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REPORT ON EDUCATIONAL SYSTEMS IN FOUR COUNTRIES: CZECH, GERMANY, GREECE AND POLAND WITH AN EMPHASIS ON ART AND STEM INTEGRATION.

Introduction

Educational systems differ significantly across countries in terms of curriculum structure, emphasis on particular subjects, and integration of modern teaching methodologies, such as digital storytelling or STEM (Science, Technology, Engineering, and Mathematics) education. This report provides an in-depth review of early childhood, primary, and secondary education systems in four countries: Germany, Greece, Poland, and the Czech Republic. The goal is to analyze how these countries address arts, culture, inclusion, and the integration of technology, with a particular focus on early childhood education (ECE) and primary education, while also exploring the presence (or absence) of STEM and digital storytelling in their curricula.

The report is organised into three levels of education (early childhood/primary/secondary) across the four countries. A summary and a conclusion are also provided together with some recommendations for future educational practices.

Early Childhood Education

In the four countries reviewed, early childhood education (ECE) remains distinct from the formal school system. It represents the only educational level not fully integrated into the

national educational frameworks, often operating independently of primary and secondary education. Generally, early childhood education lacks a defined curriculum or framework, and it is often devoid of clear accountability measures, unlike higher educational levels. For instance, in Germany, early childhood education falls under the jurisdiction of the youth welfare sector, rather than the Ministry of Education, signaling a different approach to education in these formative years.

Across the countries examined, the provision of early childhood education for children under the age of three is especially diverse. These systems are characterized by an absence of structured curricula, centralized programs, or recommended teaching methodologies. This variability is particularly evident in Poland and the Czech Republic, where early childhood education operates without a national framework, leaving considerable autonomy to individual settings. The age range for children attending early childhood settings also varies significantly among the countries. In the Czech Republic, children from as young as 6 months to 5 years are enrolled in early childhood programs, while in Germany and Poland, the age range is from birth to 6 years. In Greece, early childhood education starts at birth and extends until the age of 4 years.

Among these countries, Germany has made efforts in incorporating educational policy principles into its Early Childhood Education and Care (ECEC) through the "Joint Framework of the Länder for Early Education in Day Care Centres." This framework provides general guidance for educational practice while maintaining the autonomy of day care centers in setting their educational objectives. On the other hand, Greece has developed a comprehensive curriculum for children aged 4 to 6, which stands out for its formal integration into the education system. Greece is also unique in mandating preschool education for children in this age group under the authority of the Ministry of Education, reflecting its structured approach to early childhood education. However, the provision for children under four years of age is not under the guidance of the Ministry of Education and does not have a framework.

Across all four countries, a common emphasis is placed on play and health in early childhood education. For children aged 3 to 6, arts, aesthetics, culture, and creativity are generally acknowledged as integral components of early learning. In addition to the creative aspects of education, the incorporation of technology or digital tools into early childhood settings is noted in most countries, except the Czech Republic. For instance, Germany places strong emphasis on enhancing children's learning dispositions, exploration, inclusion, communication, and self-determination. Notably, Germany prioritizes equity and inclusion from an early age, having updated policies for children under the age of three in 2009 to highlight the importance of holistic development and nurturing positive relationships.

Germany is distinctive in its integration of MINT (mathematics, informatics, natural sciences, and technology) and Media and Digital Education from the age of three, signaling its forward-thinking approach in preparing young children for a technologically advanced future. Poland also incorporates elements of technology, such as design, tinkering, and the presentation of work products, in early childhood centers for children aged 3 to 6. Greece is incorporating digital technologies, mathematics, and science into its most recent early childhood curriculum (2021/22). In 2021, Greece introduced 'skills workshops' in kindergartens for children aged 4 and older, with a particular focus on enhancing their technology and science skills, further solidifying its commitment to a modern, tech-infused curriculum for young learners.

Primary Education

In all four countries under review, primary education is governed by the respective Ministries of Education and is compulsory for all children. Art education is a staple across the countries' curricula, though the amount of time allocated to it varies significantly. For example, in Poland, primary school students receive 4 hours per week of arts education, whereas in the Czech Republic, this increases to 12 hours per week.

In terms of technology and ICT (Information and Communication Technology), all four countries have incorporated these subjects into their primary school curricula. The time dedicated to computer science or ICT ranges from 1 hour per week in Greece to 5 hours per week in upper primary education in Poland. Despite the global trend toward promoting STEM education (Science, Technology, Engineering, and Mathematics), none of the countries explicitly mention STEM education in their Eurydice descriptions. Instead, more generalized terms like cross-curricular projects or themes (as seen in Greece and Germany) or 'disposable hours' (as seen in the Czech Republic) are noted, though it remains unclear whether these are directly related to STEM education.

In Greece, ICT courses are delivered through a separate laboratory approach, with one hour per week dedicated to this subject. In contrast, German primary schools do not allocate specific hours for ICT in the core curriculum. Instead, Germany utilizes cross-curricular hours to cover MINT (mathematics, informatics, natural sciences, and technology) and media education, emphasizing the interdisciplinary nature of these subjects.

Secondary Education (only mainstream/general secondary education)

Secondary education across the four countries exhibits considerable diversity, despite all being governed by their respective Ministries of Education or equivalent authorities. Secondary education encompasses a wide range of school types, including general, technical, vocational, bilingual, and specialized schools. In addition to traditional academic institutions, art schools and conservatories are integral components of the secondary education systems in each of these countries.

In general secondary schools, arts and ICT/computer science or technology subjects are included in the curricula across all four countries, though the teaching hours allocated to each subject differ. For instance, in Poland, arts education is provided for 1 hour per week, while in the Czech Republic, it is allocated 4 hours per week. Greece, however, does not offer any dedicated hours for arts education at the secondary level. Similarly, the time devoted to ICT or computer science varies across the countries. In Poland, students receive 1 hour per week, whereas in the Czech Republic, they receive 4 hours per week, and in Greece, 2 hours per week. In Germany, the number of hours dedicated to these subjects is not easily quantifiable, as schools have significant autonomy in structuring their curricula. However, Germany continues to focus heavily on MINT education, maintaining its commitment to these areas throughout the educational spectrum.

Summary

In summary, the integration of arts, culture, inclusion, empathy, and soft skills varies across the educational systems of the four countries. The Czech Republic stands out for placing the highest emphasis on arts education across all levels, while Greece, surprisingly, eliminates arts education after junior high school. Despite the global emphasis on STEM education in recent decades (as seen in research by Bacovic et al., 2022; Falloon et al., 2020; Rifandi & Rahmi, 2019), only Germany has incorporated an analogous approach through its MINT education, though this excludes both engineering and the arts. Furthermore, storytelling and digital storytelling methods were notably absent from teaching approaches at all educational levels in the countries reviewed.

Recommendations for Future Practice

Expand Early Childhood Education Frameworks: Countries like Poland, Greece and the Czech Republic could benefit from developing more structured and centralized frameworks for early childhood education, especially for children under the age of three. Implementing a clear curriculum could help unify educational goals, enhance equity, and ensure that all children receive a strong foundation in their early years.

Incorporate Digital Storytelling Across All Levels: The absence of digital storytelling in the educational practices of all four countries presents an opportunity for innovation. Digital storytelling can be used not only to enhance creativity and communication skills but also to integrate arts and technology in a meaningful, interdisciplinary way. Introducing this method across early childhood, primary, and secondary education could foster greater engagement and collaboration among students. Notable examples exist from countries such as Finland which emphasizes phenomenon-based learning, where digital storytelling is often used as a method to allow students to explore topics across different subjects, blending storytelling with digital tools ((Merjovaara et al., 2020; Niemi & Multisilta, 2016; Niemi et al., 2018). Students create narratives using multimedia elements such as videos, audio, and images to express their learning in creative ways. This approach is particularly encouraged in subjects like language arts, social studies, and even science, mathematics and history.

Prioritize Arts Education at the Secondary Level: Countries like Greece, which discontinue arts education after junior high school, should reconsider the role of the arts in secondary education. The arts foster creativity, empathy, and cultural understanding, which are critical skills in today's interconnected world. Increasing the hours allocated to arts education in secondary schools, as seen in the Czech Republic, could enhance students' overall development (Lilliedahl, 2022; See & Kokotsaki, 2016; Thomas et al., 2013).

Broaden STEM/MINT Approaches: Although Germany leads the way with its MINT education, it could further benefit from including engineering and the arts (turning STEM into STEAM) to create a more holistic approach. Other countries, like Greece, Poland, and the Czech Republic, should look to Germany's MINT model as a framework for integrating cross-disciplinary subjects like mathematics, science, technology, and media education, starting from early childhood and continuing through secondary education.

Focus on Inclusivity and Equity: Germany's emphasis on inclusivity and equity from early childhood is commendable and should be adopted more widely. Policies that promote holistic development, positive relationships, and inclusion for all children—especially those under three—are vital for reducing inequalities and ensuring that every child, regardless of

background, has access to quality education (Ainscow, 2020a, Ainscow, 2020b, Whitley & Hollweck, 2020)..

Enhance Teacher Training and Professional Development: For these recommendations to be effectively implemented, teacher training and professional development programs should be expanded to equip educators with the necessary skills to integrate digital storytelling, arts, and STEM into their teaching practices. Continuous professional development ensures that teachers can stay up-to-date with innovative teaching methods and technologies that benefit students at all levels (Dardanou et al., 2023; Polgampala et al., 2017; Shernoff et al., 2017).

By adopting these recommendations, the countries under review can further enhance their educational systems, offering more inclusive, creative, and future-oriented learning experiences for all students.

Conclusion

This review of early childhood, primary, and secondary education in Germany, Greece, Poland, and the Czech Republic highlights both similarities and differences in how these countries approach education, particularly in the realms of arts, technology, inclusion, and overall curriculum structure. Early childhood education remains the most diverse and least formalized level, often characterized by the absence of centralized frameworks, curricula, or accountability measures.

In primary and secondary education, the integration of arts, technology, and cross-curricular themes varies significantly, with arts education receiving a strong emphasis in the Czech Republic but less so in other countries like Greece, which abandons formal arts education after junior high school. While the importance of STEM education is widely recognized globally, only Germany has adopted an analogous approach through its MINT curriculum, which excludes engineering and the arts. Surprisingly, the use of digital storytelling, a powerful tool for enhancing creativity and engagement, was absent in the teaching approaches across all four countries.

By expanding early childhood frameworks, incorporating digital storytelling, prioritizing arts education, broadening STEM approaches, focusing on inclusivity, and enhancing teacher training, these countries can offer more holistic, creative, and equitable educational experiences. Such improvements would better prepare students for the future, fostering both academic success and personal growth.

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Eurydice website:

CZECH

https://archiv-nuv.npi.cz/our-work/preschool.html

https://eurydice.eacea.ec.europa.eu/national-education-systems/czechia/early-childhood-education-and-care

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GERMANY
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GREECE
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POLAND:
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