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Digital Education for Sustainable Development across Europe

Report on the Potential of the Integration of a Digital Learning Platform for Education for Sustainable Development (ESD) for Elementary Schools into the National Curricula of Cyprus, Germany, Hungary and Norway

The "Digital Education for Sustainable Development across Europe" project is creating a digital European learning platform for ESD in Cyprus, Germany, Hungary and Norway, aimed at pupils aged nine to eleven to bring ESD into elementary schools as a targeted learning format. As a basis, national curricula were analyzed using a joint framework to assess potential linking points, allowing for more targeted and efficient development of educational material as part of the digital learning platform. Despite the varying structure and focus of the individual national curricula, ESD is recognized as a relevant teaching component and targeted in all of the assessed countries. Moreover, the emphasis on digital learning in the different curricula provides additional application possibilities in various and across subjects. The proposed learning platform can establish a clear link between the curricula, digital learning, ESD and the SDGs themselves. This way elementary school pupils, can engage in a positive envisioning of a just and livable future for all.

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1 Introduction

"Digital Education for Sustainable Development across Europe" is an Erasmus+ funded project to support the 2030 Agenda for Sustainable Development adopted by the United Nations. By creating a European learning platform for elementary school aimed at pupils aged nine to eleven in Cyprus, Germany, Hungary and Norway and other European countries the project strengthens awareness on the 17 Sustainable Development Goals (SDGs) of the United Nations and underlying coherencies. Thus, promoting a more sustainable and fairer world. The platform advocates for sustainable peace and prosperity and to protect our planet. It contributes to achieving the SDGs by 2030.

The platform offers teaching and learning materials covering the 17 SDGs, Johan Rockström and Pavan Sukhdev's wedding cake model[1] and dilemmas related to the goals portioned into 19 learning worlds in English, German, Greek, Hungarian and Norwegian. Each learning world provides introductory and learning modules for teachers and pupils, accompanied by handouts and directly applicable educational material. Thus, encouraging teachers to increasingly focus their lessons on holistic and transformative education in the sense of ESD and enabling pupils to reflect on and shape their thoughts and actions in the context of sustainable development. The central elements of the learning platform are the board stories, interactive animated stories that promote audio-visual learning. The board stories include smaller tasks for pupils to engage actively with the topics of the respective SDG and experience digital learning in different ways. Thereby, combining new media with important knowledge content to create a meaningful unit that makes learning fun.

[1] This model depicts the SDGs as a multi-layered wedding cake with some goals securing the livelihood of a well-sustained biosphere and other goals building on this to form a fair and just society. Thereby, it shows dependencies between the SDGs: Economies are embedded in societies, and societies are embedded in the biosphere that has finite resources. Hence, it is in contrast to common models that are subordinate to economic goals. www.stockholmresilience.org/research/research-news/2016-06-14-the-sdgs-wedding-cake.html

By conducting a comprehensive curriculum analysis in each of the four countries, potential linking points and gaps in the national curricula can be identified, allowing for more targeted and efficient development of educational material being implemented in the digital learning platform which shall be used transnational and whose publication is planned for 2025. Thus, the report provides insights into the representation of ESD within the national curricula, draws cross-country commonalities and gives recommendations for teachers to integrate the digital learning worlds for ESD effectively in their teaching.

2 National curriculum analyses

2.1 Aims

As the UNESCO's ESD for 2030 education program aims to bring about the personal and societal transformation that is necessary to change course, respective educational means are mandatory to reach such. However, the educational system of each country is different and has diverse mechanisms for the incorporation of ESD practices. Therefore, the curriculum analyses help in streamlining the different needs and requirements to make the development of new educational material more efficient and effective.

The overarching objective of the curriculum analyses of the participating countries is to identify the degree of cross-curricular and subject wise intersections with ESD topics for primary schools. To do so, the significance that is attributed to ESD as part of the national curricula is assessed. Following this, potential linkages as well as the applicability of the proposed learning worlds to the country specific curricula for primary schools are identified. This evaluation is essential to ensure that the educational material is aligned with the educational standards, goals and requirements of the national curricula of the primary school sector in Cyprus, Germany, Hungary and Norway.

By incorporating the country specific given factors and by considering potential differences between the countries, the learning worlds can follow a more holistic approach and their cross-country applicability can be increased. Moreover, possible risks that could concern implementing the digital learning platform in teaching can be reduced by considering the results of the analyses in the development process of the educational material. This allows a successful implementation of ESD practices in the primary schools of the partnering countries.

Furthermore, there is the need to assess the role of media education in the national curricula in order to identify its scope and specific learning objectives that shall be supported by the learning worlds for ESD. This, in turn, helps to promote pupil learning and success and provides a baseline to teaching that is based on a digital, integrated, multi-subject perspective towards sustainable development.

2.2 Methods

The national curricula for elementary school of Cyprus, Germany, Hungary and Norway were assessed to provide knowledge for the development of the digital learning platform and an effective implementation in the different European countries. In particular, the subject related and cross-curricular linkages with ESD and the SDGs on elementary school level were analyzed. This analysis served as a basis for assessing potentials of how to integrate digital ESD reasonably into the identified cross curricula intersection. An analytical framework for better comparability of the representation of ESD as well as digital learning within the four different national curricula was developed. The template sets clear goals and priorities for the conduction of the national curriculum analyses (see Appendix I).

Based on the framework the representation of both ESD in general and the 17 SDGs explicitly within the respective national curriculum were examined across subjects. Furthermore, learning objectives and desired competencies for ESD that are mentioned within the curricula were listed and if applicable designated methods for their achievement were specified. A keyword search across subjects was conducted to meet the targets of the analyses. The keyword search was based on the 17 SDGs, their learning objectives and the "GreenComp - European sustainability competence framework" by the European Commission to enable comparability.[2] However, the keyword search varied between the countries due to the different national languages and the wide range of possible search terms. In order to limit the use of numerous different terms, an extensive glossary was part of the common framework.

Assessing the role of digital learning within the national curricula constitutes the second part of the framework to identify further linking points of the learning worlds with country-specific learning objectives. To improve comparability, the digital competences stated in the "Digital Competence Framework for Educators (DigCompEdu)" by the European Commission[3] were used as a cross-country reference. The analyses included the significance of digital methods within the curricula for elementary school, their representation across subjects and desired learning objectives and competences.

After the execution of the national analyses by the respective project partner, the results were reviewed and merged in this report. There are country specific features to each national curriculum that should be considered. They are part of the next chapter to ensure clarity and comprehensibility.

3 Country-specific insights into the integration of ESD in the curricula

This chapter focuses on the integration of ESD in the respective national curricula for primary school and its extent to identify possible intersections for the proposed learning worlds. Thus, for each national curriculum there is a summary on whether the SDGs are explicitly mentioned; whether SDG learning objectives are

[2] https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework_en
[3] https://joint-research-centre.ec.europa.eu/digcompedu_en

reflected and on the potential applicability and linkages of the learning worlds to the national subjects or cross-curricular learning objectives of the respective national curricula. Moreover, national characteristic features of the curricula are stated to better understand the national context and potential linking points. See appendix for detailed individual curriculum analyses.

3.1 Cyprus

For the Cypriot curriculum analysis, grades three to five were assessed. Cypriot primary schools teach the following subjects: arts, design and technology – digital technologies, English language, environmental education / ESD, geography, Greek language, health education, history, literature, mathematics, music, natural science, religion, physical education. Each subject has a distinct curriculum. However, they share the same structure, providing information on the subjects' philosophy, success indicators, general scope and general scope per grade, content, methodology, and evaluation. ESD is an approach to teaching and learning that integrates sustainable development principles by infusing into existing curriculum subjects and the broader educational experience. It is stated that education must foster the "protection of the environment and sustainable development".[4] Educators are supposed to refer to and use the curriculum for Environmental Education and ESD (EE/ESD) in their daily teaching planning in a cross-thematic and interdisciplinary way to promote sustainability actions and problem solving by engaging the whole school and incorporating all learning subjects.

The curriculum for EE/ESD focuses on ESD urging schools to design, implement and monitor a sustainable environmental education policy to deal with local sustainability challenges. In contrast, the other subject curricula do not namely refer to ESD, the 17 SDGs or ESD related competencies but may describe indicators that indirectly refer to ESD, which were identified. For instance, the Greek language curriculum covers "cultivating a healthy citizenship in a modern multicultural society as well as awareness against racism and hatred". This learning objective can represent linking points to SDG no. 10 as pupils could learn how discrimination affects different groups of people and reinforces inequalities. It could also relate to SDG no. 11 as pupils could realize how the development of cities and communities can further increase inequalities by excluding people in various ways. Hence, reviewing the subject curricula revealed that there are multiple references resembling ESD competencies but no direct referrals as such.

However, in the EE/ESD curriculum, it is mentioned that the curriculum embraces "sustainability at the heart of education, making it one of the basic educational goals, and highlighting it as a key concept for the re-orientation of education itself and of learning in general". In addition, this curriculum "seeks the formation of the sustainable school, which will act as an agent of change in education and society".[5] These statements clearly underline the significance attributed to ESD.

[4] https://archeia.moec.gov.cy/sd/554/ap_filosofia.pdf
[5] https://archeia.moec.gov.cy/sd/554/ap_deiktes_eparkeias_epitychias.pdf

Furthermore, ESD reference can be part of teaching even though it is not mentioned in the respective subject curricula as the curricula describe what should be taught focusing on indicators of success such as intended learning outcomes, while educators could choose to achieve learning outcomes based on ESD topics. For example, textbooks could contain teaching units referring to environmental issues, while the teaching of environmental issues is not being stated in the relevant curriculum itself. These units may be used in a cross-thematic way under the EE/ESD curriculum. This set of facts applies to the other national curricula, too.

Apart from the teaching hours for EE/ESD there is no specific time budget predefined to cover ESD.
There is a multitude of suggested methods for applying ESD as part of the subject curricula (see Appendix II).

3.2 Germany

There is no federal education system in Germany. Education policy is the responsibility of the individual federal states. In the inter-state Standing Conference of the Ministers of Education and Cultural Affairs, common quality standards in schools are agreed on and set out in recommendations, resolutions and agreements. Thus, the federal states each have their own curricula, which are binding for all schools in the respective federal state. These differ in terms of focus and phrasing of learning objectives as well as content of the subjects taught. There is also a differentiation between curricula for primary and secondary schools.[6] The target group essentially comprises the curricula for primary school grades three and four. These grades were also selected for Berlin/Brandenburg, whereby elementary school here includes the fifth and sixth grades, too.

Since it would have been too much effort to include all 16 federal states in the analysis, the curricula of the federal states of Berlin/Brandenburg, Baden-Wuerttemberg and Saxony-Anhalt were examined as a cross section. In Baden-Wuerttemberg, there are curricula for each school subject. In Berlin/Brandenburg and Saxony-Anhalt, in addition to the subject syllabuses, there are also volumes of principles that apply to all school subjects. The differences in the structures and existing documents reflect the complexity of the approach to the study.

ESD and the SDGs are not explicitly listed in any of the curricula examined. In some cases, they are recorded as overarching competence objectives or guidelines and anchored thematically. Moreover, there is a different emphasis of ESD in the federal states considered: it is stated as a key perspective in Baden-Wuerttemberg, in Berlin/Brandenburg as an overarching topic and in Saxony-Anhalt there is no specific mention or reference. In relation to the SDGs, however, only a well-founded interpretation is possible. This is made more difficult by the fact that the various concepts of competence in the various curricula are not congruent with the specific competences of ESD as described in the European sustainability competence framework by the European Commission.

[6] An overview of the respective curricula can be found on the website www.bildungsserver.de/lehrplaene-400-de.html.

Topics from all 17 SDGs were identified in the various subjects during the analysis. In general, the subjects taught in German elementary school are arts, English language (or another foreign language), ethics or religion, general studies, German language, mathematics, music, natural science and sports. Across the federal states, however, certain subjects offer significantly more points of reference to ESD and the SDGs than others do: Here, by far the most frequent points of reference are general studies and, subsequently, ethics and religion. This includes the fact that other subjects also work methodically in terms of ESD, but only a few references are made in the curricula. Furthermore, there is no specific time budget assigned to ESD or the SDGs. Accordingly, there is a large structural gap in the compulsory integration of ESD in primary schools across federal states. Even though teachers can decide to implement ESD, they can also decide to leave it out of their lessons. Therefore, the proposed learning worlds offer a great potential here for integrating ESD into practical teaching by actively connecting topics that are represented in the subject curricula with ESD and the SDGs.

3.3 Hungary

In Hungary, the National Core Curriculum as a government decree regulates the content of subject-related so-called frame curricula. These are ministerial documents, published at the site of the Educational Authority of Hungary. There are specific frame curricula for each compulsory school subject, structured in two-grade units, as well as for a wide range of elective (facultative) subjects. Based on that, schools have to write their local curriculum, which is an obligatory appendix of their pedagogical program.[7] The local curriculum must include everything listed in the subject-related curricula and must contain some additional components that make up 20% of the overall time related to the number of lessons in the frame curricula. Teachers can choose extra content, projects, thematic weeks or outdoor activities, recommended by the National Core Curriculum. However, they can add anything related to learning that the school community considers appropriate.

Two curricula units were examined: the one for grades three to four and the one for grades five to six as the target group aged nine to eleven years encompasses grades three to five. The subjects taught in the relevant frame curricula for compulsory subjects for age group nine to ten include digital culture, ethics or religion, Hungarian language and literature, living foreign language, mathematics, music, natural science ("our environment"), physical education, technology and design as well as visual culture.[8] The subject curricula for age group eleven, meaning grade five, additionally include community education and history as well as country and folk culture and drama and theater, while the last two can also be introduced in later grades, also as a block or scattered through the curricula.[9] This must be specified in the local curriculum and in the pedagogical program of the school. There are various other subjects that schools may introduce – some are related to ESD, e.g. farming, cycling, getting around in Hungary, wild waters and family life.[10] To establish

[7] Local curricula are prepared by a team of teachers and then accepted by school directors and school maintainers. However, pedagogical programs are prepared by the entire teaching staff, signed by the director and the parents' board and maintainers need to give their consent.
[8] https://www.oktatas.hu/kozneveles/kerettantervek/2020_nat/kerettanterv_alt_isk_1_4_evf
[9] https://www.oktatas.hu/kozneveles/kerettantervek/2020_nat/kerettanterv_alt_isk_5_8
[10] https://www.oktatas.hu/kozneveles/kerettantervek/2020_nat/kerettanterv_7_melleklet

comparability with the other national curriculum analyses, all subject curricula of grades three to four were considered as well as the one for history introduced in grade five.

ESD is a key competence area as well as a priority pedagogical task in the preamble of the National Core Curriculum. Therefore, teaching about sustainability, shaping environmental attitudes and awareness must be accomplished by every teacher while working with their classes in the academic year. Accordingly, ESD based content is present in various subject curricula. Even though the 17 SDGs are not mentioned explicitly, their content is referred to in many parts of the curricula (see Appendix IV). On top of that, there is the EE/ESD plan as another obligatory appendix of the school's pedagogical program. As the local school EE/ESD plans serve the whole school community (including the entire age range of students) in the schools concerned, this means that no school in Hungary may avoid dealing with ESD, therefore this may serve as an entry point for project activities. Learning worlds can bring an added value and fit in the suggested didactics and pedagogical scenarios set in the national core curriculum.

Hence, this initial situation offers many linking points for the implementation of the proposed learning worlds for ESD in Hungarian primary schools.

3.4 Norway

In Norway, the target age group of primary school pupils of nine to eleven years old includes grades three to six. The learning goals are referred to as competence aims and they are stated for the individual subject. Competence aims describe desired level of competency gained, in addition to specific topics covered, after finishing grade four and seven. Thus these two levels of competence aims were examined.

The Norwegian core curriculum is split into three parts: 1: Core values of education and training, 2: Principles for education and all-round development and 3: Principles for the school's practice. Additionally, there are three interdisciplinary themes stated in the overall part of the core curriculum which are to be addressed across multiple subjects: Health and life skills, democracy and citizenship and sustainable development. All the interdisciplinary themes relate to ESD. There is a separate text for each subject, in addition to the one in the core curriculum that states the purpose and link between the three interdisciplinary topics and the respective subject, because the pupils develop competence in connection with the interdisciplinary topics by working with issues from various subjects. Moreover, there are separate texts that explain the relevance, central values and core elements for each topic. This relates to all grade levels.

Furthermore, there is an own curriculum for Sami students that ensures that the Sami values and the Sami languages, culture and societal life are passed on. However, the description of the core curriculum above still applies.

For assessing whether the different learning objectives of the SDGs are referred to in the curriculum, the following subjects were considered: Art and craft, English language, food and health, mathematics, music, Norwegian language, natural science, religion and ethics, social science and physical education. The different SDGs are not explicitly mentioned in the curriculum, however, similar to the other national curriculum analyses, links between the different subjects and the SDGs could be identified (see Appendix V).

Overall, due to the three interdisciplinary topics and the related precise competence aims for each grade level, there is a strong anchorage of ESD in the Norwegian primary school curriculum and with that countless linking points for the proposed learning platform.

4 The role of digital learning in the national curricula

The following section identifies the extent of media education in the national curricula listed per country. The main goal is to draw possible linking points for the proposed learning worlds for ESD and to take these up as recommendations in the following chapter on the conclusions for learning worlds for ESD in primary school (see chapter 5). Especially proposed learning goals can be considered and integrated into the educational material as part of the development of the learning worlds. However, it needs to be considered which of these learning goals are realistically representable in the learning worlds without compromising the content for ESD. This applies for all the following suggestions per country.

4.1 Cyprus

The national EE/ESD curriculum states competences referring to digital learning such as digital content creation, information and media literacy, digital communication and collaboration as well as digital problem solving. There is no specific recommendation at which grade level digital media shall be introduced, but there is a reference of digital media in all thematic units of ESD. Moreover, there is a subject dedicated to digital learning called “design and technology – digital technologies” starting from fifth grade.

As a consequence, there are various subjects where the digital learning worlds could be applied while supporting the achievement of the learning goals listed in the respective subject. This includes design and technology, EE/ESD, English language, geography, Greek language and literacy.

For instance, in the English language course the general use of digital methods is scheduled and in the Greek language and the literacy course, the usage of digital tools and applications is described as an integral part as well. For the development of the proposed educational materials, learning goals such as doing internet research and utilizing online simulations in the EE/ESD course could be taken into account.

The achievement of the following learning goals per subject could potentially be supported by the digital learning worlds for ESD:

- Design and technology: Acquiring the fundamentals of responsible use of digital and online technological applications, adjusting communication techniques according to audience while being aware of cultural differences and of diversity in digitally environments
- EE/ESD: Obtaining information and media literacy, digital problem solving
- English language: Using web search, creating digital presentations
- Geography: Utilizing educational digital resources with geographic content
- Greek Language: Using digital tools
- Health education: Using audio-visual media, understanding the concepts of digital technologies and the internet
- Literature: Learning about responsible media usage
- Mathematics: Digital content creation
- Natural sciences: Utilizing educational multimedia material, using web search
- Visual arts: Digital creation or image editing

Hence, these subjects could be potential application areas for the digital learning worlds.

4.2 Germany

In its joint strategy "Education in the digital world" (2016, 2021), the Standing Conference of the Ministers of Education and Cultural Affairs emphasized the importance of digital opportunities in the classroom and provided the federal states with recommendations for the use of digital technologies for integration into the curricula.

The federal states have taken up these recommendations individually and implemented them in their curricula. In Saxony-Anhalt, for example, digital methods and objectives were newly introduced when the curricula were revised in 2019: Initially, all curricula were revised in this regard and the incorporations were highlighted in red font. In addition, a separate handout on digitalization was developed.[11]

In general, there are no specific subjects for digital education. Rather, it is distributed differently in the federal states: In Baden-Wuerttemberg, an integrative anchoring of media education in the individual subjects is planned; in Berlin/Brandenburg, the focus is on the interdisciplinary competence model of media education. For elementary school in Saxony-Anhalt, the guiding principle "Living, learning and acting in the digital world", media literacy as an additional basic competence and the interdisciplinary subject area "Internet ABC" must be taken into account.

[11] Curriculum requirements "education in the digital world" https://lisa.sachsen-anhalt.de/fileadmin/Bibliothek/Politik_und_Verwaltung/MK/LISA/Unterricht/Lehrplananforderungen.pdf

Considering this, reference points can be found in the curricula of all subjects that recommend the use of digital technologies methodically. Pupils in years three and four encounter different digital methods in all subjects. In general, German primary school pupils encounter digital teaching and learning materials in a variety of ways, which makes it easier to work with digital ESD materials.

The following learning goals are stated that could potentially be targeted in the educational material as part of the digital learning worlds for ESD:

- Arts: Creating digital images, image sequences and simple picture stories
- Ethics: Knowing and understanding the ethical principles of digital communication
- General studies: Searching, processing and structuring factual information and evaluating digital information sources
- German language course: Searching for and structuring specific information on the internet, e.g. using a search engine for children
- Mathematics: Doing factual tasks, using podcasts and explanatory videos
- Religion: Obtaining information, using tools for problem solving

These subjects could be potential application areas for the digital learning worlds.

4.3 Hungary

Generally, Hungarian legislative documents refer to DigCompEdu as a general framework for relating to digital literacy. Building on this, digital literacy is a key competence area highlighted in the preamble of the national core curriculum and in each of the subject curricula. This means that all subjects in all grades should engage in developing digital literacy, similar to ESD. In general, digital learning shall be introduced from grade one onwards, always reflecting on the development of the student. Using digital media is considered as a means of practicing the didactic freedom of the teachers. However, there are still digital safety regulations such as the Digital Child Protection Strategy, its Implementation Plan and related decrees that teachers must consider. Furthermore, there is a specific subject called digital culture that includes and combines computer science, digital literacy and digital media.

There are different learning goals for each subject at primary school level which could be taken up in the learning worlds:

- Digital culture: Getting to know the solutions implemented with digital devices used in everyday life and acquiring the ability to solve problems using these devices
- Foreign language incl. English: Using digital devices and interfaces in a foreign language
- Hungarian language: Digital text processing, using digital information sources and learning to reflect on them critically and ethically
- Natural science: Using digital sources to expand their knowledge

- Visual culture: Recognizing the possibility of manipulation in technical images and in the computer environment

4.4 Norway

The Norwegian core curriculum defines five basic skills: reading, writing, numeracy, oral skills and digital skills. The development of the basic skills is important throughout the entire learning path and shall be taught in connection with each other and across subjects. However, some subjects might have more responsibility in the development of a skill than others. Hence, learning objectives that are linked to digital skills can be identified for each subject (see Appendix V). It is then up to the teacher if they want to use the objective to enhance digital skills. This results in countless starting points for the learning worlds in the classroom. All listed subjects are potential application areas of the learning worlds.

5 Conclusions for a European digital learning platform for ESD in primary schools

In the previous chapters, potential linkages and the applicability of the proposed digital learning worlds to the country specific curricula for primary schools with regards to ESD and digital learning were identified. How can the elaborated findings per country now be processed for the development of the learning worlds for ESD in primary schools? Are there any subjects which are particularly suitable as areas of application?

Despite the varying structure and focus of the individual national curricula, ESD is recognized as a relevant teaching component and targeted in all of the assessed countries. Whereby the assigned significance and extent of ESD differs between the countries as there is a strong anchoring of ESD in the Cypriot, Hungarian and Norwegian curricula in contrast to the German ones. Nevertheless, there are sufficient possible applications of the European learning platform for ESD supported by the primary school curricula. Likewise, digital learning is stated as an essential part of each of the national curricula, while assigning different emphasis. Table 1: “Linking points for ESD and digital learning across national curricula” provides an overview of subjects and specifics of the national curricula for a potential inclusion of the learning platform.

Moreover, there are always possibilities for the teachers to integrate ESD in their teaching even though it is not explicitly included in the core or subject curricula. For instance, all of the national curricula leave room for special focus on ESD and thus, the SDGs as well as for choosing appropriate methodologies. So, teachers in Norway can choose how much time they spend on different topics and activities, which applies to Cyprus, Germany and Hungary, too. Teachers can use the scope of the curriculum depending on one’s own skills, abilities and relevant field expertise. In German elementary schools, teachers have a certain amount of allowance to implement ESD projects internally or with external partners as they see fit. In Hungary, by preparing their local curricula, pedagogical program and plan on EE/ESD, teachers can influence which

significance they attribute to ESD. They may regroup topics, use innovative teaching and collaborate across subjects. In practice and based on experience, however, these possibilities are not often seized. Still, ESD cannot be ignored as it is explicitly mentioned and referred to in all content-regulatory, legislative documents in the country.

In this respect, there is a large field of application for the digital learning worlds. By providing teachers with purposeful educational materials on the SDGs combined with precise instructions and recommendations, the extent of practical implementation of ESD in the classroom can increase. Especially as the board stories are intended to introduce a lesson and the respective ESD content, this lowers the hurdle for teachers to decide on a sustainable topic and reduces their time spend preparing topics. If these hurdles are lowered, then isolated gaps in the curriculum, if any, can be closed to successfully integrate learning on the SDGs into their lessons. Even though in none of the examined countries the SDGs are mentioned as explicit mandatory learning content, their learning goals and educational content as stated in the GreenCompEdu is an important part of the curricula. The application of the digital learning worlds, however, then shows a clear connection between the learning goals proposed by the curricula and the SDGs themselves. This way pupils, already at young age, can be aware of these goals and engage in a positive envisioning of a just and livable future for all. This lays the foundation of acting for a sustainable development and thereby, the learning platform contributes to achieving the SDGs.

The learning platform is intended to be available in Cyprus, Germany, Hungary and Norway as well as other European countries. As specific features from different countries are considered in the development of the learning platform, the application in other European primary schools should be possible. Because the countries studied are relatively diverse in terms of their geographical location, population density, cultural diversity and aspects that result from that. If there are already many similarities between the application opportunities in the curricula, there is a good chance that the learning worlds will also work in countries that were not part of the study, when translated into the respective national language.

Table 1: Linking points for ESD and digital learning across national curricula

	Cyprus	Germany	Hungary	Norway
Scope for action for ESD and SDGs	ESD is a cross-curricular pedagogical task; Subject EE / ESD offers concrete opportunities and guidelines, other subjects also have SDG-related indicators	No explicit mention in curricula, but as a guideline, schools can carry out ESD and teachers can integrate ESD topics as they see fit to achieve other learning objectives	ESD is a cross-curricular pedagogical task, schools have 20% of the total time to design their own content and projects, which can be used for ESD	ESD is an interdisciplinary topic and with that a cross-curricular pedagogical task, additional learning objectives are described per subject
Explicit mentioning of SDG concept	No			
Minimum time to be spent on ESD topics	Third and fourth grade timetable assigns two hours per week and fifth to sixth grade, one hour weekly	No special time budget		
Subjects that offer linking points for digital learning worlds for ESD	All subject curricula address the contents of the SGDs so that prioritizing certain subjects does not seem necessary	Subjects with relevant reference in gradation with number of SDGs per subject	Subjects with relevant reference in gradation with number of SDGs per subject	All subject curricula address the contents of the SGDs. The following lists mentions with most SDGs per subject
Forming healthy and active life 1 - 2 - 3 - 4 - 5		General studies / health education / ethics / sports / natural science	Hungarian language / ethics / sports / natural science / technology and design / music	Social science / religion and ethics / food and health / English language / mathematics
Preserving our earth and making our life on it sustainable 6 - 13 - 14 - 15		General studies / health education / ethics / sports / natural science / French language	Mathematics / visual culture / sports / natural science / technology and design / English language / ethics	Social science / religion and ethics / natural science / food and health / crafting-design-art
Shaping prosperity in a fair and sustainable way 7 - 8 - 9 - 10 - 11 - 12		German language / general studies / health education / ethics / music	Hungarian language / visual culture / sports / natural science / technology and design	Social science / sports / religion and ethics / natural science / food and health / crafting-design-art
Shaping partnership and peaceful coexistence 16 - 17		General studies / health education / ethics / religion	Visual culture / ethics / history / natural science / technology and design	Norwegian language / social science / religion and ethics / English language
Linking points to digital learning objectives	Digital learning stated as objective across subjects, subject design and technology from fifth grade onwards	Digital learning recommended across subjects	Digital learning stated as objective across subjects	Digital learning stated as objective across subjects as part of one of five basic skills

6 List of references

In order to ensure a better overview, this list of references is separated into the national curriculum analyses.

6.1 Cyprus

Ministry of Education, Sports and Youth (n.d.)$_a$. *English Language Curriculum*. Primary Education Department. Retrieved January 11, 2024, from https://angld.schools.ac.cy/index.php/el/english/curriculum

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7 Appendix: Framework Curriculum Analysis

A joint framework to assess potential linking points allows for more targeted and efficient development of educational material as part of the digital learning platform. In addition to that, the framework shall provide guidance for other practitioners in examining the role of ESD and digital learning in their subject/ national curricula. Based on the results potentials for a stronger establishment of ESD and digital learning in curricula can be identified to enable a more effective implementation of ESD.

Notes for completion:
Target group: Students aged nine to eleven years.
Please use the country-specific curriculum as well as the underlying subject related curricula.
The questions of the framework apply for each subject separately.

Education for Sustainable Development

1. Are ESD, Sustainable Development and/ or Sustainability mentioned in the principles/ guiding ideas of the overall curriculum? If so, what are the main instructions for teaching?

   For scanning the curriculum, there is a list at the end of this questionnaire with suggested terms. The terms need to be adjusted to the language used in the curriculum.

2. Are there any statements about the significance that is attributed to ESD? Which ones?

3. Which competencies related to ESD are stated as learning objectives in the respective subject curriculum?
   Please use the competencies compiled in UNESCO (2017): Education for Sustainable Development Goals: Learning Objectives, p. 10 as a reference.

4. Which teaching methods for ESD are recommended in the curriculum?

5. Are the UN Sustainable Development Goals (SDGs) explicitly mentioned in the curriculum? How?

6. What learning objectives are described in the respective curriculum in relation to the SDGs?

7. How much leeway do teachers have in implementing the curriculum in terms of topics and methods taught?

8. Please identify and mark which content within the curriculum relates to the SDGs: Is the respective SDG and its main ideas not mentioned/ outlined/ covered?
   Choose one of the above and explain.

SDG	Answer
1 – No Poverty	
2 – Zero Hunger	
3 – Good Health and Well-being	
4 – Quality Education	
5 – Gender Equality	
6 – Clean Water and Sanitation	
7 – Affordable and Clean Energy	
8 – Decent Work and Economic Growth	
9 – Industry, Innovation and Infrastructure	
10 – Reduced Inequalities	
11 – Sustainable Cities and Communities	
12 – Responsible Consumption and Production	
13 – Climate Action	
14 – Life below Water	
15 – Life on Land	
16 – Peace and Justice, Strong Institutions	
17 – Partnerships for the Goals	

Digital Learning

1. What learning objectives are cited within the respective curriculum in terms of digital learning?
2. Which competencies for digital learning are targeted within the respective curriculum?
3. Which digital learning methods are recommended?
4. Are there any statements within the curricula about the significance of digital media? If so, which?
5. Are there any recommendations listed for the use of digital media? If so, which?
6. Are there any specific subjects for digital learning as part of the national curriculum?

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Terms for scanning the curriculum for ESD

The following provides a selection of terms that can be used to scan the curriculum in order to answer the questionnaire. No claim to completeness.

- 2030 Agenda
- Actions at school and local level
- Active citizen
- Circular economy
- Citizenship
- Climate change
- Climate justice
- Cooperation with stakeholders
- Critical thinking
- Cross thematic approach
- Democracy
- Development Education
- Eco literacy
- Ecological education
- Ecological footprint
- Education for Sustainable Development
- Emissions
- Empowerment
- Environmental education
- Environmental issues
- Ethical issues
- Experiential and collaborative learning
- Future generation
- Global Citizenship Education
- Global Development (Goal)
- Global Learning
- Greenhouse gas emissions
- Inclusiveness
- Intercultural competence
- Interdisciplinary approach
- Intergenerational
- Learning in global contexts
- Livelihoods
- Mental health
- Nature education
- Planetary Boundary
- Planetary Guardrail
- Planetary Health
- Resilience
- SDGs
- Social equity
- (Multi) Stakeholder
- Skills/competencies
- Sustainability
- Sustainability impact
- Sustainability indicators
- Sustainability policy
- Sustainability vision
- Sustainable / sustain
- Sustainable consumption
- System thinking
- Teaching methodology
- Transdisciplinary
- Transform Learning
- Well-being
- Whole Institution Approach
- Whole School Approach
- World Action Program (WAP)