.com/@skoopula793/videos
- We published content on the Edutorij platform
- We held online classes via MS Teams

Content which we created was viewed more than 7000 times and it was used by the colleagues regionally as well as across the entire country.

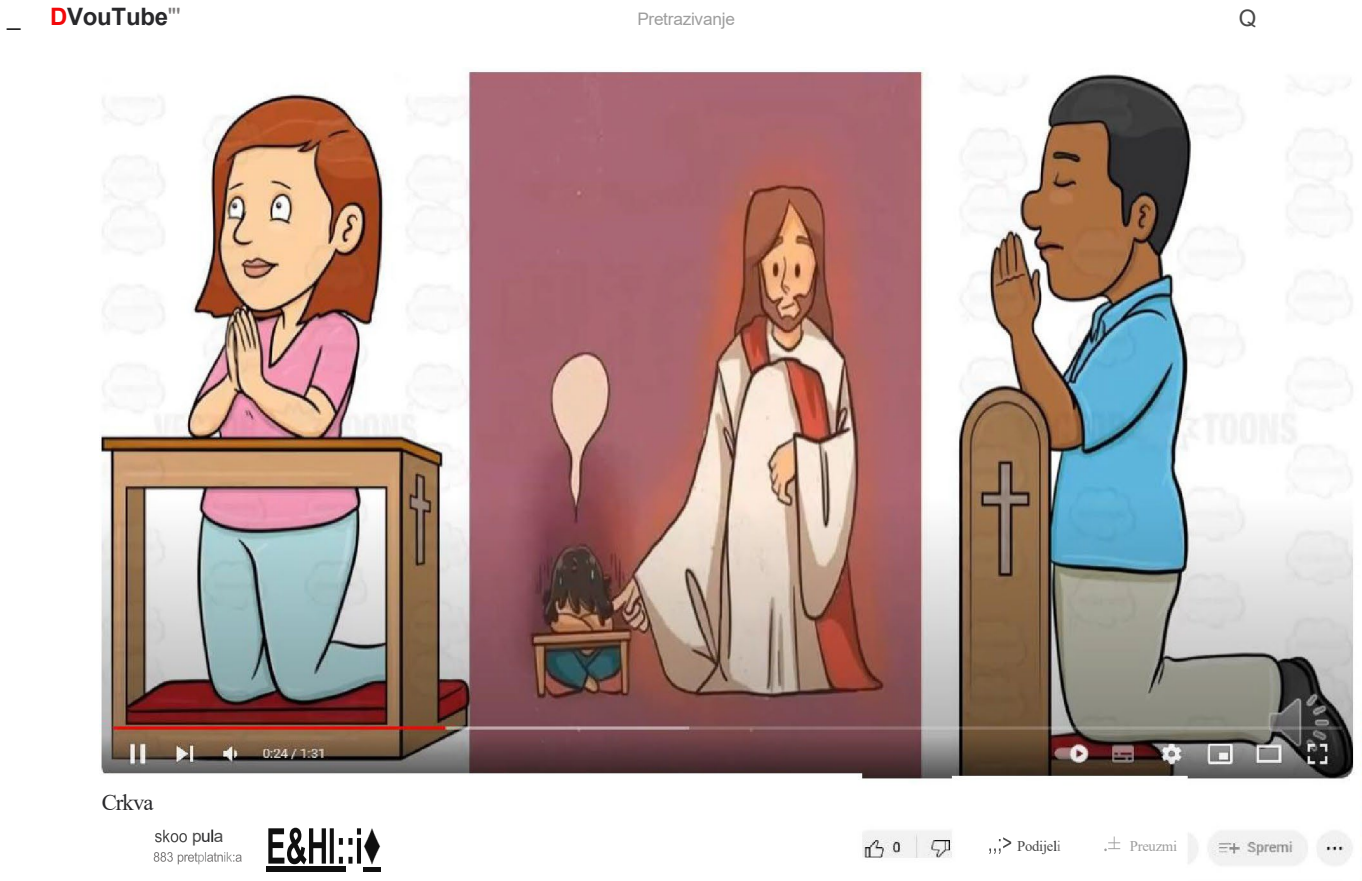
Example 1:
Instructions for using Covid 19 antigen test



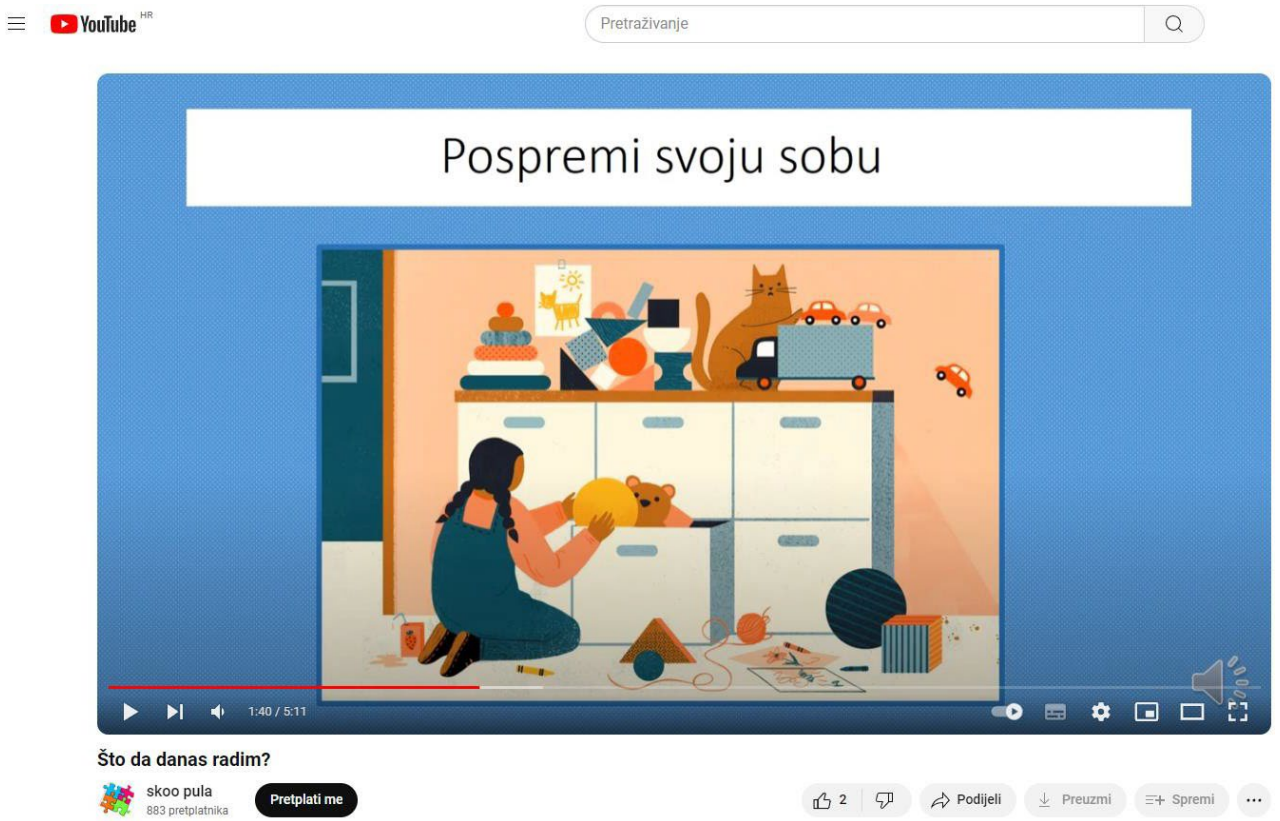
Example 2:
Correct hand washing



Example 3: Church

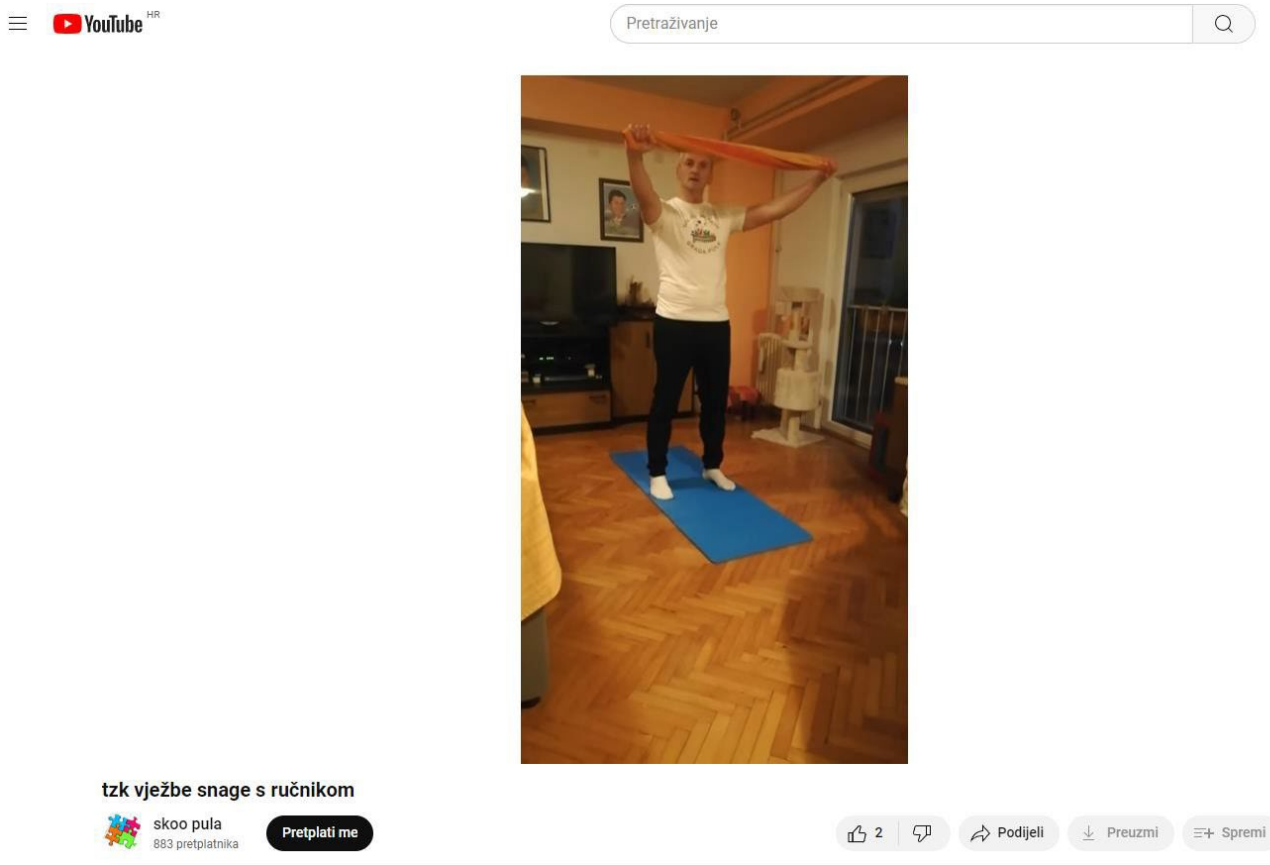


Example 4: What should I do today?



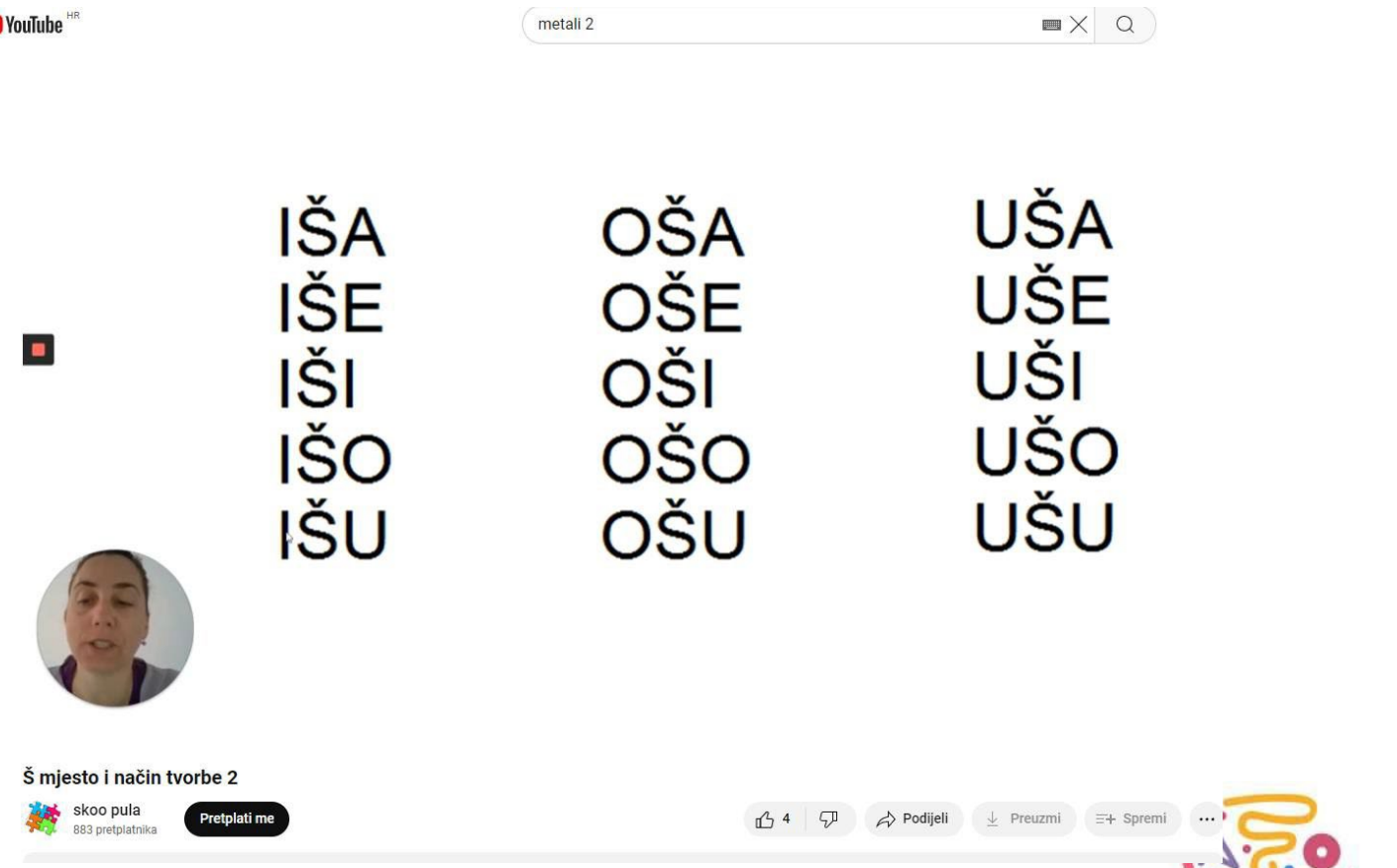
Example 5: Metals

Example 6: Strength exercises using a towel



Example 7:

„Š” place and how to do it



Example 8: What is Corona virus?

Conclusions

- For education of students with developmental challenges it is required to have quality traditional and digital materials
- Unfortunately, we need projects which will enable creation and availability of materials
- We need project Atollo

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BULGARIA

Petya Dimitrova

Co-funded by the European Union

Introduction

- General and additional support
- Most SEN students are in mainstream schools (app 25 000 per year)
- Some (hearing impaired and visual impaired) are in specialized schools, and more complex cases are in centers for special educational support
- General learning programmes can be adapted and individualized for each student
- Special programmes for students with hearing and visual impairments
- No special focus on digital education for SEN students

Some examples

- https://podkrepime.mon.bg/
- https://www.rcpppo-tg.com/%d1%83%d0%b5%d0%b1-%d1%80%d0%b5%d1%81%d1%83%d1%80%d1%81%d0%b8-2/
- https://www.unicef.org/bulgaria/%D0%BF%D1%80%D0%B8%D0%BB%D0%BE%D0%B6%D0%B5%D0%BD%D0%B8%D0%B5-cboard
- https://sen-power.eu/activities/
- https://www.steam4sen.eu/en/work-packages/io1-educational-kit.html
- https://ucha.se/
- https://edu.mon.bg/ - the digital backpack

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GERMANY

Suna Korap

Co-funded by the European Union

EXAMPLES OF BEST PRACTICE IN DEVELOPING MATHEMATICAL PROFICIENCY

Suna Korap & Andriana Stathakopoulou

GERMANY

CHARLES HALLGARTEN SCHULE

CONTENT

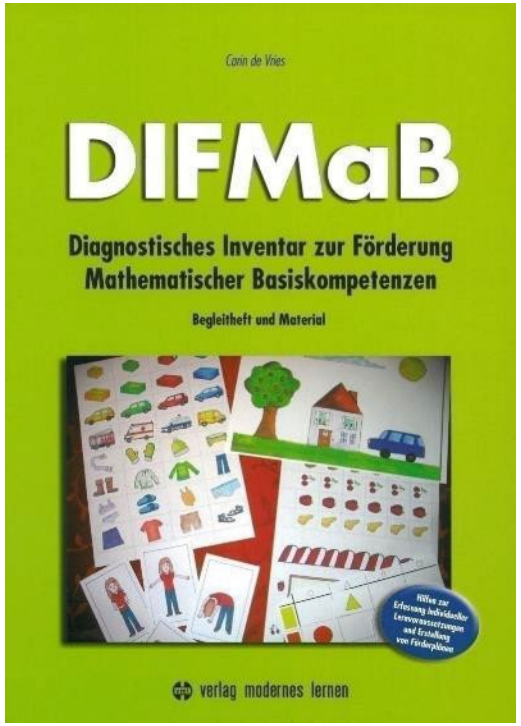
1. Who are we talking about?
2. Diagnostic inventory for promoting mathematical basic competencies (DIFMaB)
3. Examples of best practice

WHO ARE WE TALKING ABOUT?

- Students with developmental delay, limited cognitive resources
- Difficulties with abstract thinking and planning actions in advance
- Are reliant on concrete material and familiar situations, are often less flexible
- Some have difficulties in language, working memory, and sensory impairment

DIAGNOSTIC INVENTORY FOR PROMOTING MATHEMATICAL BASIC COMPETENCIES (DIFMAB)

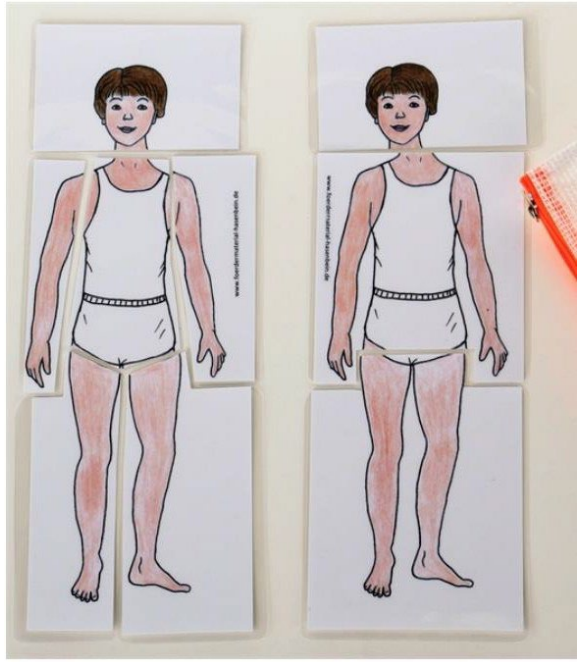
- Assessment and promotion of fundamental mathematical skills among students
- Purpose: Determine students' current proficiency in various mathematical concepts and identify appropriate intervention measures
- Areas assessed: pre-numeracy, numerical concepts, arithmetic operations
- Tailored support for students - enhancing mathematical proficiency through targeted interventions



Best practice examples

BODY SCHEMA

Body puzzle



„Put the pieces together to form a person.“

Dress-up doll

„Dress the child in the picture.“

Recognize identical hands

„Look carefully at the hands on the cards!
Where can you find the same hand?
Pin them together!“

Promoting body schema through movement activities

- movement songs
- body rhyme
- movement games

COMPARING OBJECTS - COLOUR

Primary colours, colour matching

COMPARING OBJECTS – SHAPE AND SIZE

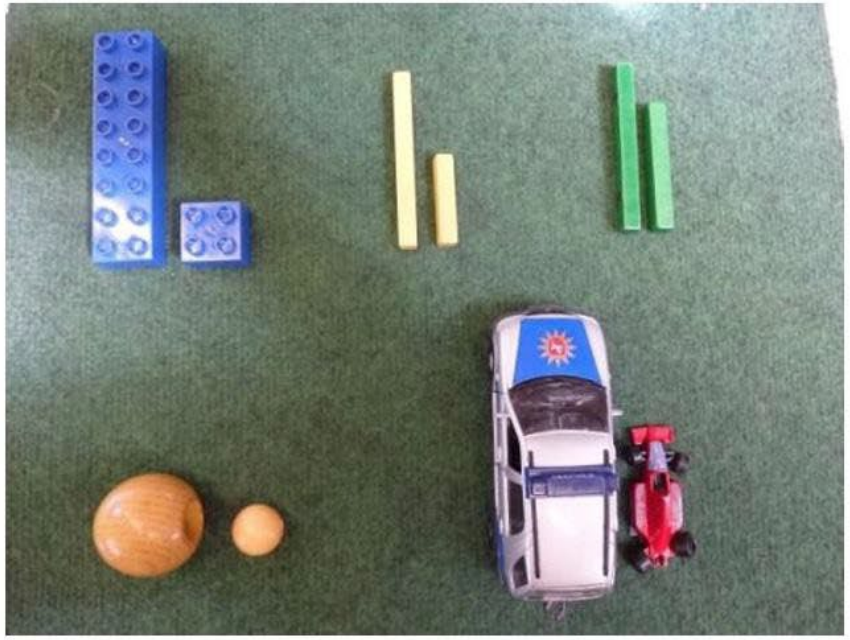
Objects are differentiated based on characteristics such as angular-round, short-long, thick-thin, wide-narrow.

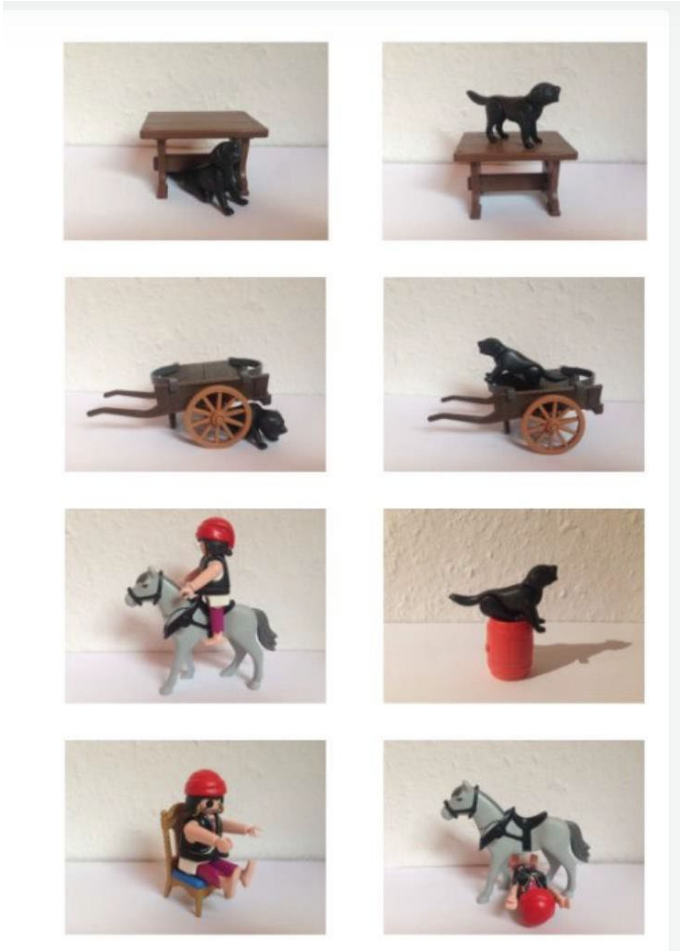
Who is bigger?

Who is smaller?

We make ourselves big or small.

Which tower, building block, bead, etc. is bigger?





SPACIAL ORIENTATION

Who is to the right or left of me?

Which object is in front of, behind, below, or above the table?

CLASSIFICATION

Exercises for group formation, whole-body somatic level

Counting rhymes like:

Eeny, meeny, miny, moe,

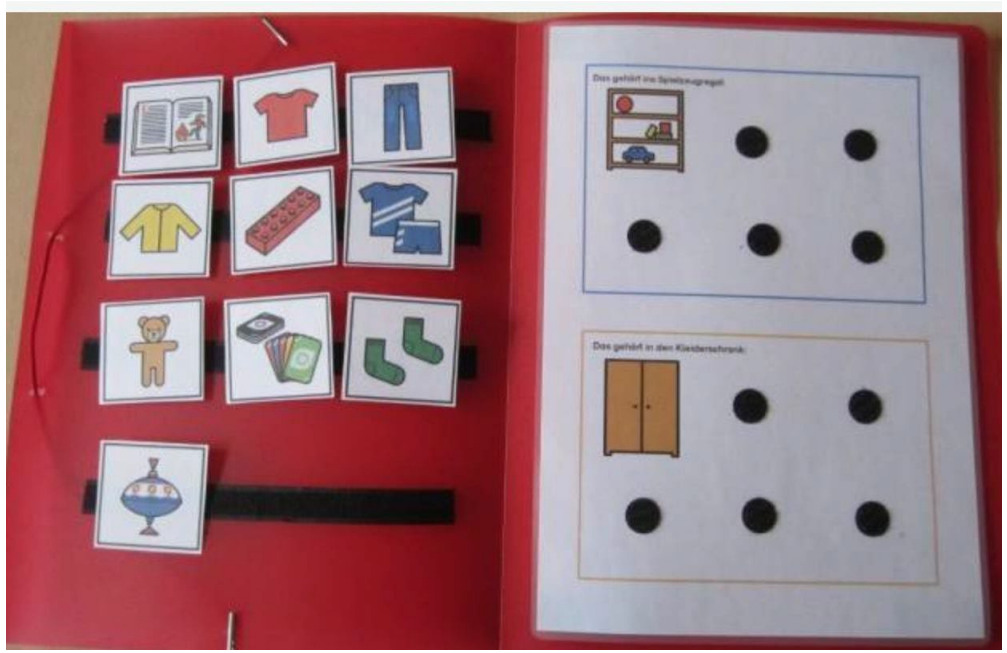
Catch a tiger by the toe.

If he hollers, let him go,

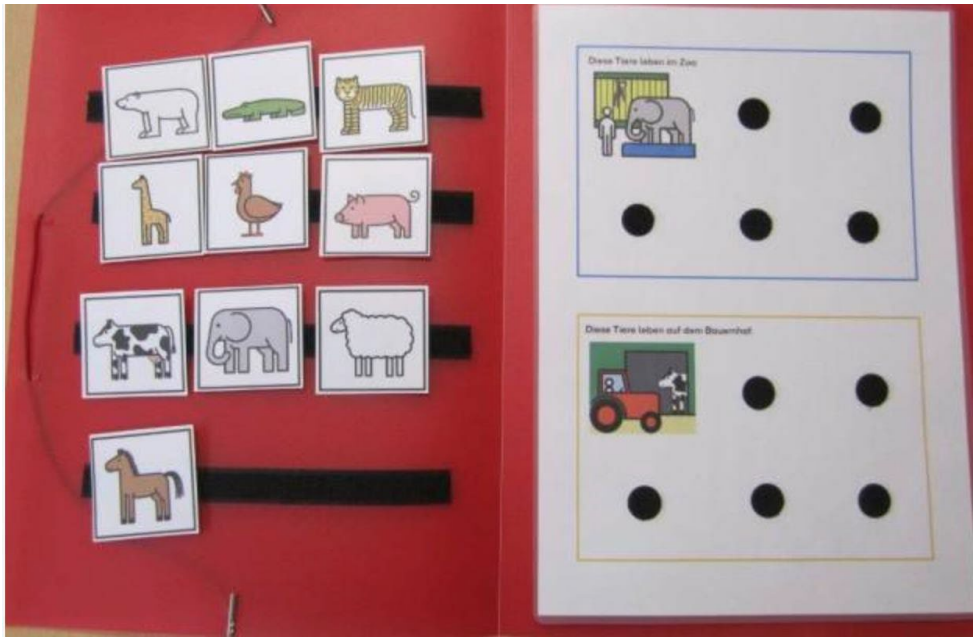
Eeny, meeny, miny, moe.

CLASSIFICATION

Category formation with clothes and toys.



Zoo animlas and farm animals.



SERIATION

Formation of rows according to colors

„Arrange the rows with the colorful tiles in the same way!“

.

COMPARISON OF QUANTITIES

Concrete differentiation of quantities through one- to-one correspondence.

"Do I have enough spoons?"

"One spoon is too much! I have more spoons."

COMPARISON OF QUANTITIES

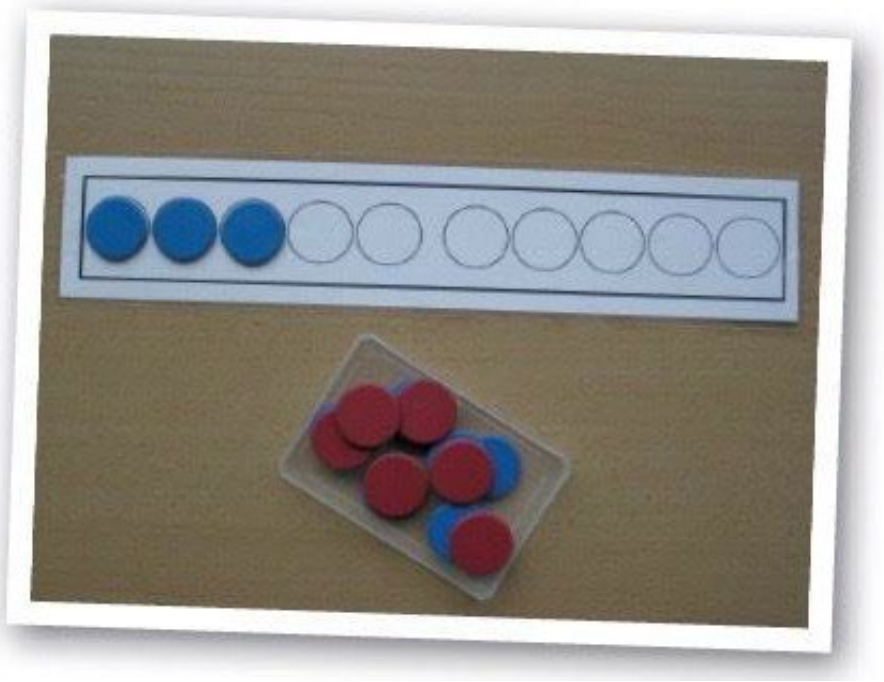
Concrete differentiation of quantities through lining up the elements or building towers.

CONCEPT OF NUMBERS

Numbers as quantities

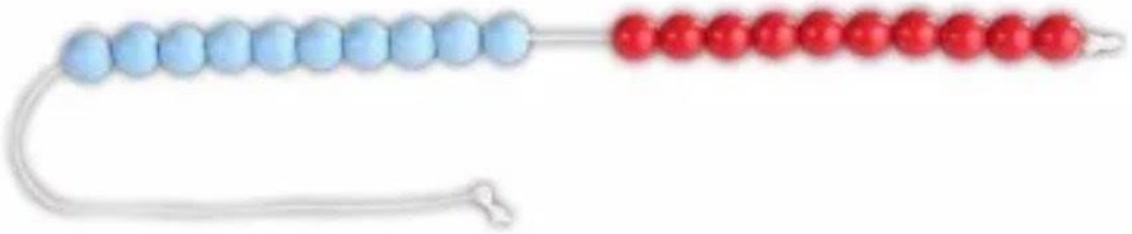
„Mengen, zählen, Zahlen“ Die Welt der Mathematik verstehen. Fördermaterial.

CARDINALITY OF SETS



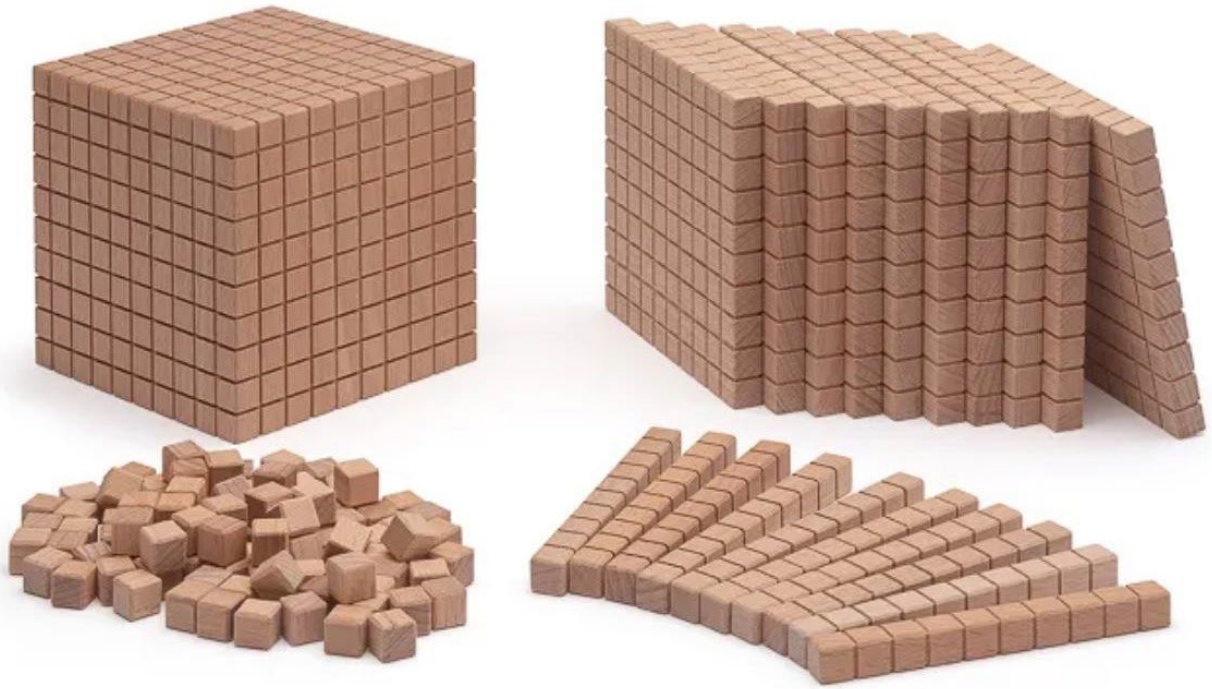
Number line

CONCEPT OF NUMBERS



Counting chain

CONCEPT OF NUMBERS

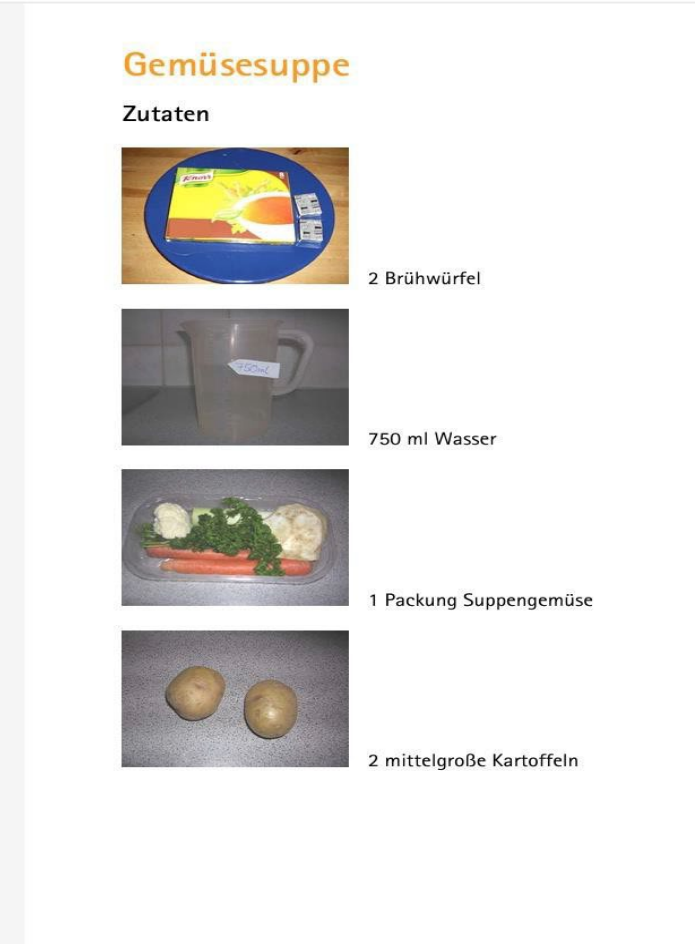


Dienes material

MATHEMATICAL COMPETENCIES IN LIFE PRACTICE - PICTURE RECIPE COOKING

- https://www.lv-koerperbehinderte-bw.de/rezepte/gemueseauflauf.pdf
- https://www.kochen-kann-ich-auch.de/rezepte.php

- Measurement
- Fraction Understanding
- Counting and Sequencing
- Spatial Reasoning
- Problem-Solving



TIME, LENGTH, MEASUREMENTS...

Through development of “Stützpunktvorstellungen“ or reference point concept

1. Hands-On Measurement Activities
2. Visual Representations
3. Life Skills Training
4. Multi-Sensory Learning
5. Real-World Applications

SOURCES / PICTURES

- https://www.foerdermaterial-hasenbein.de/produkt-kategorie/mathematik/
- https://gpaed.de/
- https://www.montessori-material.de/

Atollo Project
Breaking barriers, building futures

IRELAND

Aoife O'Driscoll

Co-funded by the European Union

Atollo Project
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Agenda

1. Introduction
2. Case Study
3. Study Design
4. Results
5. Key Findings
6. Conclusion

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According to the Department of Education Ireland

Special needs education (SEN) is the educational arrangements in place for children with disabilities. Not all children with disabilities have special education needs.

You have special educational needs if your capacity to participate in and benefit from education is restricted due to an enduring physical, sensory, mental health or learning disability.

The Irish Department of Education's policy is to provide SEN in mainstream settings as far as possible. Children are to be educated in an inclusive setting unless this would not be in the best interests of the child or the effective provision of education for other children in mainstream education.

The law on special needs education

All children have a constitutional right to free primary education and children with special educational needs have the right to free primary education up to age 18.

Education for Persons with Special Educational Needs Act 2004

- Provides that people with special educational needs are educated in an inclusive environment, as far as possible
- Establishes that people with special educational needs have the same right to avail of and benefit from education as children who do not have those needs
- Provides for the greater involvement of parents in the education of their children and decision making
- Establishes the National Council for Special Education (NCSE) on a statutory basis

Organisations with a role in special needs education

The National Council for Special Education (NCSE) works with the Irish Department of Education to improve the delivery of special needs education, with the following roles:

- Plans and coordinates education and support to children with special educational needs (with schools and the Health Service Executive)
- Plans the implementation of the Education for Persons with Special Needs Act, and and advises on best practices
- Provides resources and information to parents and educational institutions about entitlements and support.
- Monitors, reviews, and assesses the progress and resources for people with special educational needs, including adults with disabilities
- Advises the Minister for Education on special education matters, conducts research, and disseminates findings.

An Irish Case Study

“Assistive Technology Implementation in the Mainstream Classroom to Support Students with Learning Difficulties“

This study was carried out by Alexandra Corr as part of a master’s thesis, published by Tampere University of Applied Sciences in November 2021.

- Find a link to the full paper here

Background

Since the 1980s, the Irish education system has changed from an emphasis on making the student ‘fit’ into the environment, to changing the environment to fit the needs of the student.

However, Ireland is slow to restructure the curriculum, and Ireland lacks a truly inclusive model.

The research question is:

> “How can assistive technology (AT) be implemented in the mainstream classroom to support the needs of students with learning difficulties (LD)?”

Study design: digital equipment

This study focused on ‘high-tech’ AT (iPad); its features, accessibility features, and applications.

Uses:

- Text-to-speech
- Speech-to-text
- Screen readers
- Word processing and word prediction

Study Design: Participant sample

School overview:
Irish school with no assistive technology (AT) for students with learning difficulties (LD). 76 students with LD, 35 with severe literacy challenges.

Literacy support:
Students receive daily 30-minute literacy support but spend most of their day in mainstream classrooms, struggling with participation and low self-esteem due to learning barriers.

Focus group:
Study targets students with 'high incidence special needs', like dyslexia, highlighting frequent issues in the broader population.
Study population: Involves 17 teachers (13 mainstream, 4 special education) and 35 female students aged 7-13 with literacy difficulties, under the Student Support Plus group.

Teacher demographics:
All Irish, and 91% of mainstream teachers were female, and 9% were male. Overall gender ratio not specified for special education teachers).

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Study design: Method (1 / 3)

- Research focus: Aimed at planning and implementing Assistive Technology (AT) in mainstream classrooms for students with Learning Difficulties (LD).
- Methodology: A mix of qualitative and quantitative research methods, including surveys, interviews, document reviews, observation, and autoethnography — an approach that combines ***personal experience with cultural analysis*** to understand the experiences of teachers and students, in this case.
- Data collection: Surveys among teaching staff and selected students; interviews held with 5 classroom teachers directly involved with the student participants.
- Participant selection: Chose 10 students from those with literacy difficulties for surveys and AT usage. Two students from each of the 5 classes from second to sixth class, were chosen to use the AT.

Study design: Method (2 / 3)

- AT implementation: Introduced AT in English lessons, with flexibility for broader use.
- Researcher's role: Acted as facilitator, supporting constructivist learning — an action-oriented approach where students build on existing knowledge to apply and better understand new concepts
- Support: Offered guidance to 5 teachers and 10 students on challenges related to AT use.
- Monitoring: Daily teacher observations to oversee AT integration and effectiveness in classrooms.

Study design: Method (3 / 3)

- Observation period: Researcher observed the 10 students intermittently, based on her availability.
- Student survey: Study included a 9-question closed-ended survey, plus 1 open-ended question, delivered via natural reader.
- Accessibility features: Survey presented in dyslexia-friendly font, and students had the opportunity to have questions read to them. Responses were accessible in shared notes.
- Pre-test survey: Conducted with 3 additional students from the broader group of 35 with literacy difficulties, not in the main sample.
- Teacher interviews: End-of-term, semi-structured interviews with 5 teachers, recorded and transcribed for detailed analysis.

Results

The results of the qualitative methods were structured by and presented under the following 6 themes:

- Importance of high-quality, relevant AT training.
- Benefits of AT implementation and usage.
- Challenges and barriers to AT use.
- Importance of careful planning for AT integration.
- Users' and facilitators' attitudes towards AT.
- Recommendations for future AT plans and implementations.

The results of the quantitative analysis from the surveys were analysed and put into tables such as the here:

	2nd 8 years	3rd 9 years	4th 10 years	5th 11 years	6th 12 Years	
Yes	2	2	1	0	0	5
Row %	20%	20%	10%	0%	0%	50%
No	0	0	1	2	2	5
Row %	0%	0%	10%	20%	20%	50%
Total Number of Students	2	2	2	2	2	10
Column %	100%	100%	50%	0%	0%	

Table A: Responses to the question, *Do you think you need more training on the AT that you used this term?*

Results: Key Takeaways

- Teaching staff had minimal AT knowledge and training, and barely any experience with AT in the classroom
- AT can be implemented in the mainstream classroom to support the needs of students with LD if teachers and students work collaboratively and mindfully
- The researcher started by training the students in a small amount of AT and found that it was a sufficient amount of content to train pupils over a school week.
- Most students mastered the AT, but younger students needed more training, and also lacked experience in some technological skills. A need was identified for early intervention for technological upskilling for typing.
- It was found that it is crucial to question the technological skills of students and to dismiss the myth of ‘digital natives’, where we assume that students have the appropriate technological skills

Results: Key Takeaways

- There was **limited understanding and experience with AT among teaching staff**.
- Successful AT use requires cooperative effort between teachers and students.
- Initial training was adequate for most, but younger students needed additional technological skill development.
- **It is critical to assess actual technological competencies rather than assuming proficiency for a certain age group, for example ‘digital natives’.**
- Students were uncertain about using AT beyond English lessons, so a need for broader application support
- Teachers require further assistance for effective AT use across various subjects.
- Some 70% of students and all teachers were proficient with AT, mainly in English.
- AT helps students with LD keep up with peers, emphasising the importance of inclusive technology.

Challenges for AT implementation

- The results of the study revealed several challenges to the researcher which need to be overcome in order to enable a more successful implementation of AT on a large scale;
- Moving from non-AT to AT environments requires more planning and training.
- Post-training, AT implementation was affected when accessible resources weren’t available.
- The use of iPad 'Notes' **limited homework continuation and parent engagement**.
- Teachers were initially concerned about AT due to lack of experience — more dialogue and training needed
- Student concerns about using AT could hinder its adoption without supportive communication.

Future Suggestions

- Encourage students with LD to share how AT helps their learning, fostering positive views on AT.
- Increased support requested for AT planning and a new program for storing school work to enhance home-school connection.
- With the Irish curriculum incorporating Universal Design for Learning (UDL), AT research becomes vital for inclusive education.
- Emphasise **supporting students' and teachers' wellbeing** during the transition to AT use.
- Effective AT implementation relies on proper teacher and student training, and appropriate planning.
- AT **promotes inclusion, equal opportunities** and comprehensive student development.
- Further research suggested included revising AT training to improve approach, content, and resources, and considering early ICT skill interventions for younger students.

Conclusion

- Ireland is continuing to aim for inclusive education, with exceptions based on individual child's needs or mainstream education efficacy.
- Despite specific policies and support organisations, further work is needed to leverage technology for special education needs.
- The study highlights the significant advantages of AT for students with special educational needs, emphasising careful classroom implementation.
- Both students and teachers require more training to integrate technology effectively into educational practices.
- Additional resources are needed to support independent learning at home, benefiting pupils, teachers and parents alike.
- **Encouraging dialogue about AT can help alleviate anxieties and foster a more welcoming attitude towards its use.**

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Thank you for your time

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AUSTRALIA

Steven Pace

Co-funded by the European Union

https://www.youtube.com/watch?v=cd2gKs4Tf20

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AUSTRIA

Tobias Buchner
Brigita Höger

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europaschule-linz
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austria

Best practice: Using coding as methodical tool in primary education

Hs.-Prof. Dr. Tobias Buchner
Mag.a Brigitta Höger
Susanne Hofstätter BEd MA

die pädagogische
hochschule
oberösterreich

1478764650.webp

Introduction: Teaching future skills in an inclusive way?

- making
- coding
- Digital literacy

} inclusive?

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© Dennis Wise/University of Washington

TEAM DIGITAL INCLUSIVE EDUCATION AT UNIVERSTIY OF EDUCATION UPPER AUSTRIA

BRIGITTTA

ANNA

JELENA

URSULA

SUSANNE

TOBIAS

MARGIT

MICHAEL

ELISABETH

Future Space
@ University of Education Upper Austria

From Labs to practice…

…learning coding with BeeBots in primary education

europaschule-linz
praxisschule ph oö
austria

Digitalization in the Austrian curriculum ofprimary education

europaschule-linz
praxisschule ph oö
austria

Didaktical principles:

"The use of media and the use of digital devices in the classroom thus tie in with pupils' everyday lives on the one hand and open up new didactic and methodological possibilities on the other. They expand the variety of methods, support different types of learners and promote pupils with different talents and learning speeds”

“contemporary teaching and learning therefore also requires digitally supported teaching”

“The use of digital media is an important addition to the teaching materials used so far, but should not completely replace them”

Österreichischer Lehrplan der Volksschule
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Introduction to coding

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- **Start**: Relating to the children's world of experience: Where have you ever seen a robot? What is a robot like this used for?
- **Learn commands** ‚forward‘, ‚backward‘, turn right‘, and ‚turn left‘
- **Mutual analogue “codinmg" of the children**

Application by working with the tablet

- Exercise: Programming the virtual BeeBot from the start "beehive" to the finish "flower“
- Avoiding various obstacles
- Various "theme worlds" with increasing levels of difficulty

Kostenlose App „Bee-Bot“

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First steps in coding a BeeBot

- Use of equipable BeeBot mats with 15 cm spacing between the individual fields
- **Focus on coding**
  (no linking to other topics)
- **Roll the dice!**
- Add gradually more fields

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BeeBots as tool for ‘station learning’

- Link tools with other contents (bees and flowers)
- Colour coding of the different levels
- Take task cards - coding the BeeBot's path to the solution field on the mat

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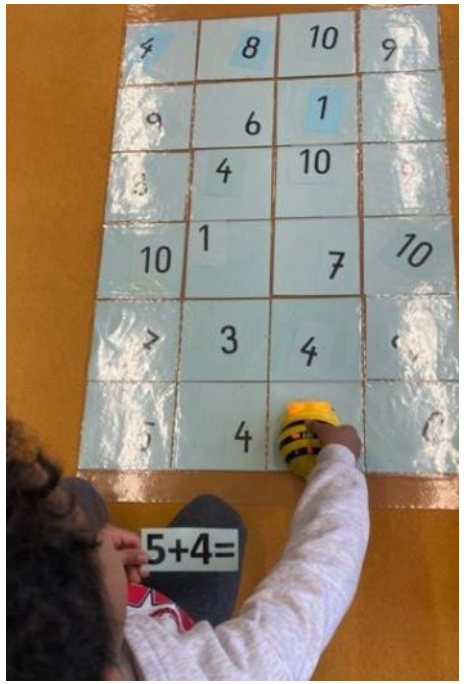
BeeBots as a methodical tool in mathematics

- addition and subtraction in number range 1- 10
- Displaying figures up to 30 in tens and ones
- Combination of multiplication (1x1) with single-digit addition or subtraction in number range 1-100



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BeeBots as a methodical tool in German on differing levels

- **read and search fsimple, short words**
- **Read, search for and copy multi-syllable words**
- **Transferring words from block letters to cursive writing**

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Thank you for your attention!

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Thank you for your time

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