## rAn

# Raising awareness about natural disasters through the development of best practices and serious games

2019-1-UK01-KA201-062018



# Intellectual Output 1 / Learning Methodologies Framework [Country]



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## **Executive summary**

Natural disasters constitute a global phenomenon and they concern everyone on our planet. Since the problem very often affects EU countries (climate change and natural disasters have no borders) there is a significant positive impact in carrying out the work at all levels, local, national, regional and European level. Fires, floods, earthquakes and landslides are natural phenomena that have concerned humanity throughout the history. Environmental deterioration and pollution as well as other -man made- factors have helped turn these physical phenomena into disasters and the consequences do not only affect infrastructure and property but they cause massive loss of human life. Children, especially infants and the disabled, being one of the most vulnerable social groups when faced with a natural threat or disaster, have a right to live in safety thus it is the duty of authorities, institutions, communities, families and schools to provide them with adequate protection as well as with proper knowledge and skills to tackle such difficult situations. However, there is one more serious reason apart from children's natural fragility and vulnerability because of low age: the children of today are the adults of tomorrow thus the consortium clearly considers that disaster risk reduction begins at school, and to make this a reality we need to integrate awareness about natural phenomena and emergency preparedness into the school curriculum in a playful and engaging manner. Disaster risk reduction and emergency preparedness can be ensured first of all through prevention, namely the design and construction of safe schools, the reinforcement and maintenance of school infrastructure, the development of school safety plans, adaptations for disabled access and so forth. However, the context calls for integration of more actions such as:

• developing a "prevention culture" through both actions and attitudes.

• ensuring the right to education in matters of risk reduction, emergency preparedness and in actual disaster situations.

• bringing the wider community together to participate in school activities.

• informing families and the community of the threats and encouraging them to take preventive measures

• a better understanding of the effects humans have on the earth as well as natural phenomena

In addition, teacher's knowledge and competences and the quality of children's education are also issues that extend past national boarders in a connected Europe.





This is also a direct result of the challenges that the EU27 face to adapt to within the current fast changing technological environment, one of which is the need for a more inclusive and efficient education and training. As such, it requires a European-level approach to provide also the opportunity for all European educators to benefit by increasing their knowledge of ICT technologies and tools, serious games and their use in education and training, especially in relation to children. The rAn solution targets the European education and training community as a whole by fostering the enhancement of the proposed curriculum and tools. In primary education, for instance, a core concern is when and how to introduce such issues. This decision is important in order not to frighten children and young people, but to empower them to understand, critically engage with and tackle environmental change and natural phenomena. Educators at all levels will also need support and training to deliver quality education about complex, climate related topics in ways which are both relevant to local environmental, social and political contexts, and which meet wider educational targets (e.g. literacy, numeracy, citizenship). The rAn project mainly aims to develop:

• A "natural disasters awareness kit" and a serious game that promote awareness of young people in the field of natural disasters and measures, tools and practices for either predicting/preventing or facing hazardous situations.

• Learning methodologies and best practices that promote "hands-on" experiential learning scenarios, critical thinking and problem-based learning. Such methods draw their content from real-world practices and needs, promote knowledge abstraction, encourage the deployment of state of the art technological tools and methods. They tend to foster the creation of concrete representations for a plethora of science concepts (coding, mathematics, mechanics etc.) through active role playing.

• Learning scenarios and puzzles that encourage either Computational Thinking (Coding, IoT) principles and processes as well as "smart", modern and responsible solutions for the aforementioned problem(s) in a digital environment.

• An active community of practice for teachers that will be interested in disseminating the aforementioned concepts, tools and practices among stakeholders that come from the field of education.





## 1 Introduction

The project presents an innovative educational tool (serious game) and methods for disaster risk reduction for the educational community and the children. The serious game will be freely available online for anyone to use, and in 4 languages (English, Spanish, Greek and Portuguese). Moreover, the fact that it is a digital resource makes it also easier to translate it into other languages in the future, widening its potential use even further. Floods, earthquakes, hurricanes, fires and landslides are natural phenomena which have been pestering humanity throughout the history. Anyhow, environmental deterioration and pollution, rapid population growth, increasing poverty and other factors have helped turn these physical phenomena into disasters. These events not only damage infrastructure and property but they cause massive loss of human life. Children, especially infants and the disabled, constitute one of the most vulnerable social groups when faced with a natural threat or disaster. Children have a right to live in safety thus it is the duty of national and local authorities and communities, of institutions, families and schools to provide them with adequate protection as well as with proper knowledge and skills to tackle such difficult situations. For one more reason this sounds even more important: they are the children of today, the youth of tomorrow and the adult population of the future.

The consortium believes that disaster risk reduction begins at school, and to make this a reality we need to integrate disaster risk reduction and emergency preparedness into the school curriculum in a playful and engaging manner. Disaster risk reduction and emergency preparedness can be ensured first of all through prevention, namely the design and construction of safe schools, the reinforcement and maintenance of school infrastructure, the development of school safety plans, adaptations for disabled access as well as the development of a "natural disasters prevention and preparedness toolkit" through both actions and attitudes.

Among the horizontal priorities of the project are open education and innovative practices in a digital era. The open and innovative character lies in a set of features, including:

• combination of hands-on materials and activities with a serious game/app where children can learn and consolidate knowledge and experiences through play.

• a digital tool with an interactive story-line in which users actively participate





 activities and mini-games that deliver learning contents and help consolidate knowledge on a matter that is seriously underrated but rather important for the aforementioned reasons

 easy accessibility for children with mild learning difficulties and impairments
open access to all the tools and activities of the project for the educational and general public

The second horizontal priority is related to supporting educators. The project activities enhance teacher capacity to integrate digital solutions into their instructional practices through learning sheets and good practice recommendations that are based on the findings that emerge from piloting the proposed learning methodologies and supporting digital tools in real-life learning contexts in primary schools. In addition, it targets educators by developing a learning solution they can use and by specifically training them in the use of the new tools made available by the project.

Last but not least, horizontal priority 3 is about supporting individuals in acquiring and developing basic skills and key competences. The targeted skills should be among basic and transversal competencies that help young learners be aware and knowledgeable regarding natural phenomena and tackling emergencies. Furthermore, the project promotes the development of learning-to-learn and collaboration skills as the proposed tools will be designed for deployment in the classroom in the context of wider blended learning activities that combine instruction, collaboration, exploration, and ICT tool deployment. In addition, one of the aspects of the proposed serious game will be that certain actions will have to be performed through coding with blocks (such as in Lego EV3, Scratch, Blockly environments) so this means that children will be exposed to computational thinking and coding processes as well. The proposed solution fosters the integration of ICT in learning and teaching for young learners through the design, development, and validation of proof-of-concept educational applications based on serious games that will be openly available to interested parties.





## 2 rAn vision and high level objectives

Natural disasters are becoming increasingly frequent. They have devastating effects on the development of a country and can destroy the achievements of long-standing initiatives, including those financed by development cooperation. And indeed, poor countries are particularly vulnerable to disasters, since their mechanisms for disaster preparedness and mitigation are usually weak. Weather-related disasters can be due to the effects of climate change, a trend which will grow in future, making the mitigation of disaster risks a key factor for the successful implementation of development strategies.

The EU adopted a Communication on an EU strategy for supporting disaster risk reduction in developing countries in February 2009. With this Communication, it aims to ensure closer cooperation with developing countries in efforts to reduce the risk of disasters. In addition, the project addresses STEM related skills, metacognitive strategies and sense of initiative and critical thinking. Moreover, young people should develop true passion for innovative, state of the art technologies (IoT, Artificial Intelligence, Ubiquitous computing, Robotics and so forth) that go beyond schemes of Formal education and expand the space for empirical analysis and creativity. This requires the development of innovative approaches, new methods, and dynamic, uptodate, interactive and engaging tools such as serious games that appeal to young students' interests, experiential attitude and preferred learning style(s) and creativity through the deployment of "modern skills". The proposed approach at the community level focuses on establishing a community level inventory of existing information and best practices, developing guidelines on hazard and risk mapping, linking actors and policies throughout the disaster management cycle with more training and awareness raising, improved access to early warning systems.

Sustained community action can help reverse these patterns, and children have two essential roles in this process. First, through school activities that involve their community, children can raise public awareness about risks and motivate others to take protective measures. Children are also the key to instilling a "culture of prevention" in our societies, for a safer world in the 21st century. They can learn at an early age to respect our environment and understand development consequences, building habits that last a lifetime. Our project other than to complement existing materials about natural disasters in European country, aims to provide a digital tool and good practices





for schools and learning communities in general with regards to knowledge and skills that are needed in order to act responsibly prior and after a natural disaster.

The project mainly aims to develop:

• A "natural disasters awareness kit" and a serious game that promote awareness of young people in the field of natural disasters and measures, tools and practices for either predicting/preventing or facing hazardous situations.

• Learning methodologies and best practices that promote "hands-on" experiential learning scenarios, critical thinking and problem-based learning.

Such methods draw their content from real-world practices and needs, promote knowledge abstraction, encourage the deployment of state of the art technological tools and methods. They tend to foster the creation of concrete representations for a plethora of science concepts (coding, mathematics, mechanics etc.) through active role playing and of course through an active community of practice for teachers that will be interested in disseminating the aforementioned concepts, tools and practices among stakeholders that come from the field of education. The idea of communities of practice (CoP) is that learning occurs in social contexts that emerge and evolve when people who have common goals interact as they strive towards those goals.





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## 3 Foreseen outcomes

The following results are foreseen from the implementation of project objectives and activities:

- A learning requirements and methodologies analysis; this result will include a mapping of stakeholders in the area of addressing the development of knowledge about natural disasters and emergency preparedness in the countries in which the project consortium has partners.
- An analysis of current practices for raising awareness about natural disasters in primary school; finally, a methodology effectively building relevant skills among young learners in primary school through and a serious game and active learning that promotes knowledge scaffolding through exploration and class collaboration.
- A proof-of-concept serious game fulfilling the instructional objectives of the project.
- A user guide on the proposed serious game, available in English as well as the national languages of project partners.
- Instructional support content in the form of good practice videos that will facilitate the integration of proposed methodologies and tools into existing learning practices in primary school curricula, enriching learning experiences.
- An evaluation strategy that will provide a comprehensive guide on how the relevance, acceptance, effectiveness, and quality of the proposed tools and methods and instructional support content will be established through formative and qualitative evaluation methodologies.
- Evaluation outcomes from the deployment of the proposed methodologies and tools in real-life educational contexts in UK Greece, Spain, Portugal, with the objective of generating objective feedback with a European footprint on learning outcomes resulting from rAn activities in diverse educational, cultural, and economic environments.
- Conference publications targeting the academic community and industry and presenting information on project objectives, implementation activities, and outcomes.





- Contacts with policy makers, teachers, teacher trainers, learning designers, and other stakeholders with the objective of disseminating project results and promoting uptake of outcomes.
- Multiplier events for dissemination purposes and for the promotion and capacity building on the adoption of project outcomes to take place in UK, Greece, Spain, Portugal.
- A project portal for disseminating information on project objectives, activities, and results as well as for promoting the rAn tools and instructional support content to the targeted stakeholder primary school education sectors.
- A project newsletter on a bi-annual basis.
- Informational material in the form of a leaflet, poster, and promotional project video that will present in an easy to understand manner targeting the general public project objectives, activities, and outcomes.
- Internet and media publications for reaching widely the identified stakeholder groups as well as the general public on expected project benefits to learners and teachers





## 4 Learning objectives

The rAn project aims to engage young people (6-12 years old) with activities regarding natural disasters and emergency preparedness and raise their awareness for either predicting/preventing or facing hazardous situations. The 4 natural disasters addressed in the game are floods, earthquakes, storms, and wildfires. Since the project promotes "hands-on" experiential learning scenarios, critical thinking and problem based learning, its learning methodologies draw their content from real-world practices and needs, promote knowledge abstraction, encourage the deployment of state of the art technological tools and methods such as coding / IoT and promote the creation of concrete representations for a plethora of science concepts through active role playing.

Project rAn aims to address the aforementioned concerns and help young learners as well as their teachers to:

- Bring to light their previous knowledge and experiences related to natural disasters.
- Evaluate the knowledge gained from the training activities in the classroom.
- Stress the importance of natural disaster preparedness and prevention.
- Develop individual responsibility in case of natural disasters.
- Get to know useful and easy to remember tips to stay safe in a situation of emergency.
- Demonstrate how natural hazards may eventually lead to a natural disaster.
- Examine certain processes that can help the prediction of natural disasters.
- Give examples of increasingly effective technology that can help in mitigating the effects of natural disasters.
- Be engaged in a problem-solving iterative process.
- Practice activities that build a sense of being part of a wider community.
- Appreciate the benefits of deploying state of the art tools and innovative methodologies in order to tackle states of emergency.
- Develop a positive attitude towards Coding, Ubiquitous computing and Science Adopt responsible attitude towards the environment.





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## 5 rAn innovation

rAn project is innovative in terms of:

- Core idea that aims to develop learning scenarios that combine Computational Thinking (Coding, IoT) principles, awareness about emergencies and relative reactions.
- Learning methodologies since the project promotes "hands-on" experiential learning scenarios, critical thinking and problem based learning, draws its content from real-world practices and needs, promotes knowledge abstraction, it encourages the deployment of state of the art technological tools and methods such as coding/IoT, it promotes the creation of concrete representations for a plethora of science concepts (coding, mathematics, mechanics etc.) through active role playing, it encourages mindsets which are directly linked with alternative, "smart"/next generation methods, it promotes long-term engagement with learning through digital games that attract and retain the interest of students.
- Educational objectives since it addresses emerging needs in Primary education within the European Community. More specifically it tackles the urgent need to align training practices to real world needs throughout initiatives that expose students to smart/innovative technologies, the necessity to update education practices and curricula through the deployment of educational technologies (serious games, coding) and the need to develop open, innovative and up-to-date educational resources (tools, methodologies, practices) for free use in formal and informal learning contexts.
- Pedagogical design. The project introduces a problem based, collaborative learning design approach. Problem solving through computational thinking is extremely important for every professional context, not to mention he fact that Ubiquitous computing is an already established reality and computational thinking practices will provide the commonly accepted and fundamental ways in which humans solve problems in every field of everyday life. With this project, the consortium aims to design, implement and validate the use of a serious (video) game, targeting primary education.



 Technical implementation. It will validate the aforementioned learning design through the development of a serious game (for desktop computers and tablets) in which learners will be encouraged to design and synthesize solutions that address specific professional needs. The serious game design process is based on experiential learning values, peer learning and hands-on methodologies that facilitate interdisciplinary approaches to teaching objectives.





## 6 The Target Sector: a map of Stakeholders

As already stated in the project proposal, it is necessary to define the stakeholders that are expected to benefit from the proposed methodological framework and tools. The task requires an analysis of a precise map of stakeholder groups (learners that stand to benefit directly or indirectly from innovative pedagogical interventions). The main objective of this task is to create a list of potential stakeholders in order to consider and organize what needs to be documented ("who", "why", "target group members addressed") and to help the consortium understand who to be engaged in the project. Direct stakeholders include learners and educators; indirect stakeholders span wider groups including educational policy makers and administrators, the educational software applications industry, the academic community on learning design, SMEs.

The expected impacts will be on three levels:

- Innovative educational policies
- Teacher change
- Social awareness.

A wide audience stands to gain from project activities and outcomes.

**Direct stakeholders**, namely individuals to whom the rAn serious game-based learning intervention is addressed are:

- **Primary school pupils** who are the ultimate beneficiaries of the rAn active learning approach and the proof-of-concept serious game
- Educators who stand to gain from good practice recommendations on how to best integrate emerging pedagogical innovations supported by ICT, and specifically by serious games, into their already well developed instructional practices for the benefit of their pupils and their own.

Indirect stakeholders, namely individuals who will also benefit are:

- **Parents**, who stand to gain from more effective learning initiatives that target their children.
- Policy makers in the areas of education and employment, who stand to gain from enhanced feedback on how emerging pedagogies, such as active and





experiential learning, and supporting ICT technology based on serious games can contribute to the enrichment of learning initiatives for bridging the gap between available skills and those demanded by the industry.

 The educational software industry, that stands to gain from feedback on the relevance, acceptance, and effectiveness of proposed serious gaming solutions as learning tools thus gaining insight on how to design technology-supported learning applications that address specific educational needs and objectives.





#### 6.1 Primary grade students

#### 6.2 Educators / Trainers

In addition, educators and policy makers could benefit from their involvement in the project, by developing wider and up-to-date teaching methodologies and educational design models. We consider this to be really important because after their initial training, educators continue to grow professionally throughout their careers and integrate knowledge related to emerging learning design, pedagogical frameworks, technological and other solutions that may be deployed as supporting learning tools, and more. Professional development is important for educators as a resource that can lead to enhanced practices, long-term career building, and career satisfaction through the opening of opportunities that result from enhanced skill sets. The needs of educators may be summarized as follows:





- Instructional skill enhancement through training and access to references and good practices related to emerging didactical design, such as active learning and experiential learning that are the focus of rAn. Exposure to emerging didactical design can help educators further build their already welldeveloped teaching practices for their own benefit and the benefit of their learners.
- Digital skill enhancement, or the capacity of educators to integrated ICT solutions and services into their existing instructional practices as complementary learning tools that can help enrich learning experiences for their learners and for themselves. In addition to enriching training content, ICT can be deployed for enhancing communication or introducing alternate communication channels. ICT can further help effectively integrate emerging didactical approaches, such as the ones mentioned above, into learning by supporting the deployment and delivery of innovative learning programs and activities.
- Access to digital resources designed for learning purposes. Teachers in the field often point to the lack of educational content, especially in digital form, that can be deployed as complementary material in classroom activities.
- Access to good practice guidelines on how to integrate ICT, and particularly emerging serious gaming applications, as well as innovative learning approaches into classroom activities. While many educational sites in Europe offer at least a basic ICT infrastructure, which may range from a simple computer to more advanced computer labs that offer computer equipment, digital whiteboards, and other supporting devices, ICT infrastructure is often underused within learning. One of the reasons that lead to this shortcoming may be connected with the lack of teacher training on the deployment of ICT tools in wider blended learning contexts and the lack of adequate technical support. Good practice guidelines and examples of learning activities that combine emerging pedagogies, such as active, experiential, or collaborative learning, with supporting ICT services, may significantly boost educator capacity to fully exploit their school's ICT infrastructure in learning.
- Networking, peer learning, and establishment of links with industry. Teachers can significantly benefit from networking opportunities with peers for



promoting peer learning, know-how transfer, and good practice exchanges on the deployment of combinations of ICT and emerging pedagogies in instructional contexts. Furthermore, links with industry can help educators initiate learning activities that help bridge the gap between education and the world of work.

- Access to life-long training at the regional, national, and European level can help educators keep their skills up-to-date for their own benefit and for the benefit of their learners. Educators in the field point to the lack of effective ICT training as a reason for not effectively using the technology in the learning activities they bring in the classroom. Educators sometimes point to the fact that limitations in the number of training hours they are allocated may lead them to choose a subject other than ICT for training, such as, for example, how to manage bullying behavior or other social issues.
- Continuous professional development throughout their careers increasing effectiveness in their roles and promoting long-term career satisfaction as a result of training. Careful planning from regional, national, and European level educator training initiatives can help teachers advance their skills in line with an evolving job market, ICT technology, and industry in general.

#### 6.3 Policy makers and Administrative authorities

The main objective of regional authorities in education and development is to promote effective education at all levels and to create opportunities for employment through grow. Education and employment ensure the well-being of local communities and promote social cohesion. The needs of this group can be summarized as follows:

 The improvement of relevance of the educational system to real-life and the enhancement of its effectiveness for preparing learners to transition smoothly into the world of work. Policy makers are interested in the documentation of industry trends and an analysis of how school curricula can be flexible and help learners build skills that are in demand in the job market. This will help bridge the gap between the worlds of education and work and





align available to needed skill sets, which is a need highlighted by European level agendas such as ET2020 and New Skills for New Jobs.

- Encouragement of the integration of emerging pedagogies in educational systems such as collaboration, exploration, active learning by doing, experiential learning through immersion to real-world scenarios, and more. These emerging didactical frameworks can enrich educational practices through careful learning design that takes the current situation a step further and closer to actual, modern needs.
- Understanding the benefits of emerging ICT-supported learning technologies, such as serious games deployed within active and experiential learning practices that help expose learners to educational activities that they might not have the opportunity to engage in otherwise. For example, simulations and related serious games can help learners practice in a controlled, safe, laboratory environment with task-oriented processes that require equipment not available in educational labs. This objective lies within the wider need for updating educational practices for the digital era by deploying ICT services and tools that serve educational purposes, including multimedia content, internet references and resources, web-based and mobile applications, simulations, learning management systems, communication systems, social media, and more.
- Enhancing the availability and quality of school ICT infrastructure. The availability of adequate equipment, network connectivity, and software is significant for empowering educators to integrate ICT-related activities into wider blended learning practices. Educational authorities can introduce recommendations and standards in relation to proposed educational infrastructure. They can further ensure that necessary technical support is available to educators for installing, maintaining, and using ICT equipment and labs.

## 6.4 Educational software industry

The educational software industry designs, implements, and delivers applications, services, and tools with educational contexts. The range of products and services that the educational industry may provide is wide. It includes, software for PCs, internet services, mobile applications, social communities of learning, on-line



training modules within massively open on-line courses (MOOCs), serious games designed from the beginning for learning purposes, entertainment games that may be deployed in learning contexts, and more.

In order to develop and introduce effective products, the educational software industry must build a thorough understanding of the needs of learners and educators. It must further build an understanding of the desires of parents in relation their children's skill development. It must also build knowledge on how related software and services are perceived by the targeted educational sector in terms of relevance, acceptance, and effectiveness as learning tools. The needs of this sector can be summarized as follows:

- Understanding of the objectives and activities of educational curricula in order to design more effective services and applications that may be used as complementary learning tools within formal and informal learning processes.
- Documentation of the educational needs of learners in terms of building ICT skills for employment. Understanding of how these skills will be used by learners in the context of other educational initiatives, e.g. within other subjects, or for pursuing employment. This knowledge can help the software industry build applications that address real-life learner needs.
- **Documentation of educator needs** for the deployment of ICT solutions, and specifically serious games, as supporting tools that can enhance the effectiveness of their teaching practices.
- Analysis of competitive or substitute products such as similar educational services as well as open source services targeting the secondary education sector and specifically the development of digital skills. This information allows the software industry to invest resources in developing offerings that fill gaps in the market or introduce innovation.
- Networking with educational authorities, other industry players, and domain experts on the collaborative development of educational content that addresses specific learning needs. The need for this collaboration is highlighted by ET2020 and the Horizon2020 program that promote stronger ties between the software industry and educational stakeholders towards the development of serious games for learning.





- Information on trends in adult education theories and latest outcomes from relevant studies and research. This piece of information may be used in designing thoroughly researched and pedagogically sound technological applications.
- Analysis of the buying power of targeted customers, who in the case of rAn may be informal educational organizations, and others that will potentially purchase educational applications for their students or their own customers.





# 7 National policies and typical practices for developing digital skills in the field of Primary education

#### 7.1 In Greece

Most recently, digital skills have been mostly linked to STEAM education in Greece and lately, there have been a lot of efforts in order to integrate these domains into education. According to the Institute of Educational Policy in 2015, incorporating STEM into the educational process is suggested both because it better serves learning through interdisciplinary problem-solving scenarios and because it tends to bridge the gap between science and its practical applications. Therefore, a STEM-driven framework can potentially be more effective for the development of much needed digital and scientific skills of the "21st century", however, it seems that in Greece there is a lack of official general policy on STEAM education and especially the primary school curricula in their current form, leave no space for the integration of independent STEM/STEAM activities but only separate relevant subjects are taught like. Digital teaching scenarios constitute an innovative way of learning and can be designed with the assistance of interactive digital platform tools such as "Photodentro" and "Aesop".

Besides, in Greece, it was only in the early '90s that the Ministry of Education launched the national strategy for integrating ICT into education and throughout the following years several programs and projects have been implemented aiming at either introducing ICT in more schools or further developing laboratories and facilities, networks and fast access to internet, as well as software and services (applications, educational portals etc). Local ICT centers (KEPLINET) were also set up in order to provide technical support, guidance and training to educators while, along with European and National funding, lots of projects that promoted ICT usage in education were implemented. Once such program was the ambitious "Information Society program" which lasted 6 years (2000- 2006) and saw a total of 20 million Euro being spent per year for ICT-related facilities, infrastructure and services. According to Suhonen (2011) such was this program's impact that ICT infrastructure at all levels of education has been greatly improved at the point point that almost every Greek school, including kindergarten, secured access to computers and internet connection, even if there is still room for improvement.





A successor to the aforementioned program was another established reform strategy that took place in Greece under the title "Digital School project" and was initially launched in 2010 in order to help integrate ICT into curricula and teaching practices. The project targeted the digital upgrade of the primary and secondary educational process in Greece and it was part of a wider strategy of the Greek Government for the "Digital School", which includes the completion of training courses for teachers on the use and application of ICT and of digital tools, plus a fully operational and accessible e-repository of educational text books. The project was divided into six sub-projects of which the more interesting for their expected outcome and general outreach were:

- the supply and installation of interactive systems (including the purchase of 36.804 interactive systems),
- trainings, installation and demonstration services
- the supply and installation of mobile computer laboratories, with ten laptops for a primary school and fifteen for a secondary school

The full implementation of the Digital School project was considered critical for the future of the education and training sector in Greece. This is why it received significant funding by the European Social Fund 'Education and Lifelong Learning' operational program and the European Regional Development Fund 'Digital Convergence' operational program for Greece. Total investment for the project "Digital Services of the Ministry of Education, Lifelong Learning and Religious Affairs" has been 174.441.430 €, of which the EU's European Regional Development Fond contributed 146.635.815 €.

Long before economic recession, Greek educational authorities and more specifically the Ministry of Education, introduced the Information and Communication Technology/Computer Science (ICT/CS) curriculum for the first time in 1992 for the Gymnasium stage, namely grades 7-9). This was later reformed in 1998 for the Lyceum stage, namely grades 10-12 and is under major and continuous revision aiming for the integration of ICT/CS in kindergarten and primary school curricula. Informatics as a separate subject in its own is now taught right in the first years of secondary education but since Digital Literacy is one of the key objectives in the agenda of the European Commission, Greek educational policies have adopted the entire ICT literacy objective





and this is more than obvious throughout the curriculum regardless of whether the taught subjects are strictly related with new technologies and sciences. The general objectives of the curriculum are grouped around specific axes and the main and wider purpose of ICT teaching is to:

- "Equip" students with an autonomous, coherent and comprehensive perception of basic computer and technological functions under the broader perspective of technological literacy that triggers critical thinking skills and active learning.
  Familiarization with a set of basic simple concepts relating to the general structure of computer systems and the timeless principle governing them.
- Bring students in contact with various computer applications that can act as exploratory manipulative and at the same time will enable them to debunk computers and technology and treat them as mental tools that fulfill creation and personal expression. Acquire methodological skills and use and exploitation of ICT and cover needs and desires.
- Ensure effective communication and collaboration as part of their daily school activities.
- Enable students to acquire basic knowledge and develop skills in Internet applications and services.
- Promote the use of educational multimedia applications.
- Enhance cooperation, communication and social interaction under a variety of individual and group-synthetic work.
- Help the students consider the impact of new technologies and Science in the various fields of everyday human activity.

Existing ICT policies in the Greek school system are directly linked with:

- Establishment of learning theories and teaching methodologies that promote digital literacy by introducing access to digital learning material either in classroom or at home via specific and well-organized web portals.
- Two stages ICT Training for Primary and Secondary educators.
- Production of digital material including new curricula and e-books.
- Integration of e-material such as repositories of applications and e-books and online resources in Primary and Secondary Education.
- Integration and/or optimization of infrastructure and educational software for several special needs schools.





- Recognition of fast broadband access as a basic right for students of all schools through the establishment of a school network (sch.gr).
- ICT equipment in several schools that don't have the necessary infrastructure.

Greek teachers when asked about the reasons that lead them to ICT use with young pupils, they argue that activities and tasks carried out by the children are not only interesting for them but they also serve perfectly well the purposes and suggestions of the Greek School Curriculum such as the development of language, maths and fine motor skills via innovative and alternative learning activities that embed ICT applications. Teacher interaction and participation in ICT driven activities varies from low to high depending on whether these are part of the free-play or somehow obligatory as part of a project or according to Curriculum suggestion. Thanks to the aforementioned initiatives and granted that all primary schools have yet a dedicated laboratory that in most cases is equipped with enough computers to be used by a whole classroom of almost 20 pupils, there is a 1 computer per 3-4 children ratio. Contrary to what happens in preschool settings where the teacher is responsible for every activity that takes place in the classroom, in Primary school, ICT teaching is appointed to dedicated educators and for this reason, specific hours are reserved for this subject on a weekly basis. The computer laboratories serve as a place of experimentation with basic digital skills in a variety of domains and activities such as text/presentations editing (Office suite etc.), safe internet use, programming (Scratch etc.). During a typical lesson, along with the traditional teaching tools, ICT teachers deploy original material such as videos that are freely available on major platforms like "You tube" or dedicated applications and serious games or even online applications such as "Lightbot". Moreover, they have the opportunity to make use of suggested activities and applications that are designed by colleagues and are freely available on Photodentro<sup>1</sup>, a repository that has been set up by the Ministry of Education in collaboration with the Computer Technology Institute "Diophantus"<sup>2</sup> in order to digitally support the work of teachers and educators of all levels and teaching domains.

<sup>&</sup>lt;sup>2</sup> <u>https://publications.cti.gr</u>



<sup>&</sup>lt;sup>1</sup> <u>http://photodentro.edu.gr/aggregator/</u>

## 7.2 In the U.K.

In the UK there are significant differences in the educational systems between Wales, England, Scotland, and Northern Ireland. Education and schooling vary between each of the four countries having separate systems under separate governments. It is thus important to keep these differentiations in mind when looking at skills development in UK education.

According to the Digital Education at School in Europe report (2019)<sup>3</sup> the education system in the UK is decentralized and leaves considerable autonomy to teachers and schools. In England, Wales, and Scotland, for example, instruction time is not specified in the curriculum. It is the school that decides how to distribute the time to the specific subjects within the framework of school autonomy.

More specifically, in Scotland the curriculum is not statutory, meaning that the delivery of digital competences is not obligatory. The curriculum provides guidelines for teaching and learning in Scottish schools. At the same time, it gives teachers some autonomy to decide how to work with their students in order to help them become active, responsible, and confident individuals.

In 2016, the Scottish government published a Digital Learning and Teaching Strategy. The strategy's aim is to help all Scotland's teachers, students, and parents to take advantage of the opportunities offered by digital technology.

A key priority of the Scottish Government's Digital Learning and Teaching Strategy is to align the needs of employers with the curriculum. Involving the industry more in school initiatives will help students to develop skills and attitudes that will allow them to thrive and leave their mark in the workforce.

The Digital Schools Awards is an interesting example of the implementation of the Strategy's goals. The Digital Schools Awards a program offered by Education Scotland in collaboration with HP, Microsoft, and Intel that aims at promoting and encouraging the use of technology in primary schools. The program provides schools with resources and guidance based on their specific needs in order to involve more digital technology in their curriculum. Namely, it provides primary schools with a roadmap for planning and teaching 'with' and 'about' digital technology to prepare the

<sup>&</sup>lt;sup>3</sup> European Commission/EACEA/Eurydice, 2019. Digital Education at School in Europe. Eurydice Report. Luxembourg: Publications Office of the European Union.





next generation of informed, responsible, and resilient digital citizens. The program encourages schools to incorporate digital skills across the curriculum and to adopt best-practice models of digital pedagogy. Additionally, the program encourages universities and employers to partner with schools to equip students with cutting-edge digital skills. Teachers and schools need to identify activities as to help the students build digital skills through real-world work-ready scenarios. The schools that successfully participate in the program get the award of national 'Digital School' status.

The revolution in digital education in English schools seems more hesitant and uncertain. Fewer students are getting the necessary digital skills to thrive in today's world and workforce. Of course, there is more to this than employment. Learning digital skills at school can significantly benefit students and young individuals in many ways regardless of their future career paths. The young individual can develop valuable skills like reasoning, creativity, perseverance, critical thinking, etc. that can be transferred to different aspects of their life.

That's not the case for Aldwyn Primary School in Greater Manchester that ran the "digital leaders" project. During this project, students (8 to 11 years old) successfully created a small IT/Media startup company and started producing their own e-safety business cards and child-friendly posters. This project helped children to build important skills by working in a very "adult" way to produce a professional website and business.

Another interesting case study in England is the Highfurlong School in Blackpool, a special school with children with a wide range of needs. The staff is using assistive technology to help the students be active participants in their learning. Simple switches, eye-tracking technology, even student controlled sensory rooms are provided to encourage the students to communicate and express themselves.

In 2014, the English national curriculum introduced a new subject in primary education: computing. The aim of this addition is to give schools the chance to provide a more exciting and modern curriculum that addresses the challenges and opportunities of the technologically advanced contemporary world. Through computing the children will be able to build important life skills such as problem solving, resourcefulness, and creativity and learn how computers, software, the internet, and search engines work.

The computing curriculum includes 3 aspects:

• Computer science





The aim is to understand algorithms, to create and debug simple programs, and to use logical reasoning to predict the behaviour of a simple program.

Information technology

The aim is to be able to create, organise, store, and retrieve digital content, to effectively use search technology and the Internet services, and to collect, analyse, evaluate, and present data.

Digital literacy

The aim is to understand digital communication and collaboration, learn how to use technology in a safe, responsible, and respectful manner, and to identify where to go for help and support online.

With this new curriculum, England became the first country in the world to introduce coding as mandatory at the primary and secondary levels.

A similar curriculum reform was introduced in Wales in 2016. The Welsh Government published the Digital Competence Framework (DCF) that intends to facilitate the introduction of digital competence across the full range of lessons. The Framework aims at helping students of all ages to widen and develop their digital skills. Digital competence is presented in the new curriculum as one of three cross-curricular themes (literacy, numeracy and digital competence). The DCF expects that each school will have a 'digital lead' practitioner. The role of the 'digital lead practitioner is to set a clear vision for digital learning in the school and coordinate how the framework is used in the school. They have to prepare a plan for the implementation of the framework and identify and meet the needs of the staff in terms of professional development. The Welsh government is overviewing the implementation of the Digital Competence Framework in order to ensure that all schools have integrated successfully in their curriculum and activities.

According to the DigiSkills report (2019)<sup>4</sup> Northern Ireland is the only UK region that does not have a digital strategy. The last development plan and ICT framework was the 'Strategy for Education Technology in Northern Ireland' set in 1997. Sadly, research has shown that Northern Ireland rates the lowest in digital skills. Although, one of the key priorities of the Department of Education's Circular 2010/22 is the raise of the standards of students' performance in literacy, numeracy, and ICT, not all

<sup>&</sup>lt;sup>4</sup> Study Into The Development Of Digital Education In Primary Schools In Northern Ireland. (2019). Belfast.



schools have effectively incorporated technology-enhanced teaching and learning in their curriculum.

Differences are also observed between the four UK countries in terms of digital skills assessment. According to the Digital Education at School in Europe report (2019), in England, Wales, and Northern Ireland the assessment of digital competences in technology-supported national tests and most commonly combines on-screen testing with practical testing.

In particular in Wales the curriculum states that students in the primary level should be given opportunities to assess their learning experience and their work and discuss new developments in digital technologies and how ICT is used in the wider world.

In Wales and Scotland, the education system has developed criteria and/or standards that describe the proficiency levels in digital competence and the use of technologies in primary schools. These standards can be used by teachers in order to assess the students' skills and knowledge. In Scotland primary schools are provided with detailed benchmarks for each learning outcome identified in the curriculum, that guide teachers in this assessment.

In England, Wales, and Northern Ireland the digital competences are actually reported in the annual assessment reports in primary education.

From 2019, Wales has introduced digital standartised tests that cover literacy (reading) and numeracy (procedural and reasoning), in primary and lower secondary schools. Additionally, Wales has established technology-supported national tests for the assessment of students for all education levels.

## 7.3 In Spain

Digital skills in Primary Education are included in current Spanish educational curriculum as part of the learning process, considering them fundamental for students' development. ICT have been implemented gradually in the Educational System due to the willingness of adapting education to current times, as is expressed in the White Paper on Education and Training elaborated by the European Commission "*Training and apprenticeship polices, which are fundamental for improving employment and competitiveness, must be strengthened, especially continuing training*" (European Commission, 1995)



Actually, major law in Spain governing education field is the Organic Law for the Improvement of Educational Quality 8/2013 (*"Ley Orgánica para la Mejora de la Calidad Educativa"*), known as LOMCE, which modified previous law LOE 2/2006.

LOMCE considers that information and communication technologies can adapt students to new profiles demanded, as well as guarantee universal accessibility to education and the possibility to customize each student educational rhythm. In article 18<sup>th</sup> is stipulated that ICT will be developed in a transversal way in all areas of Primary Education as its integration is considered key driver of the methodological change demanded by the society.

Further policy in educational field is Royal Decree-Law 126/2014 ("*Real Decreto Ley*"), in which is stablished a basic curriculum for Primary Education. The law remarks the importance of ICT naming "digital skills" as one of seven basic skills to be acquired by students in Primary education.

Information and Communication Technologies have become a fundamental axis in our daily lives, introducing structural changes and forcing users to quick adaptations. Educational field, which used to adapt to new polices, methods and educational reforms, is now focused in changes in ICT (Cabero, 2007). The implementation of educational policies in ICT has allowed to introduce new communicative environments, opening to new educational experiences with activities never considered before. To traditional face-to-face and distance learning methodology is now complemented by on-line learning (Ferro, Martinez, Otero 2009).

The union between ICT and education has turned the student the main character of his own learning process, being time and flexibility the main drivers of this virtualized education (Suárez & Custodio, 2014). Digital skills provides them basic competences demanded on today's world as use of computers, participation in collaborative networks, evaluation of available information, synthetization of relevant points, storage and present results, all using the Internet (Revuelta, 2011). Furthermore, it indirectly develops other as independency, efficiency, responsibility, critical thinking, reflexive analysis or information management (Area, 2009).

Digital skills provide a high rate of interdisciplinary, as can be implemented in different ways and areas of Primary Education. This allows the student to use





competences acquired for facing challenges in different fields, as cooperative learning, digital literacy, creative thinking, refinement of expression and identification of relevant information, among others.

Implementation of digital skills present many advantages for students:

- **Increase motivation**: As materials are presented in an attractive way, students learning feel dynamic and less monotonous. more
- **Catching students' attention**: By the use of videos, audios, graphs, pictures, interactive exercises, etc. students pay more attention leaning than traditional methods, and productive hours increase. This advantage is especially relevant in Spain, as a recent student showed that Spanish students in Primary Education spend on average 792 hours at school, more than EU-23, but present lower results. This unproductive system of long hours can be improved with the introduction of ICT in classrooms.
- **Cooperative learning:** ICT dynamics promotes the creation of synergies among classmates and the coordination of works for facing challenges. Cooperation also involves an individual responsibility as the team relies on you, as well as values like solidarity, empathy, equality, commitment and respect.
- **Development of right brain hemisphere**: Traditional educational plans have focused in the left hemisphere, the one that involves logic, facts, reality and quadratic thinking. ICT introduced in education are an opportunity for develop the left hemisphere and train skills like creativity, emotions, intuition, curiosity and imagination. ICT's will balance both parts and provide a complete profile to students for facing the world demands.
- Growth communication skills: ICT's present new ways of communication complementary to traditional face-to-face like chats or forums. New channels are synonym of new opportunities for students to express themselves in a more informal way. Monitoring their work may become easier, as well as evaluating results.





rAn - Raising awareness about natural disasters through the development of best practices and serious games

Even all advantages may have the integration of ICT and digital skills in Primary Education, also new threats may arise not present before, distorting the positive effect.

- Internet addiction: The use of Internet and ICT in classrooms may introduce students to a new addictive environment, having access to time-consuming applications and webs that may affect their results. Uncontrolled use of ICTs can create a great dependency and drift in concentration, anxiety, aggressiveness and dependency problems in the student.
- **Cyberbullying**: New channels of communication can be used for harming and bully classmates, not only in class as traditionally has happened, but now also outside. The control teachers could exercise in order to avoid this situation, disappears when children finish school and go home but keep contact with their classmates.

Taking in consideration advantages and disadvantages of digital skills is necessary for an adequate implementation of ICT in classrooms. In order to provide best possible learning experience, the Ministry of Education joint with the INTEF ("*Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado*") has developed an open project with several resources available for teachers. The project, named EDIA, promotes innovation and didactic experimentation in classroom based on open education and cooperative networks among educational sector (Proyecto EDIA -INTEF, 2020).

In the platform can be found several e-tools to be used in classroom sorted by years with learning materials about all subjects. Some applications are writing workshops, GDP techniques for better understanding history, adventure games about famous characters of Spanish history, Investigation workshops, role playing games or table games adapted to ICT. All are available for free to be used by teachers in class and implement ICT, as well as create a network with other schools using the tools.

At an intern and small level, schools also are implementing own initiatives for introducing ICT's in learning processes. Many of them are digitalizing by changing books for electronic devices as tablets and computers for making learning more attractive. However, economic cost supposes a high barrier among students, so many



private and public initiatives are arising for providing needed device to children with less resources.

Moreover, many applications are widely implemented in schools as practices for developing digital skills. One example is "Kahoot!" a free platform that allows teachers to quick evaluate their students by the creation of a questionnaire. Each student has a device in which selects the correct answer asked by the teacher and shown in the screen in a limited period of time. In a dynamic environment, students are not only evaluated their knowledge but also skills like logical thinking, management of time or fast response.

Another ICT that has been developed in recent years thanks to its growing popularity are Robotics. Schools are more and more implementing digital skills through the approach of diverse programming e-tools. One is "Scratch", a popular application developed by MIT (Massachusetts Institute of Technology) that allows students to self-programme their own interactive stories, games and animations and share it with the online community. With Scratch, children learn to reason, digital literacy, creativity and team work among others.

Presence of ICT in schools are widely spread and have reached an important role in the learning process of Primary Education. Spanish educational polices have tried to increase their use and implementation, but there's still a long way to guarantee equal access to ICT among children.

#### 7.4 In Portugal

There are several important documents that can be referred as pillars of the policy of education in Portugal. The first one is the Profile of the student when leaving compulsory schooling (Martins et al., 2017). This document defines the key competencies, principles and values that have to be acquired by students during their basic school education. It aims to create a reference framework the encompasses freedom of choices, responsibility, recognition of work, self-awareness, family and community insertion and participation in the society that surrounds us.







Figure 2. Principles, competencies and values of student profiles when leaving compulsory school. Adapted from (Martins et al., 2017)

Accompanying this document, the Portuguese Ministry of Education promoted a pilot project, (now enlarged to all schools in the country), providing Autonomy and Curriculum Flexibility (Palmeirão & Alves, 2017). The project, called PACF (Project for Autonomy and Curriculum Flexibility), provides schools with the necessary conditions to manage a percentage of the curriculum in an autonomous way and integrate innovative practices to improve student learning. The OECD conducted a review of the project and produced a report with the main outcomes of their review (OECD, 2018a). During the first year of implementation of this new model, 235 schools participated. Since 2019 the model is now extended to all schools and headmasters have the freedom to choose how much of the curriculum will be integrated in the flexibility model.

These documents are an integral part of the National Strategy for Education and Citizenship, a document created by the ministry of education, presenting the overall framework to improve education in Portugal (DGE, 2017). The document presents a set of rights and duties that should be part of the education of Portuguese students in order to raise individuals with a civic conduct that favours equality in interpersonal relations, respect for human rights and the values of democratic citizenship.




In Portugal, as in most of the countries in the world, the main skills demanded nowadays are related to the digital world. According to the OECD (2019) a large fraction of the demand in the online labour market is related to software development and technology, and Portugal is no different. Internet access is however still an issue with a large share of households with less broadband access than other European countries. Portugal is one of the countries in Europe (together with Greece) where the lack of infrastructure in rural areas is more evident (OECD, 2019). According to (EC, 2019b) the investment in school infrastructure is insufficient and there are plans to envision a large investment in schools across the country.

Portugal has a total of 8.469 schools distributed across the various cycles in preschool, primary and the secondary level. For the primary level considered for rAn the distribution is the following:

- 1st cycle 1st to 4th grades (ISCED 1) 4.178 schools
- 2nd cycle 5th to 6th grades (ISCED 1) 1.190 schools

The number of students per computer had a great improvement in the beginning of the last decade but the value has suffered some setback. All schools in Portugal have computers and internet access but the existing infrastructure is old and support for the maintenance of the equipment is weak. Not all the schools have experts on the use of the infrastructure and software management is frequently very poor. Still, according to the 2nd survey of the use of ICT in schools (EC, 2019), we can see that Portugal is well positioned in terms of schools being well equipped and connected, in comparison with the average of EU.



Figure 3. Digitally equipped schools according to the 2nd survey for the use of ICT in schools (EC, 2019)





2019-1-UK01-KA201-062018

The same can be concluded in relation to internet speed. However, when we consider the number of students who use a computer at school for learning purposes Portugal appears very far from the EU average. The use is mostly done with the student's own equipment. This can be understood in several ways. Schools don't have personal equipment for each student, computer labs are not used regularly, and teachers don't always require the use of ICT for learning purposes. Technology enhanced learning (TEL) is not a common practice among teachers in Portugal. Although most students have smartphones there are severe restrictions for its use in classrooms. Still, students in Portugal have less access to ICT devices at home when compared with the EU average as presented in (EC, 2019).

As far as ICT, many schools are adopting a strong policy support, creating ICT labs and other infrastructure as can be seen in the figure below but the accompanying training measures have to follow in a stronger format, developing teachers' digital skills and providing teachers not only with experience in programming and robotic but in the use of TEL in general for learning curriculum content, assessment, inclusion actions, etc. There is a pressing need as according to (EC, 2019b), in 2018, 34.6% of companies reported problems in finding the required ICT skills in the market. The proportion of ICT specialists in the country, as compared to the total workforce is of 2.2%, one of the lowest of the EU. But reforms are in place (Bourgeois, 2019) to integrate digital competences as an integral part of the school curricula. As part of the national strategy of education for citizenship, already referred in this document and the reforms taking place since 2017 (Martins, 2017), the improvement of the competence profile of the students in Portugal is a key priority. ICT has a huge importance to this vision and steps towards concrete areas in this direction are now being materialized via the INCoDE.2030 program.





# 8. National policies and typical practices for raising awareness about natural disasters

### 8.1 In Greece

In Greece, the way the national disaster management system and civil protection and awareness are implemented, is by the General Secretariat for Civil Protection (GSCP) coordinating, on a national level, regional and local authorities to work together with local and public institutions and services. The General Secretariat for Civil Protection (GSCP) studies, plans, consolidates and coordinates the country's policy concerning issues of public awareness, prevention and confrontation of natural or manmade disasters as well as coordinating the actions of the public services and the civil protection volunteers. The (GSCP) once established in 1995 (Law 2344/1995), under the Greek Ministry of Interior, Public Administration and Decentralization, is today under the Ministry of Civil Protection. Since 1995, a series of legislative regulations has shaped the current framework of the GSCP. In 2002, the Law 3013/2002 upgraded the role of GSCP, emphasizing the importance of citizen protection and assigning roles to the local authorities. According to this law (article 1), the aim of the Secretariat is being defined as to protect citizen's life, health and property from natural hazards, technological accidents (including biological, chemical and nuclear threats) and other disasters, causing emergency situations during peace period.

The Secretariat issues circulars with guidelines to ensure effectiveness and efficiency structured along the pillars of prevention, preparedness, response and recovery of natural and technological disasters. Each ministry is then responsible for prevention plans and taking preventive structural measures in the area of their competency and drawing up special plans for dealing with disaster. The National Civil Protection Plan "Xenokrates" (Ministerial Decision no. 1299/2003) sets the national framework for an effective risk management planning and provides for the development of hazard-specific plans at the local, regional and national level. In accordance with "Xenokrates", at national central level, the General Secretariat for Civil Protection issues National Plans for all kinds of natural and manmade disasters. All ministries, decentralised governmental authorities, and local government authorities





should design their plans based on the national plan. The General Secretariat of Civil Protection is the general coordinator of the planning.

The law also defines a shared competence of all levels of governance and **action**; authorities and resources at national, regional and local are to be involved in the Civil Protection system and are called to respond and act upon to emergency situations. The coordinated system sharing responsibility includes the fire brigade, the police force, the coast guard, the Emergency Medical Care Service, the armed forces, Hellenic Rescue Team, the Earthquake Planning and Protection Organization (EPPO), the competent agencies at the Regional and local level, the Public Power Corporation, the Hellenic Telecommunications Organization, the Water & Sewage Company and the Hellenic Meteorological Services as well as voluntary organizations. The law also stipulates the establishment of a Civil Protection Unit in all the involved ministries and public corporations enabling the coping of disasters.

On the site of the General Secretariat for Civil Protection (GSCP)<sup>5</sup> guidelines for self-protection and information on all kinds of natural and man-made disasters are available, in Greek and foreign languages (English, Spanish, French, Albanian, and Arabic. Risk communication and awareness raising information is disseminated via various methods such as campaigns, TV and radio spots for specific disasters, publication of leaflets and brochures, electronic material, and school visits while hazard-specific communication is provided by public authorities in their sphere of competences.

Early warning systems are responsible for providing valuable valid and timely notification to the State Authorities through the General Secretariat for Civil Protection (GSCP) that issues the daily forest fire risk map during the summer period. It is uploaded on its website and sent to all competent and local authorities involved in forest fires management. Severe weather phenomena warnings are issued by the Hellenic National Meteorological Service. Tsunami early warnings are provided by the Institute of Geodynamics, which hosts the Hellenic National Tsunami Warning Centre. The Institute of Geodynamics has also a crucial mission, which is to inform the Government, the General Secretariat of Civil Protection, the Earthquake Planning and

<sup>&</sup>lt;sup>5</sup> <u>https://www.civilprotection.gr/en</u>





Protection Organization (E.P.P.O) and the Public about the upcoming seismic activity of Greece.

Trainings and exercises are undertaken at national, regional, and local level by competent authorities. Greece also participates in the Union Civil Protection Mechanism training programme and Greek authorities have also organised international exercises, such as, EU EVITA 2014, EU PROMETHEUS 2014, EU POSEIDON 2011, and EU EVROS, 2010. Greece has participated in others, such as, EU TWIST 2013, EU Dr HOUSE, 2012, PT QUAKE 2009, and SARDINIA 2008.

In Greece, numerous efforts have been made towards the education of different target groups on natural disasters protection issues. These target groups are the following: School Community, Public, Officials, Volunteers, People with Disabilities, Tourists. The relative education procedure includes the implementation of seminars and lectures on natural disaster mainly earthquake and fire protection for the different target groups, the elaboration of specific educational projects and the publication of educational material for pupils and teachers.

The Earthquake Planning and Protection Organization (EPPO) has participated in numerous educational programs on seismic safety at schools ("Earthquake protection at schools" 1999, "Protect Myself and Others", 2001), provides online educational material and on-site visits. EPPO experts and likewise staff from the Hellenic Rescue Team and the local Fire Department train on school grounds students and stuff and through seminars directors and teachers of elementary schools annually. On the occasion of the beginning of the new school year, the Ministry of Education invites the Directors of the Primary and Secondary Schools to take the necessary steps regarding the implementation of measures in the framework of the implementation of guidelines for Civil Protection and Civil Defense. The planned actions are a compilation or updating of the existing Emergency Plan of the School, the training of staff and students on self-protection issues and the obligation of each school to perform readiness exercises three (3) times during the school period. The Emergency Plan of the School known as "Internal Regulation of the School Unit (YES) and the Memorandum of Action for Fire Management, Extreme Weather, Technological Disasters and CBD» kept in the archive of the School Unit with the obligation to inform the Housing Directorate of Education is a detailed plan of action against natural disasters.





# 8.2 In the U.K.

The UK government develops strategies and actions in the field of natural disasters preparedness in order to be in position to effectively respond and recover from emergencies. In this scope, it collaborates with devolved administrations, emergency responders, and other organisations active in the field of natural disasters.

The government's work is mainly focused on 4 actions:

- risk assessment
- preparation and planning
- response and recovery
- building a resilient society to ensure businesses and communities are better prepared for, and able to recover from, emergencies

Regarding the building of a resilient society, the actions for achieving this include the collaboration with organisations and individuals from across the UK, and more specifically, local responders, businesses, the voluntary sector, communities, and individuals. The aim is to equip them with the necessary skills and knowledge to become better prepared for a natural disaster and know how to recover from one. Also, the UK's government provides opportunities to share news, ideas and good practices, publications, and practical guides<sup>6</sup>.

The government believes that individuals, communities, voluntary sector groups, and local businesses in a better position than the government to understand and respond to the needs of the local community before, during and after an emergency. So, there is an effort to support communities using local resources and knowledge to help themselves during an emergency in a way that complements the work of the local emergency services. To encourage the community to be prepared for emergencies, the government has supported the sharing of information about successful community activities in a lot of areas and provide a range of public information tools.

<sup>&</sup>lt;sup>6</sup> www.gov.uk





One particular publication aiming to enable owners and operators of the UK's infrastructure to improve the security and resilience of their assets, having always the support from relevant regulators, is the "Keeping the Country Running: Natural Hazards and Infrastructure Guide".

More specifically, the guide supports infrastructure owners and operators, emergency responders, industry groups, regulators, and government departments, to work together to be in place to improve the resilience of infrastructure and services necessary to the community. Its aim is also to provide advice regarding identifying and assessing risks from natural hazards, and to offer guidance on standards of resilience, business sectors and economic themes and to promote information sharing (Cabinet Office, 2011).

In this Guide there is also a section referring to the Guidance on Natural Hazards, which directs infrastructure owners and operators, and all those with a stake in the delivery of essential services (including regulators, suppliers, and emergency planners), providing the worst-case scenarios of natural hazards. This kind of information will improve the cross-sector resilience in case of natural disasters (Cabinet Office, 2011).

This guidance is divided into two sections. The first section includes the interconnectivity of natural hazards and provides reasonable worst-case scenarios for those hazards which have been defined form National Risk Register. It also describes an analysis of additional hazards and their potential impact on critical infrastructure. The second section lists some potential geological hazards for infrastructure owners and resilience partners that can also affect them, depending on the specific characteristics of their location (Cabinet Office, 2011).

The UK government has also addressed natural disasters through the National Resilience Capabilities Program (NRCP), which aims at increasing the country's capability to respond to and recover effectively from emergencies. The NRCP helps government departments understand the relationships between risk, consequence, and capabilities so that they can be better informed and prepared.

The government believes that raising awareness about natural disasters is essential, and that's why it is urging organizations to be informed and warn the public about emergencies. The government believes that a well-informed public will respond in an efficient manner to an emergency, and thus that will minimize the emergency's effects on the community. Organizations should try to make the public aware of the



risks of emergencies and how the organizations are prepared to deal with them if they occur.

The most effective way for organisations to raise awareness is by publishing information through the internet. Still, hard copies should also be available for those who can't access the internet, in public places such as libraries. All materials produced should look interesting and attractive enough for people to want to read it and make sure in this way that the public will be informed. Particular care should be taken to reach vulnerable people or those who may not understand the message (such as the elderly or children in schools.

Except for the UK government, The Natural Hazards Partnership (NHP) which was established in 2011, provides information and conducts research and analysis on natural hazards to assist governments and the responder community across the UK to develop effective policies regarding natural hazards. The NHP is a collaboration between 17 UK public bodies, and its main objective is to deliver trusted and effective natural hazard advice and services (Hemingway and Gunawan, 2018).

More specifically, the Natural Hazards Partnership aims to establish a forum for the exchange of knowledge, ideas, expertise, intelligence, and best practices concerning natural hazards, to provide useful advice to government and emergency responders and to create an environment, promoting the development of new services which aim at assisting communities to respond efficiently in case of a natural hazard.

NHP collaborates with several initiatives from the UK's environmental services and hazards resilience communities, in order to develop a service delivery model to which will support the disaster risk management and will provide data and information to the infrastructure field, according to the wider resilience community's ( Governments, responders, public and private sector) needs and expectations<sup>7</sup>.

In the UK there is also another initiative that aims at raising awareness about natural disasters. More specifically, the #30days30waysUK which was first piloted by Northamptonshire County Council Emergency Planning Team in 2015 and since then it takes place every September<sup>8</sup>.

#30days30waysUK is coordinated through UK Local Resilience Forums: the emergency services such as the police, fire and rescue services and health, including

<sup>&</sup>lt;sup>8</sup> www.30days30waysuk.org.uk





<sup>&</sup>lt;sup>7</sup> www.naturalhazardspartnership.org.uk/

NHS Clinical Commissioning Groups (CCGs), Health and Wellbeing boards and also by individuals such as risk specialists, doctors, and academics.

This particular initiative uses online means in order to create "challenges" or "games" which present activities that are very similar to life cases scenarios, taking place in real social contexts. These tools are mainly focused to provide resources for young people, as they are the future generation who needs to be prepared for natural hazards. For this reason, there is a specific focus on training content addressed to kids and schools. All materials are free and available to all, as they are published by creative commons license and thus everyone can share and adapt them.

In the UK, there are plenty of initiatives about raising awareness about natural disasters and emergency preparedness. However, most of these initiatives focus on specific community sectors that must know how to face a natural hazard. In regards to education on natural disasters there are not many initiatives aiming to inform children and young individuals who are vulnerable groups when it comes to emergency preparation and handling.

#### 8.3 In Spain

Environmental education has been present in Spanish Educational System since late 1970's but was after the celebration of the 1<sup>st</sup> Conference on Environmental Education that in October 1983 when it really took a relevant place in current education curriculum. Some of proposals done my experts during the meeting were incorporated with the Organic Law for the Management of the Educational System ("*Ley Orgánica para la Gestión del Sistema Educativo*") of 1990 better known as LOGSE.

Environmental education in LOGSE stablished a practical training with interdisciplinary approach for providing the student a global framework of topics that included natural awareness, conservation of biodiversity, nature protection, among others. (3) The aim of the implementation of environmental education was to raise awareness and acquire knowledge, skills, competences and aptitudes for educating students in nature-conservation, as well as increasing their participation in solving future environmental problems.

In the same path and with the willingness of developing accurate polices in environmental protection was elaborated the White Paper on Environmental Education in Spain by the Ministry of Natural Environment in 1999, that was supposed to be a





union point between what intentions wondered and what reality demanded. Trainers in Environmental Education acquired a principal role in the achievement of goals stablished.

With the implementation of the LOMCE in 2013, Environmental Education was modify with the separation between Social Science and Natural Science, and an approach to environmental conservation and awareness only from a natural perspective, showing the misunderstanding of legislators for not linking both science. Students, as required experts in the field, need a global perspective of all areas affected by environmental issues, and should be approached from an interdisciplinary vision as denying social consequences of natural disasters was not realistic. This argumentation didn't provided students an accurate approach about real environmental issues as water scarcity, renewable energy or consequences of consumption and its direct effect on climate change and natural disasters.

National schools and educational centres have experienced a progressive expansion of the development of sustainability polices, increasing the methods for implementing them in the educational system and adapting to their own inter system of each school and inherent characteristics. A change from Environmental Education to Sustainable Development Education took place when methodology and approached focused not only in preservation but also in future consequences, with different visions from the educational field (Fernández Ostolaza & Gutiérrez Bastida, 2015).

The implementation process in parallel with national polices have as objective a change not only in education but also in the whole society, forming a generation that will change the world trained in "environmental management" as well as looking for a coherence and cooperation work among contents, methodology, educational environment and society (Salomone, 2007).

Sustainable Development Education has been traditionally approached from an excessive theoretical point of view, not compatible with a coherent training path for acquiring needed competences. As general cases, curriculum designs only expose concepts even the law stablish "the incorporation of elements liked with environmental protection" from all areas of Primary Education, but aspects taught are still from traditional definitions. Sustainable Development Goals, established by United Nations, are being implemented in our nowadays society in different forms and fields.



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Educational field in Spain may include them also and provide students a new approach that contains some objectives like preservation of marine and terrestrial ecosystems, sustainable communities, responsible production and consumption, among others (Calvo Roy, 2015).

Educational practices included in the Primary curriculum are complemented by some practices carried out by schools in order to raise awareness on students lead by example. We find regional initiatives, like the project Actívate+ from Bizkaia Provincial Council or Global Action Plan, which objective was improving energetic consumption of schools and promote renewable energy. By this practices, students start to be familiarized with alternative sources of energy not invasive with natural environment.

Schools evolved in sustainable development are all present in ESenRED "*Escuelas hacia la Sostenibilidad en Red*" a network created by public institutions in 2012 that pretended to be a nexus of union among educational centres with sustainable projects. With the same onjective was created by the European Commission the EURONET50/50MAX Project, developed by more than a hundred Spanish Centres evolved in sustainability practices. These projects allowed centres to share ideas and proposals for raising awareness among their students.

Educational Centres also participate in regional projects, usually related with a determined climate, wildlife or vegetation characteristic from that specific region. It is the case of "*Educar hoy por un Madrid más Sostenible*" (Educate for a more sustainable Madrid), a programme launched by Madrid Town Hall where scholars are taught biggest problems the city is facing nowadays (pollution, wildlife destruction, reduction of green zones) and how to prevent these natural disasters. Another example can be found in Balearic Islands with "*Centres Ecoambientals*", where by a practical approach, scholars learn about the wildlife of the island, as well as prevention and sustainable practices.

These activities conducted by educational centres and promoted by public governments try to correct theoretical approach and use learn-by-doing methodology in order to explain and make more comprehensible climate change, environment protection, natural disasters and preservation, and form future leaders in sustainability.

Finally, another wide spread practice for raising awareness on natural disasters among scholars are free time activities carried out by different associations. One





example is National Centre in Environmental Education, which acronym is CENEAM that carries out many activities regarding nature preservation and raising awareness, as well as providing a varied programme with exhibitions, dynamic activities, videos in YouTube, free available material and sustainable initiatives, among others. These resources complement environmental education, sometimes excessively theoretical, and evolves scholars in dynamic activities. Other more informal associations like Scouts, the Red Cross and Ecologist Associations provide general public and specially scholars a wide variety of activities for raising awareness on environmental issues. Some examples are trips, picking up garbage from protected areas, beach clearness, wildlife conservation, animal shelters, etc.

All practices carried out in Spain in Primary Education regarding environment and natural disasters are, as conclusion, poor and not enough for facing the near future of the planet. This conclusion can be extracted by the survey conducted by Fundación Endesa in 20016, where young students between 18 and 35 years and which Primary Education curriculum included environmental topics evaluated concepts acquired and the methodology used. The outcome showed that respondents ranked environmental education as insufficient and their willingness of a deeper knowledge on these topics. Particularly demanded more emphasis in topics related with environment problems (climate change, natural disasters...). Furthermore, traditional education with theoretical topics was most common training practice, as only the 16% had practical training and only 11% used Internet for learning about these topics.

## 8.4 In Portugal

Portugal has a National Platform for Disaster Risk Reduction<sup>9</sup> (PNRRC). It aims to be a convergence point between entities and partners with expertise in the prevention and mitigation of disaster risk reduction and extreme climate events. There is a national commission for civil protection with the following competencies:

• Ensure the implementation of the general lines of governmental civil protection policy in all administration services.

<sup>&</sup>lt;sup>9</sup> https://www.pnrrc.pt/





- Appreciate the general bases of the organization and functioning of the bodies and services that, directly or indirectly, perform civil protection functions.
- Consider the agreements or conventions on international cooperation in the field of civil protection.
- Approving civil protection emergency plans.
- Provide advice on national and regional civil protection emergency plans.
- Adopt institutional collaboration mechanisms between all the bodies and services with responsibilities in the field of civil protection, as well as forms of technical and operational coordination of the activity carried out by them, within the specific scope of the respective statutory attributions.
- Proceed with the recognition of the criteria and technical standards on the organization of the inventory of resources and means, public and private, mobilizable at local, district, regional or national level, in the event of a serious accident or catastrophe.
- Define the criteria and technical standards for the preparation and implementation of civil protection emergency plans.
- Define the priorities and objectives to be established with a view to staggering the efforts of the bodies and structures with responsibilities in the field of civil protection, regarding their preparation and participation in common civil protection tasks.
- Approve and monitor public initiatives aimed at publicizing the purposes of civil protection and raising citizens' awareness of self-protection and the collaboration to be provided to the bodies and agents that carry out that activity.
- Appreciate and approve the forms of external cooperation that the bodies and structures of the civil protection system develop in the fields of their specific duties and competences.
- Determine the implementation of national or supra-district civil protection emergency plans and initiate the actions provided for therein.
- Enable the rapid and efficient mobilization of organizations and indispensable personnel and of the available means that allow the coordinated conduct of the actions to be carried out.





- Formulate requests from the Government for assistance to other countries and international organizations, through the competent bodies.
- Promote the realization of exercises, simulations or operational training that contribute to the effectiveness of all services involved in civil protection actions.
- Disseminate official communications that are appropriate to the situations provided for in this law

For the triennia 2018-2020 the platform has as main objectives the implementation of the following activities:

- Safety assessment of teaching structures (creation of the methodology and measures suggestions).
- Experts in post-earthquake structural damage assessment (identify experts and consolidated evaluation forms).
- Resilient Cities (increase the number of cities conforming with the established criteria).
- Resilience of Critical Infrastructures of the Private and Business Sector of the State (create methodologies, promote interactions, elaborate guidelines).
- Damage Databases (compile relevant information).
- Cultural heritage (reduce risks and elaborate a guide of good practices)

In the field of education, an important document was published in 2015 by the Ministry of Education, more specifically the General Directorate for Education, devoted to the creation of a reference framework to the integration of Risk Education within the school curricula, for all grade levels from pre-school to high secondary (DGEstE, 2015). The framework aims also to establish the necessary links between the school and the community with the main aim of building a set of orientation guidelines to its integration in the curriculum component. The framework has the following objectives:

- Sensitize the educational community to the topic of civil protection.
- Identify risks.
- Acquire safety habits and develop skills in the field of civil protection.
- Promote appropriate attitudes and behaviour in emergency situations.
- Promote personal security and internal security plans against risks.





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The document establishes the lines of intervention and collaboration within schools, giving priority to:

- Technical and scientific components related to risks that have to be considered in advance, properly identified, studied and disseminated.
- Public information actions that motivate citizens to join projects that increase their preparedness for an emergency situation.
- Emergency planning processes, including the training and exercise component.
- Accident, emergency and catastrophe response operations, enabling and encouraging citizens to react proactively in the processes

The topic of prevention is considered one of the more important and the suggestion is to engage the community in:

- Awareness actions towards preventive and protective behaviour.
- Awareness related to the existing problems in the community location.
- Finding solutions collaboratively.
- Preparing actions to enable the mitigation of catastrophes related to earthquakes, floods, fire, etc.
- Awareness in terms of attitudes in face of emergency situations.
- Understand the procedures established by the civil protection,

The document also establishes the different topics and its associated objectives, distributed across the various school grade levels. For the grade levels where rAn intervention will take place (1st to 6th) the topics are the following:

- Civil Protection (The importance of citizens in civil protection, develop a culture of safety, Know how to act in emergency situations, The structure of national civil protection. Agents of civil protection).
- Understanding self-protection measures and Natural Risks (Know the causes and susceptibilities, Identify the main effects in case of floods, droughts, heat wave, cold wave, earthquake, tsunami, volcanic eruption, mass movement of strands, coastal erosion).





# 9. Opportunities for the development of Primary school teachers' digital skills through Lifelong learning initiatives in your country

# 9.1 In Greece

Current research shows that effective teacher preparation is an important factor for successful integration and implementation of ICT practices in education (Davis et al. 2009, Jimoyiannis & Komis 2007, Zhao & Bryant 2006). In addition, seminars or workshops that focus on developing functional skills about specific educational applications and software do not necessarily help teachers understand how ICT could complement traditional pedagogies and enhance learning in specific subject matters (Jimoyiannis & Komis 2007). In Greece, the recent "Digital School strategy" emphasizes teacher training through both traditional and distance learning (synchronous and/or asynchronous) and the evaluation and certification of a wide range of ICT skills, however, following the most recent and emerging needs that are "imposed" by the simultaneous technological evolution, specific training programs are designed for teacher trainers on the use of newer tools such as interactive whiteboards in the education process. In general, due to the fact that the majority of teachers today are mostly familiar with ICT and have the basic skills for effective use of common software and applications in education, the ongoing teacher training actions are defined by a two-level logic (A & B Level) and are implemented by the Teacher Training Agency (O.EP.EK) along with various scientific organizations such as the Pedagogical Institute (PI) and the Computer Technology Institute and Press "Diophantus". Funding is primarily provided through integration of programs of either the National Strategic Reference Framework or EU initiatives and actions.

Throughout the years, A-Level training has been implemented through various actions such as:

- "Teacher Training in the Use of ICT in education" program which took place from 2002 until 2005 and was the first large scale attempt to train 83.315 teachers in the effective use of ICT in education.
- "Primary & Secondary Education Teacher Training in Basic Skills of ICT In education".





Every A -Level training program consisted of 52 hours in total and was conducted at specific Training Centres across the country, with adequate space and the required computing, networking and telecommunications equipment. The contents of such training seminars aimed at the familiarization with basic IT concepts, PC use for generic purposes, text editing software, spreadsheets, presentations software, and internet applications. On the other hand, B-Level training materialized through actions such as "Teacher Training in the ICT use and exploitation" which took place throughout Greece and involved 8,000 teachers of Primary and Secondary education, and especially Mathematicians, Physicists, Chemists, Geologists and Kindergarten teachers. The programs, with a total duration of 96 hours each, aimed at the development of knowledge and skills for the pedagogical use of Information Technologies and Communication (ICT) in teaching specific school subjects according to the trainees' specialization. The teachers that participated in these programs, had the chance to either attend in person or prefer a blended model that involved e-learning such as e-blackboard collaborative activities, lessons via video conference, access to asynchronous material

One more important initiative for ICT in teacher education is provided within the framework of the In-Service Training of Teachers for the Utilisation and Application of ICT in Teaching Practice project, which is being implemented by the Institute of Educational Policy (formerly known as Pedagogical Institute) and CTI-Diophantus. Part of the project is the in-service training of 600 educators, that will become the teacher trainers of specific educational actions. These teacher trainers, along with the existing trainers of the B-Level Teacher Trainer Registry (namely teachers with advanced ICT skills), are expected to provide the in-service training and support the acquisition of the skills and knowledge in the educational use and application ICT by B-Level teacher trainees.

Besides the actions and programs organized by the Ministry of Education, many teachers and educators that pursue further specialization in ICT use in the learning process, have the opportunity to improve their professional skills and knowledge by:

 Enrolling in one of the numerous MSc courses that are related to ICT exploitation for didactic purposes. Many Greek Universities that run Teacher Education Departments also offer the possibility for ICT specialization at postgraduate level with a duration of two years usually. Notwithstanding this,



many other opportunities for such studies are offered by foreign universities either in traditional or in distance learning mode.

- Enrolling in an undergraduate or postgraduate course offered by the School of Pedagogical & Technological Education (ASPETE)
- Enrolling in various ICT courses that are implemented by the Institution for Lifelong learning (I.NE.DI.VI.M). These courses might not be oriented towards the pedagogic exploitation of ICT but they provide an opportunity for generic digital skills development for teachers that lack feel uncomfortable with new technologies

# 9.2 In the U.K.

For the UK the development of citizens' digital skills is important, and that is why England was the first country in the world to introduce teaching coding to children at primary and secondary schools. The introduction of computing in the national curriculum means that teachers have been well-equipped with digital skills to successfully implement it. Thus, the government is funding the Computing at School Network of Teaching Excellence in Computer Science, a Network of more than 350 teachers that provide continuing digital skills development to teachers. The government also encourages computing graduates into teaching, by providing bursaries and scholarships.

Computing at School network (CAS) is a community open to anyone interested in computer education, including teachers, parents, academics, developers, and IT professionals. CAS's mission is to support all staff involved in Computing education in schools and to promote the establishment of Computer Science in all Primary and Secondary schools<sup>10</sup>.

In this context, CAS in partnership with BT, created the Barefoot Program which supports primary educators to acquire, knowledge, skills and resources to teach computer science. The program is also supported by the Department for Education and includes free resources, lesson plans, and workshops, to assist all teachers to successfully implement computer courses in the classroom. The program has already

<sup>10</sup> www.computingatschool.org.uk





helped more than 70,000 primary school teachers and 2 million students according to <u>www.internetmatters.org</u>.

CAS has also designed "The Senior Leader Toolkit guide" which has been produced to help school leaders to develop and provide computing in their school curriculum. This toolkit contains a series of leaflets that present the most important issues, essential to be addressed in the school's planning and implementation of the computing curriculum, helping in this way school leaders to implement computer learning as most efficient as possible.

Another organisation that provides training on digital skills is The Education and Training Foundation (ETF), which is the government's support body for the Further Education and Training sector. The main goal of The Education and Training Foundation is to support teachers and trainers to gain the necessary digital skills. ETF has developed initiatives and services aiming at promoting the use of digital tools in teaching, learning, and assessment processes. ETF also supports the personal digital skills of practitioners via online courses which aim to improve teachers' digital skills and further assist them to apply those in our in their teaching methods<sup>11</sup>.

In order to encourage and support teachers, trainers to use technology, the ETF developed the Enhance Digital Teaching Platform which offers free, training modules, that also provide a certification once the learner completes them. These modules aim at inspiring teachers and trainers to use educational technology (EdTech) in their classrooms and are based on UK's EdTech competency framework, the Digital Teaching Professional Framework (DTPF).

These courses are designed to help improve teachers' digital skills, and building their confidence to integrate technology in their lesson plans. Although aimed at those who may have experimented with digital tools for personal development and use and now are in the position for further developing their skills and apply them in their classrooms, they can be also used by those with no knowledge or skills, but curious to discover new fields.

Another initiative regarding the enhancement of teachers' digital skills developed by the Government is the HwbMeets, a Welsh open education resource platform. The platform was developed in the context of the Learning in Digital Wales program, which aims to collect useful digital tools and resources. The Hwb also

<sup>11</sup> www.et-foundation.co.uk





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supports teachers' continuing professional development (CPD) through the organisation of 'HwbMeets' events and resources (European Commission/EACEA/Eurydice, 2019). These events provide CPD opportunities and support the adoption and use of digital tools and resources in the classroom and include topics such as the integration of applications in the traditional curriculum, the use of Augmented reality games in the classroom, and the utilization of educational games, such as Minecraft<sup>12</sup>.

Except for programmes and courses aiming to boost teachers' digital competences, there are also self-assessment tools, with the scope to assist teachers to evaluate their competences. One of these tools is the Digital Competence Framework self-assessment tool which is considered as a specific online tool for digital competence in Wales (European Commission/EACEA/Eurydice, 2019). Also, the University of Edinburgh Digital Skills Framework provides access to a big range of digital resources and training courses that provide information on the development of digital skills. It includes a self-assessment questionnaire for the evaluation of current digital skills, profiling regarding the most useful digital skills for users roles, and resources for improving these skills.

In the UK there is also a network of Digital Pioneer Schools which support other schools in the implementation of the Digital Competence Framework. Furthermore, local events directed to schools' needs are being offered by the Regional Education Consortia and are funded by The Welsh Government. These involve experts who share good practices on topics including the implementation of the Digital Competence Framework, the use of digital technology for the strengthening of school's collaboration, online safety, and information on the Hwb learning platform (European Commission/EACEA/Eurydice, 2019).

Regarding the framework, teachers in primary and lower secondary education are provided with detailed benchmarks that guide them in assessing their skills. The benchmarks are provided for each learning outcome and each level. For example, under Digital Literacy level 4, and specifically the area of "Cyber resilience and internet safety", the corresponding learning outcome has five benchmarks, such as "identifies the main causes of security breaches in the industry" and "demonstrates understanding of how cyber security breaches in industry can impact on individuals".

<sup>12</sup> www. hwb.gov.wales





Although these benchmarks are important, they aim to guide teachers in the right way of the learning process and are not prerequisites for developing the skills (European Commission/EACEA/Eurydice, 2019).

Also, in England, Wales and Northern Ireland, the awarding organisations publish specifications for qualifications. These specifications contain methods of assessment and assessment objectives, define the learning outcomes and the examination requirements. Teachers can use these specifications to evaluate and assess student progress in their classrooms regarding digital skills (European Commission/EACEA/Eurydice, 2019).

In conclusion, in the UK many initiatives are focusing on assisting teachers to develop their digital skills and apply them inside the classroom. These initiatives consist of platforms, courses, events, frameworks and assessment tools. Nevertheless, the most these initiatives concern all teachers and trainers working in schools and in lifelong learning education. While initiatives like these must include as many interested parties as possible, it's necessary to be developed actions focusing on the development of digital skills but addressed to individually target groups in order to cover their actual needs.

#### 9.3 In Spain

Digital skills introduction in Primary Schools have supposed a complete change not only for scholars, but also for teachers. It requires the development of critical reasoning in the teacher, learn different audio-visual and textual languages as well as learn to use ICT as drivers of information, communication and production of knowledge (Gewerc y Montoro, 2015). Consequently, the training process of the teacher in digital skills may be done transversely for a better exploitation in the classroom and for providing students a real advisement in ICT. Learning methodology changes as the teacher becomes a guide instead of just reciting lectures.

For acquiring digital skills, teachers not only need to develop ICT knowledge, but also motivation, personalized work, communication and learning stimulation in order to be able to better provide inclusive practices among their students (Fernández-Batanero y Torres 2015). Teaching collaboration is a key factor in attracting and developing positive attitudes towards ICT, as well as positively solve common problems in learning activities.





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Introduction of ICT in educational centres can be the driven motor to a more inclusive system and moving to innovative practices. Digital resources have a priority paper in the own development of each student, being able to mark their own educational path and acquire competences according to their characteristics, capabilities and different rhythms. Providing a complete ICT equipment to teachers is not the only action to be taken by national polices. Other elements as adaptation of education to technologies, motivation, and orientation should also be taken into consideration for implementing ICT in classes as a real, useful pedagogic resource (Davis, Preston y Sahin, 2009).

Teaching may not only focus on lectures about software and e-resources, but also a promotion of teaching capabilities for a real transfer of knowledge between teachers and students, and a reciprocal learning process (Gegenfurtner, 2011). A correct teaching process is key for preventing problems derived from misuse of ICT in students and an optimal use of them.

Important factors in the learning process of digital skills from teachers in order to develop good educational practices supported by ICT are: adequate media and resources for developing the process, giving importance to constructivism, adapting tasks and taking advantage of personalized activities to each student characteristics, stimulate autonomous work and collaborative practices.

ICT can be integrated in new educational system with attention to diversity and to provide education of quality, equity and excellence to students. These requires carry out in a real and effective elements as values, barriers, leaderships, community participation, creative methodologies, flexible curriculums, innovation and above all, a constant teacher learning process. ICT and acquiring digital skills have multiple benefits for students as stipulated before, but also for the teacher (Marques 2003):

- **Sources of information**: Internet and ICT open up to a wide variety of sources of information about different topics before unreachable. Teachers can import other methodologies and approaches to complete students' formation.
- Individualization: Educational functions can now be split and adapted. Students present different interest, intelligences, and characteristics that demand individualized learning programs. Teachers thanks to ICT can design personalized processes to students, with positive outcomes for scholars.



- **Team work**: ICT provide resources that provide better conditions for group creations dynamics, and all advantages this evolves.
- **Contact**: Teachers have available new channels and increase their contact with relevant interested parts, as parents or educational institutions, a more fluent and informal way that improves quality of communication.
- Liberalization: Teachers can take advantage of liberalization of tough work linked with ICT development. Tasks that demanded long working days passing information on hand can now be automatized and automatically introduced in computers. This allows the enhancement of time spend exclusively on students development and so quality provided to them.
- Evaluation: New methods of evaluation of students' knowledge apart from traditional ones are now available for teachers. In traditional question-answer system of evaluation many students could not demonstrate real knowledge and some intelligences seemed unmeasurable. Introduction of ICT methods suppose a remodelling of traditional system, leaving space to new measures of different knowledge. These can improve motivation of students that did not feel intelligent with traditional evaluation system.
- Synergies: Creation of networks in educational field that allow a fluent exchange of ideas, methodologies and resources creating positive synergies. Teachers can take advantage of other successful methods and implement them in their schools, all thanks to ICT.

From the central government, the Ministry of Education and regional government bodies are taken several programmes and projects for development of teacher digital skills, with free training to centres in order to be updated in ICT and e-resources.

# 9.4 In Portugal

Portugal has been targeting of several education reforms where teachers' careers have suffered many changes. In the past few years, teachers' careers suffered a strong impact due to the 2008 economic crisis, becoming stagnant. This has changed with more recent education reforms and teachers have regained their ability to progress in their career through the acquisition of training credits. As such, teachers have been active in searching for training opportunities, discovering new ways to update their



practice and become more digitally skilled. Due to the several years where teachers' practice has been impacted by the economic crisis, Portugal has encountered a somewhat decreased level of development and innovation in TIC, with teachers' confidence and level of support in digital skills being affected. In this chapter we describe in more detail the current and past situation of teachers' digital skills and lifelong learning initiatives in Portugal.

A recent survey related to ICT in education (EC, 2019) presents an encouraging result with Portugal presenting a fair distribution on the usage of digital technologies in lessons. Portuguese teachers are among those with more experience in terms of using computers and internet at school. There is a large fraction of teachers using it for more than 75% of the lessons. However, it seems that innovation is falling behind placing Portugal as the country with the highest decrease level and the lowest increase level of innovation and the level of confidence on their own digital competence is very low.



Source: OECD (2019). Measuring Innovation in Education 2019. - Figure 14.11.

Figure 4. Innovation in the use of ICT in schools. (Vincent-Lancrin, 2019)

Furthermore, although teachers' experience in using ICT in their lessons seems to be high it seems that teachers also feel less digitally active and less supported in comparison with the other European countries participating in the study. This lack of support, which can be manifested in terms of lack of funding or lack of time during the working hours to participate in such training, might be the reason for the low rate of participation of Portuguese teachers in compulsory ICT training.





But other considerations need to be in place when trying to map the educational scenario in Portugal, such as the fact that the teachers' taskforce in Portugal has been ageing over the past decade mainly due to the severe cut in the number of teachers during the 2008 crisis. The percentage of teachers under 30 years is around 1% and there is very low interest of young students in teaching careers, while a wave of retirements is starting to emerge. As a consequence, it is expected that a very critical shortage of teachers, especially in a few domains, as for instance STEM subjects, will occur in the near future, with the added high loss of experienced teachers.

In addition, the first and structural training that teachers receive before they begin their teaching career is the pre-service training. During this training it is expected that teachers acquire their most fundamental skills in order to become updated and effective educators in the current societal context. However, this is not the case, and especially not in the ICT skills profile. The pre-service teachers, still attending their preparation courses in Portugal, often lack interaction with ICT skills at a desirable level as its integration is not mandatory. However, according to EC (2019b), initial teacher training is being modernised although the changes are not yet visibly implemented.



Figure 5. Inclusion of teacher-specific digital competences in top-level regulations/recommendations on Initial Teacher Education or teacher competence frameworks, primary and general secondary education (ISCED 1-3), 2018/19 – Source: Eurydice / (Bourgeois et.al

In addition to pre-service training, in order to promote teacher training and lifelong learning, as part of the National Programme for Promotion of School Success, the government has reinforced the budget of around 90 training centres located in schools,





2019-1-UK01-KA201-062018

the CFAE (Centros de Formação de Agrupamento de Escolas and established a series of competence centres, the ccTIC (centros de competencia TIC – ICT competence centres). These centres offer free training to all interested educators. Furthermore, a series of private training centres exist, distributed across the country, that also provide a valuable contribution for the improvement of the competence profile of educators (as for example NUCLIO, that is a certified training centre). As mentioned before, in order to progress in their career, teachers have to acquire a number of credits, having to engage in 50 hours of training within the period of four years. Still, as already mentioned in the text, there is still lack of training using ICT in specific domains such as for instance in STEM related subjects. There is an independent body in charge of the accreditation of courses, the CCPFC (Concelho Científico-Pedagógico da Formação Contínua - Scientific- Pedagogical Council of Continuing Education), which centralizes all accredited teacher training actions. In-service training courses are in general concentrated on general themes and it is sometimes hard for science teachers to find suitable training for their area (Dourado, Leite, & Morgado, 2016).

According to (OECD, 2019b) 88% of teachers report have taken part in some kind of in-service training in the previous 12 months, and 82% of them acknowledged that it had a positive impact on their teaching practice. But their participation in compulsory ICT training continued to be very low, among the lowest in the European countries included in the ICT in education report (EC, 2019) and also in courses related to the pedagogical use of ICT. The same report presents a rate of 34% of teachers stating they have participated in personal learning about ICT in their own time during the past years. This could be a consequence of the lack of specific accredited courses in the desired field, leading teachers to take up training opportunities that are not relevant for their career progression (not accredited courses).

As already mentioned there is a large network of public in-service teacher training centres in Portugal along with other private, non-profit initiatives. According to (OECD, 2019b) a large fraction of teachers participated in professional development activities in the 12 months prior to the survey. However, it is common to find complains from teachers that there is a general lack of relevant professional development opportunities in various areas, for instance science education as can be seen in summary of the TALIS report (OECD, 2019a). In the same report we find that the number of Portuguese teachers referring that ICT skills for teaching was part of their





professional development in the last 12 months prior to the study was very low, much lower than the OECD average, which manifestly shows the need to proper empower and engage educators in the use and integration of relevant ICT tools in resources in their routines. Disturbingly enough we also find as a result of TALIS 2018 report (OECD2019b) that Portuguese teachers are the ones that agree less with the statement that their colleagues are open to change, which as a reflect of the impact of several years of crisis and lack of team building and stimuli towards the creation of self-supportive communities of practice in Portugal.

As a conclusion, it has to be pointed out is that during the economic crisis the career of teachers was frozen, meaning that no progression was possible between 2005 and 2016. The progression was established in 2018, and the number of teachers looking for professional development opportunities, namely the accredited ones started to. As already mentioned in this document, since 2017 a new framework for teaching and learning has been established as part of the national strategy of education for citizenship (OECD, 2018). As part of this initiative the "Profile of Students at the End of Compulsory Schooling" (12<sup>th</sup> grade) was created (as already presented in chapter 1 of this document). This profile required a complete shift in the pedagogical models, forcing teachers to go out of their comfort zones and innovate. Schools had to reorganize their teaching and learning activities, introduce interdisciplinary work among other changes in methodological and pedagogical procedures. Training for innovative methodologies in classroom and the use of technology to enhance learning became even more important.

Taking into account the need for better digital competencies, Portugal launched a program called INCoDE.2030<sup>13</sup>. The program has as main objective to put Portugal in the leadership of the area of digital competences and will invest in 3 main strands: Citizenship, Employability and Knowledge. The government chose 5 axes of action: Inclusion, Education, Qualification, Specialization and Research. In particular for the field of education, technology is considered as a pillar with intervention in the development of critical thinking, collaborative work, computational thinking among other important areas. To integrate the development and/or improvement of these competencies in the students' profile a revision of programmatic content is in course.

<sup>&</sup>lt;sup>13</sup> <u>https://www.incode2030.gov.pt/incode2030</u>





Equally important and recognized by the project INCoDE.2030 is the need to improve the competence profile of teachers and facilitate lifelong learning opportunities. A reference framework for digital competence was created having as dimensional areas: Information Literacy, Communication and Citizenship, Content Creation, Safety and Privacy, Solutions Development.

This framework<sup>14</sup> is intended to support the assessment of digital competencies of individuals and is in line with the European Digital Competence Framework of Citizens)<sup>15</sup>. The curricula orientation for the introduction of ICT, taking into consideration guidelines of INCoDE.2030, in the primary level (1<sup>st</sup> and 2<sup>nd</sup> cycles) of education establishes the following priorities<sup>16</sup>: the development of critical and responsible attitudes in the use of technologies, digital environments and services; acquisition of key skills for the search of information online; capability of communicating adequately using digital tools and resources; creativity through the exploration of ideas and the development of the computations thinking.

The main curricula items are organized with the following structure: digital citizenship, investigation and search, collaboration and communication, creation and innovation. A specific platform is provided for teachers with a series of suggestions of tools and resources that can be used in the classroom<sup>17</sup>. The ministry of education has a specific department in charge of the organization of educational resources and technologies that can benefit schools. There is however freedom for educators to choose the tools and resources they might wish to integrate in their lessons. All these actions require a strong effort of the whole educational system to accommodate the new strategies and programs, the age and profile of educators and the demands coming ahead. Continuous professional development is for sure a high priority. Finally, it is important to create an overall innovation culture in the schools, where not only the school board but the overall teacher community supports each other in developing their careers. In (OECD, 2019b) we can find the view of the Portuguese teachers related to the attitudes their colleagues have towards innovation, another indicator that is far from the desired result, which needs to be improved.

https://www.dge.mec.pt/sites/default/files/Curriculo/Aprendizagens Essenciais/2 ciclo/5 tic.pdf https://www.dge.mec.pt/sites/default/files/Curriculo/Aprendizagens Essenciais/2 ciclo/6 tic.pdf <sup>17</sup> https://www.erte.dge.mec.pt/tic/recursos/?f%5B0%5D=im field nivel de ensino%3A168"





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<sup>14</sup> https://www.incode2030.gov.pt/sites/default/files/qdrcd\_set2019.pdf

<sup>&</sup>lt;sup>15</sup> https://publications.jrc.ec.europa.eu/repository/bitstream/JRC106281/web-digcomp2.1pdf (online).pdf <sup>16</sup> https://www.erte.dge.mec.pt/sites/default/files/oc\_1\_tic\_-\_vf\_03out2018.pdf https://www.erte.dge.mec.pt/sites/default/files/oc\_1\_tic\_-\_vf\_03out2018.pdf

#### Intellectual Output 1 / Learning Methodologies Framework

A lot needs to be done in order to ensure students will have the best possible education in terms of ICT. Teacher training institutes have to integrate innovative models of STEM education, that includes the use of ICT. In-service teachers need to improve their competence profile in order to include the INCoDE.2030 specific competences. Infrastructures in schools have to be modernized or a flexible policy towards personal the use of student's personal devices needs to be put in place. The project rAn can assume a very important role of facilitating the acquisition of several of the key skills presented in this document and that are within the strategic plans presented by Portugal, and briefly described in this document.





# 10. The rAn case study on raising awareness about natural disasters

The rAn consortium performed a case study among school educators and learners in relation to establishing the current situation, the learning needs of students, and the capacity building needs of instructors in relation to enhancing school practices on natural awareness and preparedness. The case study complements the review of policies, strategies, initiatives, and projects presented above. The survey was performed in Greece (2 sites), Portugal, Spain and the UK. An online survey was setup and was made available either online through a Google form or through printed hand-outs that were also delivered in order to ensure that adults with no internet access or digital skills couldn participate in the survey. The questionnaires are fully presented in Appendix 1 of this report. The results of the case study are presented below and they are based on "structured" questionnaires that involve mainly multiple choice, closed questions and deliberately limited open questions.

The participants vary in terms of profile, spanning a wide spectrum of ages and level of education, however they were limited to the target group and potential stakeholders of rAn. The consortium tried to gather as much information as possible from teachers and learners that are the prospective users of the serious game either as an instructional or as a learning tool. The feedback that the consortium received so far has been taken into consideration especially in the phase of the design of the alpha version of the serious game which will be further developed and tested in the near future.

The data presented in this summary doesn't aim at quantifying evidence but it rather sets the basis for a qualitative assessment and aims at gaining feedback from teachers and learners in the countries that participate in the project. The information that the consortium gathered so far, will be further used to demonstrate the general trend, tendency and policies regarding the use of ICT in classrooms and the knowledge about serious games and natural disasters awareness. In addition, such data will be seriously considered in the process of designing either the rAn serious games or the accompanying activities.

Most of the 101 teachers that took part in the survey, are at the moment inservice, active teachers in public and private schools while fewer are expected to work soon. As for their basic profile features, 41.8% of the participants are aged 41-50, a



fact that justifies the 60% of more than 16 years of teaching experience. The vast majority (50.7%) holds a Postgraduate degree. These facts and figures are possibly able to explain the high percentages of confidence as far as the use of ICT in classroom is concerned. Very comfortable, as well as, fairly comfortable with the use of technology teachers totaled a spectacular 85.1%!

When it comes to the question regarding the available formal and non-formal options for the lifelong training of teachers on digital skill building among learners, it is clear that the answers are almost equally distributed and cover a wide range of possibilities. Formal courses and workshops are the most popular choice (88.1%), while attending conferences (68.7%), self-paced distance learning courses (76.1%) and participation in networks and communities that support ICT use in education (73.1%), come very close in the preference list. The least preferred option seems to be mentoring activities (28.4%).

A respectful 67.1% of the participants prefer to use ICT as a teaching and learning tool as well as a source of information and educational material that can enhance the traditional tools in classroom. 20.9% of the teachers prefers to deploy ICT only for administrative tasks. Regarding the infrastructure that is available in the schools in which the participants offer their service, as it was expected, the main tools still remain the personal computers (92.5%), while, a rather encouraging fact is that 59.7% of the schools have at least one interactive board at their disposal and although at a slightly lower rate (41.8%), tablets are also present and seem to slowly take over an important educational role with regards to more traditional tools.

When the participants were asked whether they were already aware of the term "serious games", 31.3% of them declared they had never heard of it while most of the teachers were either aware (50.7%) or unsure about what it really stands for (17.9%) hence the rather sufficient percentage of teachers that make use of serious games in their classrooms (38.8%). Surprisingly, even though according to the previous questions many of the participants are not familiar with serious games and their uses in classroom, on the other hand they seem to appreciate the educational impact of such tools.

Regarding the questions about typical practices for raising awareness on natural disasters at schools in the teachers' country based on formal curricula and on local school policies, among the participants' answers we often came across the following:

• Workshops, Watching Videos,





- Reading books and articles during the classes
- Readiness Exercises
- School curriculum, books, interactive learning with computers
- Trainings and exercises in schools regarding the proper behavior in emergency situations (fires and earthquakes).
- Mostly, organizing and implementing projects concerning this subject.
- Evacuation drills that take place less often than officially suggested.
- Interaction with experts in the field,
- Informative materials, presentation of images, movies, Documentaries, projects, presentations.

Last but not least, most of the teachers (77.6%) declared that, through a potential engagement in the rAn project, they would explore new ways of deploying innovative technologies in classroom while another 61.2% will become aware of natural disasters and their prevention. This explains the fact that 80.6% of the teachers expressed a positive opinion on the possibility to adopt the tools, methodology and practices developed by rAn in their classrooms.

The students/learners that took the online survey, constitute a representative sample of potential users of the game. A total of 280 participants from 7 different countries (U.K., Greece, Portugal, Spain, Croatia, Norway, Romania) completed the on-line questionnaires, they are mainly aged between 10-12 years old and almost all of them (a total 95.4%) declared that they really know what natural disasters are about and how to tackle such circumstances and what to do in case of an emergency (a total of 65,7%) which among other things is a key element of rAn's objectives and main interests. In addition, 61,4% declared that they are being offered activities that teach you what to do in case of a natural disaster in their scools. Many of them contributed with their personal experience on the matter and here are the most representative answers:

- "Every year the school and the teachers prepare us about earthquakes"
- "We do an activity once in a while, that we learn what to do in case of an earthquake"
- "Sometimes firefighters or policemen come to the school and tell us and show us what we should do in dangerous situations"
- "Civil protection came to my school"







# • "We simulate how to leave the classroom and go to a safe place"

Moreover, 34% of the learners that took the online survey, had never heard anything about serious games in the past and the 27.6% (!) knows what the term stands for. This explains the rather high percentage of participants (37.5%) that have never been engaged in the use of such software and applications.

### 8.1 Serious Games applications in. various sectors

Serious games are games that besides entertainment, they aim at educating, informing, and training the player. They use principles, features, and mechanics of games to achieve implicit or explicit learning goals (Högsdal, 2011). An ever-increasing interest in serious game is evident in a variety of fields, such as education, language learning, recruitment, emergency preparedness, among others. The serious game industry is rapidly growing, namely, the number of serious games increased by more than 600% within 12 years, from 2000 to 2012 (Chen et al., 2015). When it comes to revenue, the game-based learning market is expected to grow from \$3.5 billion in 2018 to \$24 billion in 2024 (Statista, 2020).

Some of the advantages of serious games are that the user is challenged to perform on different levels, they are motivated, they receive immediate feedback and they learn from their mistakes. Serious games are immersive, engaging, but also fun. Through using gaming elements, serious games can teach skills and knowledge and encourage behavior change.

One of the main fields where serious games are used in is education – including all levels of primary and secondary education, higher education, as well as lifelong learning. In serious games the player can practice their skills and knowledge through challenges. After overcoming the challenges, they will usually receive awards, badges, and scores. The need for more engaging learning tools along with the widespread use of the internet and technology has led to the emergence of serious games in education. According to de Freitas and Liarokapis (2011), the integration of serious games into the curricula is offering a paradigm shift in formal education and training; a shift towards the 'gamification of learning' that emphases peer and interactive learning.

A 2011 study conducted at the university of Tilburg (Stege et al., 2011) examined the benefits of serious games in education. The researchers divided high school students into 2 groups and asked them questions about a subject they had recently





studied. One group was given the instructions through text and the other via a serious game. The study showed that the serious game group performed significantly better in the test. Therefore, the use of serious games can impact positively the learning processes especially when compared to written texts. Unfortunately learning by playing is still not considered very 'serious' in education and vocational training and as a result, gaming in learning is often excluded from school curricula. (Hauge et al., 2012).

A field that has enthusiastically welcomed this new form of training and education is healthcare and more specifically medical training. Through serious games, healthcare professionals are called to face real like scenarios and take decisions without the risk of consequences on the patient life (<u>www.game-learn.com</u>, 2019). Developing a game for healthcare settings requires expertise in the design of the game but also in the development of the content. The main type of serious games used in medical training are simulation games. Research suggests that the use of simulation in healthcare shows positive impact on training, and skills and knowledge development but also in terms of patient outcomes (Wang et al., 2016).

Additionally, more and more companies integrate serious games in their soft and hard training processes as well as in recruitment (<u>https://grendelgames.com</u>, 2019). Games in the workplace offer higher immersion and engagement. The players are motivated to immerse in the subject and develop work related skills. Additionally, serious games give the user the opportunity to experiment in a virtual environment without the risk of causing damages.

Serious games are a means of entertainment and a learning tool at the same time. The user takes decisions, learns skills, and acquires knowledge through practice and experimentation. The hands-on experiential learning where knowledge and skills acquisition happens through the transformative power of experience seems to be beneficial in a wide range of fields.

# 8.2 Serious Games for training on prevention, awareness and preparedness against natural disasters

According to Chowdhury, & Khan (2011) "the major difficulties in earthquake disaster management are inefficient communication, intricate interaction and lack of coordination as well as timely service delivery". Technology has given us the





opportunity to anticipate disasters therefore giving governments, community leaders, and organizations the opportunity to take the necessary measures to act in a timely and efficient way in the event of an emergency thus eliminating the risks and keeping people safe (Solinska-Nowak et al., 2018).

One way that this has happened is through the use of serious game for disaster preparedness. There is a wide range of serious games to help children and adults regarding prevention, awareness, and preparedness against natural disasters, ranging from quizzes to full-scale simulations offering different learning experiences. Serious games train the user on how to behave in case of a disaster and how to mitigate possible risks. An interesting example is that the US National Library of Medicine (NLM) has built a Virtual Reality Disaster Health Preparedness Training program that develops training tools for disaster preparedness through gaming and instructional design technologies.

A paper published in 2018 studied 45 non-commercial digital and analog gaming activities related to disaster risk management (Solinska-Nowak et al., 2018). Researchers examined the games' features and specifications, user profiles, and the content. The results showed that serious games are beneficial in disaster preparedness as through a rich social experience, players can effectively develop skills and knowledge. Another advantage is that serious games can reach a wider audience and give everyone access to realistic simulations of a disaster reality. Additionally, the gaming activities give players the chance to train at their own time and pace. It is cost effective but also more interesting and engaging than a typical boring PowerPoint presentation. Furthermore, though gaming the player can have many roles and test their knowledge in different scenarios and thus get training from a variety of perspectives.

When addressing children serious games with a fun, colourful, and easy to use format help them get prepared in the case of a disaster in an interactive and entertaining way. Some examples of such games are:

## • Disaster Master

A set of games that test the players knowledge in a wide range of emergencies and teaches them how to prepare an emergency kit.

## • Build a Kit





# A game where the user selects items in different locations in order to prepare an emergency kit.

# • Disaster Hero

A simulation game show for children in grades 1-8 is where the user competes against Dante Shields, the internationally famous disaster specialist, and his team of experts at four disaster scenarios: earthquakes, tornadoes, hurricanes, and floods.

# • Stop Disasters

A serious game launched by the UN that gave the player the possibility to play online in realistic disaster scenarios about tsunamis, wildfires, and earthquakes in order to learn about the risks and how to protect themselves and others. The user has the possibility to build schools, hospitals, and housing to protect the local populations.

Overall, games provide a real life-like experience that can improve the effectiveness of responses to natural disasters as the user gets prepared to act quickly and effectively in the event of an emergency. Serious games have been used in past few years in the field of disaster risk management in order to educate and inform communities and but also policymakers. It is thus highly important to engage the endangered communities into the learning and informational activities. That will help them be prepared in case of a disaster but also, they can contribute to the improvement the serious games effectiveness with their opinions and experiences.




# 9. Learning requirements definitions

The above discussions on the status quo on European education in relation to building digital skills by exploiting combinations of emerging pedagogies and technology lead to the definition of the learning requirements for students that will serve as the basis for the development of the rAn serious game as well as for facilitating the adoption of the proposed learning methodologies, technology-enhanced learning interventions, and tools in blended learning scenarios that may involve combinations of traditional classroom instruction, collaborative or individual work with digital tools, work out of the classroom. The rAn learning requirements for students can be summarized as follows:

### 9.1 Linking activities to curricula

First, there is a need to link activities and objectives to national curricula for raising the awareness of young students and -indirectly- of teachers on natural disasters prevention and preparedness. The rAn project aims at developing digital tools for use in the classroom in collaborative contexts, rather than readily available tools, that learners can use at home. The tools will be an integral part of wider learning design as discussed above. Linking the rAn application learning objectives to educational activities promotes wider adoption in the classroom as it empowers educators to make use of them as complementary content in digital form that enhances the already welldeveloped instructional practices in the classroom. The review of the national level school strategies on digital skill development that took place in earlier chapters of this report will allow the integration into the rAn serious game of tasks and challenges that extend current school practices. The tasks will be general enough to be applicable in diverse cultural, school, and economic environments in Europe. Actually, the objective of building a digital tool that is relevant at a European level is one of the key reasons for the European level implementation of rAn by a transnational consortium with a wide European footprint.

#### 9.2 Making the tools accessible to as wide audiences as possible

All project outcomes will be publicly available through the project portal for interested parties. This includes reports, informational content, learning activities,





instructional support content, and research articles. The rAn serious game will be also made publicly available through the project portal. The project portal will be maintained for at least 5 years post project completion. Social media pages related to the project will also be maintained for 5 years post project completion. The creative commons license mentioned before will ensure open use of both the software application and its source code. Furthermore, project participants will pursue the publication of the proposed serious game and supporting content through educational portals managed by educational administrative authorities with the objective of making the results accessible on a large scale to educators and learners (e.g. European level thematic portals, such as SCIENTIX, eTwinning, eLearning Europa, the SEGAN international portal and network for promoting serious games as well as national ones, such as networks of higher education institutions).

Another key requirement is to ensure that the **proposed digital solutions can be delivered to as many students as possible** in Europe. This has a number of implications. One the one hand, the **technical requirements for using the software tools** must be low in order for the application to be deployable in an averagely, or even below averagely, equipped school computer lab. The rAn serious game will be implemented in a way that allows its deployment in popular operating systems that are typically found in school labs as well as at home computers. The technical requirements for the use of the tools will be to simply have a current version of widely available operating systems. On the other hand, **the application will be made freely available to all interested parties** in order to maximize impact through mass deployment. This is in line with ERASMUS+ program objectives of making project outputs available to all. The rAn serious game will be made publicly available through a number of channels:

- Through the project portal.
- Through European level thematic portals such as the SCIENTIX network, elearningeuropa.eu, Teachers4europe and the European Schoolnet.
- Through national level educational portals that promote the mass deployment of tools by educators and learners, such as the Diofantos portal that is managed by CTI on behalf of the Greek Ministry of Education promoting reviewed educational content that is suitable for use by learners.





• Potentially through commercial portals such as the Google Store and the Apple Store for promoting wider exposure of the tools to the general public (note that the software can be made freely available through these portals).

The results and activities that will be maintained post project completion are:

- The rAn serious games
- The supporting content that targets educators and promotes adoption of results
- The know-how developed on serious game design
- The establishment of working relationships with external stakeholders, including educational authorities, industry, and others.

These results will be maintained through specific activities of partner organizations that include the following:

- The development of additional instructional support material in the form of learning cases documented in learning sheets. This will include additional learning activities based on the rAn serious games to be documented in the form of learning sheets, as well as videos, text, and other content. This material will promote the adoption of the proposed learning methodologies and tools through specific step-by-step recommendations and examples that can be integrated into existing activities enhancing learning experiences in primary education taking into account modern needs. The content will be developed as part of the on-going operations of consortium member organizations all of which are active in serious game deployment in educational practices.
- The organization of workshops and other events at the local, regional, and national level that will aim at promoting awareness on project results as well as adoption of outcomes through demonstrations and presentations of good practices. This activity will continue the foreseen organization of workshops during the project implementation period and will be conducted in the context of regular, on-going policies of project partners to maintain open communication channels with local communities.
- Close collaboration with educational and other authorities in Greece, Spain, Portugal, and the UK informing policy makers on the benefits of serious gaming





as an educational tool; this collaboration may include the organization of joint activities between project partners and educational authorities on awareness raising on the educational benefits of proposed design thinking learning design and supporting serious gaming technology.

- Continuous web presence of project outcomes through the maintenance of the project portal for at least 5 years after the completion of the project. The portal will provide continuous access to project objectives and outcomes; most importantly it will provide access to the rAn serious games, methodologies, and instructional support material. Publications to external thematic portals.
- Continuous contacts with educational and other policy makers towards establishing the benefits of game-based learning in primary education as well as wider life long learning scenarios in sectors ranging from school to vocational and professional education. These contacts will be continued in the context of regular cooperation between project partners and educational authorities in Greece, Spain, Portugal, and the UK as part of existing relationships

#### 9.3 Ensuring the extendibility of the proposed digital applications

Going one step further, the code of the **rAn serious game will be made open source** through Creative Commons licenses. The exact license will be decided during the exploitation activities of the project that will take place in the second year of the implementation period. Making the source code opens implies that not only the game will be freely available but that **external to the consortium organizations will be able to extend the code for the development of additional learning tasks** that address specific learning needs. This approach will maximize the impact of project results.

The rAn serious game must offer learning benefits that cannot be achieved through off-line learning interventions alone. In other words, the digital game must exploit the flexibility that ICT allows for introducing learning interventions that enrich classroom activities through. This can be achieved through various ICT-enhanced solutions:

• Enhanced motivation through elements of imagination and gamification that promote long-term engagement in learning.





- Real-time feedback to be generated through game play that allows learners to link the cause and effect of their actions thus building knowledge in small and incremental steps
- Exposure through simulation to real-world activities that learners would not otherwise have the opportunity to be engaged with in classroom contexts as a result of lack of equipment or other limitations.

Equally important is the linking of rAn learning to real life processes, in other words, linking education to the world of work. This will be achieved through the rAn scenario that will be inspired by real world activities.

### 9.4 Addressing language barriers

rAn will develop a digital application with the objective of promoting its deployment at a European level. Given that the application will be used by learners and teachers in different countries, the application must address potential language barriers. Learners of the targeted group of secondary and upper primary education can be expected to have a basic understanding of English. Given that the targeted age group of rAn is wide and covers learners aged 10-15, the understanding of English will differ among learners at different educational levels.

On the other hand, several countries do not allow the introduction of learning content in formal classrooms in languages other than the mother tongue (with the exception of learning content related to the learning of foreign as second or third languages).

Language considerations will be addressed in rAn through a number of software application design approaches. First of all, the software will be heavily graphical, conveying concepts through images. This will allow the minimization of text on the screen and thus will minimize the need for learners to understand written communication. By presenting the proposed learning content in a visual manner the rAn learning intervention will help overcome language barriers allowing its deployment in a number of countries throughout Europe. In addition, the visual presentations of learning challenges will help capture the imagination of learners promoting long-term engagement in learning. Any text that will be presented to learners through the rAn serious gaming application, for example in the form of directions of use or other information, will localized, i.e. translated, to all national languages represented in the



consortium through project partners, namely English, Greek, Spanish, as well as in Portuguese.



rAn - Raising awareness about natural disasters through the development of best practices and serious games



# 10. Required skills for educators

# 10.1 Understanding of the learning benefits of emerging serious games and related learning design

Educators are open to emerging learning design. It is not uncommon for educators to introduce innovative learning solutions such as collaboration, blended learning, visits to sites of interest, and more into their school practices. The development of awareness of educators on the evolution of pedagogical approaches such as active, experiential, explorative, problem-based, project-based learning, or others can significantly enhance the repertoire of activities that educators introduce in classrooms. This increased awareness as well as the capacity of educators to integrate effectively emerging learning design into their instructional practices may provide a path for professional development as educators in their expertise and enrich activities for further promoting the development of new knowledge among learners while also contributing to the satisfaction of educators in their professionals in the educational sector.

ICT, similarly to technology in all innovation related sectors evolves at a fast pace. Technology that is innovative at a point in time may become outdated or obsolete in only a few years as a result of the introduction of newer products or substitute ones that facilitate the execution of certain tasks in a manner that offers more advantages and benefits in broad terms that can range from engagement, attractiveness, motivation, efficiency, ease of use, and others. Keeping up with the evolution of ICT can be challenging even for ICT professionals. Understandably, it can be challenging for professionals in other sectors, including educators.

Educators are in need of developing awareness on how ICT, when combined with emerging learning design can be a powerful educational tool for enriching learning experiences. Notably, it is important to observe that the use of ICT is not an independent goal; ICT is a facilitator that must be consciously integrated into learning design for helping achieve specific learning objectives. ICT offers benefits in terms of enhanced communication, interactivity, simulation of real-world processes, peer learning, playful learning, and more. Educators can benefit from building knowledge on how ICT can enhance learning, schooling, and teaching. This can be achieved





through good practice recommendations, examples of ICT deployment in practice in learning contexts, educator training, and more.

## 10.2 Professional networking of educators

Professional networking opportunities for educators can be:

- Among peers in the educational sector.
- Between educators and professionals in other sectors, for example in the industry.

Professional networking among peers promotes the exchange of know-how and the development of collective expertise on pedagogical issues. In the context of rAn, professional networking among educators can promote the exchange of good practices in the area of deploying ICT, and more specifically serious games, in educational contexts. For example, educators can share information on experiences from the deployment of specific applications in learning contexts. They can further participate in evaluation of educational digital content and the sharing with peers of content reviews for helping colleagues choose among similar applications. Networking among peers can take place on various channels. First, at educational conferences where more formal presentations on experiences can be delivered. On-line communities also offer opportunities to share knowledge. Professional publications, such as newsletters and others, can also introduce opportunities for information sharing. Events targeting educators are another form of networking and sharing of experiences.

On the other hand, educators can benefit from networking with professionals in other sectors. By networking with industry players, educators are exposed to opportunities for bridging the gap between education and the world of work by becoming aware of industrial practices so that they can integrate related learning activities into their classroom practices. Similar channels like the ones described above, namely publications, events, and conferences targeting both educators and other professionals can be of value for introducing networking opportunities. In addition, informal working groups on areas of common interest, such as the development of learning interventions that help prepare learners to enter the world of work, can also be of value.





rAn aims to exploit all of the above channels in the context of dissemination and exploitation activities for helping build awareness on the benefits of serious games and more generally ICT in learning and for facilitating the as wide as possible impact of project results through the uptake of proposed learning design and technological solutions in educational initiatives designed for developing the required skills and raising awareness regarding natural disasters.





# 11. rAn theoretical framework for pedagogical design

# 11.1 Game-based experiential learning

One of the main aspects of the theoretical framework upon which the rAn activities and serious game design are grounded, is the game-based experiential learning model which better refers to how we learn best through personal experience-activity and reflection. Thus, this type of non-formal learning process is mostly about trial and error practices and about how we effectively build or expand our skills through "making", doing and experiencing the (digital or real) world around us, which brings to the construction of new knowledge. Experience-based learning seems to be a rather effective practice because it helps establish lasting behavior change mainly because rather than simply understanding a new subject or gaining a skill, we develop new habits and behaviors.

Kolb's research (1984) proves that mastering expertise is a continuous process of experience, reflection, conceptualization and experimentation, elements that make up the experiential learning cycle which shows the relationship between the various stages. During the 70s, Kolb introduced a four-stage model on which the "experiential learning cycle" is based while he advocated learning *«as a process whereby knowledge is created through the transformation of experience»*. More specifically, Kolb states that a person may initiate the learning cycle at any of the identified four stages, however, he/she must subsequently follow the rest of the steps in the given sequence.







Figure 6. Kolb's experiential learning cycle.

Elaborating more on Kolb's experiential cycle:

- Concrete experience describes the hands-on personal experiences that we learn from. It's about trying new things, applying trial-error practices and getting out of one's comfort zone. Real learning can be achieved through experience, successes and failures and it's exactly what happens next that creates real behavior change!
- Reflective observation helps the learner capitalize on his/her experiences that will eventually lead to new knowledge. It's during this stage the learner considers and ponders experiences, especially what went right and what could be improved? It seems that this is a stage of analysis, observing alternatives and drawing up pros and cons.
- Abstract conceptualization is another stage that comes right after having identified and understood the defining elements of an experience. It is exactly now that decisions will be made on what should be done differently next time (if anything). This seems like the right moment for planning and brainstorming strategies for success.





• The **active experimentation** phase of the learning cycle is where experimentation with one's own ideas takes place. The learner puts his/her plan of action to the test in real context!

Furthermore, on the same matter, Boud et al. (1993) coined the concept of "immersive experience" that refers to a situation in which a learner is fully engaged in a learning experience. Boud observed that learning takes place "effectively and somewhat naturally" through immersion that is a "condition needed for any learning to occur". He also refers an example of immersion in learning in the context of language education granted that learners are typically immersed in the culture where the target language is spoken in order to naturally build communication skills. He advocates that the same principle, which can be easily understood in the above example, holds during learning processes on other thematic areas, such as STEM.

## 11.2 Problem-based learning

The serious game and methodologies that are developed in the context of rAn, are defined by the principles of widely accepted methodologies that ensure up to date and learner-oriented outcomes. The core philosophy around which is built rAn, is Problem-Based Learning (PBL), an instructional approach that has been used success- fully for over 30 years and continues to gain acceptance in multiple disciplines. It is an instructional hands-on, active learning methodology and learner-centered approach that empowers learners to investigate processes and phenomena, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem through trial-error practices.

Problem-based learning stems from the theory, initially grounded by Anderson (1977), according to which, "for effective acquisition of knowledge learners need to be stimulated to restructure information they already know within a realistic context, to gain new knowledge, and to then elaborate on the new information they have learned, for example by teaching it to peers or by discussing the material in a group setting". In discussing the origins of PBL, Boud and Feletti (1997: 2) stated: "PBL as it is generally known today evolved from innovative health sciences curricula introduced in North America over 30 years ago. Medical education, with its intensive pattern of basic





science lectures followed by an equally exhaustive clinical teaching programme, was rapidly becoming an ineffective and inhumane way to prepare students, given the explosion in medical information and new technology and the rapidly changing demands of future practice."

During the 1980s and 1990s the PBL approach was adopted in various medical schools and became an accepted instructional approach across North America and in Europe. Albanese & Mitchell (1993) and Vernon & Blake (1993) concluded that a PBL approach to instruction seems to be equally valid with regards to traditional approaches Later reports from PBL practitioners suggest that students are more engaged in learning the expected content (Torp & Sage, 2002).

Despite insufficient research evidence, the adoption of PBL has expanded into elementary schools, middle schools, high schools, universities, and professional schools (Torp & Sage, 2002). Further research (Barrows, 1986, Savery & Duffy, 1995, Kilroy, 2004) on such a wider range of instructional design case studies, defines PBL as a pedagogical approach and curriculum design methodology that is often deployed with success in different levels of education and for various subjects and its definite characteristics are the following:

- Open-ended problems and use cases are context specific and drive Learning.
- Learners conduct research and become real problem-solvers that work in a selfpaced and active mode.
- There aren't specific and unique "right" answers but only those that lead to whichever solution.
- Critical thinking and creative skills are highly encouraged.
- Learners as problem-solvers work in small collaborative groups that have to identify the key problem and agree upon a solution that is implemented until it proves to be efficient.
- Teachers act as facilitators of learning, scaffolding the learning process and encouraging inquiry.

Elaborating more on the last point, in a PBL context, teachers don't merely provide facts or "transfer" knowledge and then assess students' ability to memorize and recall facts but they encourage them to apply the newly "acquired" knowledge to a wide range





of situations and make their way of thinking more abstract in its application. Most of the times, students are asked to investigate and resolve ill-structured problems by discovering and discussing about meaningful solutions with their peers. A learning procedure defined by the principles of PBL would follow specific consecutive and interrelated stages such as the ones below:

- The class identifies the problem.
- Students in small groups, discuss, decide, specify and clarify the facts of the given case.
- Later on, the team defines the problem and constructs a shared explanation while tutors and/or facilitators provide sufficient "scaffolding".
- Brainstorming based on the prior experiences and activation of prior knowledge through discussion.
- The team begins working on the problem and this is when real knowledge emerges.
- Reasoning through the problem comes next and after that, the team sets up a coherent action plan towards the solution of the problem.
- Learners might need to engage in independent study and individual research in order to tackle with potential learning issues, which they identified in a previous stage.
- Peers share and exchange information.
- Finally, the team presents and discusses the solution to the problem.

Moreover, PBL addresses the need to promote lifelong learning through the process of inquiry and "construction of knowledge" since it is indeed considered a constructivist approach that is based on the emphasis on an equal combination of collaborative and self-directed learning that is supported by a tutor and facilitator or a "more experienced other" (Bodrova & Leong, 1996).





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# Appendix

## A. rAn questionnaire for teachers

Retrieved at: <u>https://forms.gle/etomU5p8T97YWs1aA</u> Answered by 101 teachers as of 2/10/2020

# rAn project, Learning requirements survey (Teachers)

Dear teacher,

thank you for agreeing to participate in the project rAn that intends to raise the awareness of children at primary education about natural disasters and emergency preparedness. The project is funded by the European Union under the programme Erasmus+ (2019-1-UK01-KA201-062018) The consortium of rAn project will develop a serious game whose main objective will be for the player to survive a disaster and develop a resilient community in view of periodic geological hazards. The serious game will be based on a dynamic storyboard supported by interactive elements such as quizzes, puzzles and mini-games. Along with the serious game, it will be developed a Facilitator's Guide which will provide a full overview of all the serious game features.

It should take no more than 15 minutes to complete the questionnaire - most questions can be answered simply by ticking the right answer (from one to as much you want according to the instructions) or rating according to your opinion. A few questions nevertheless ask for open answers and short comments. All responses are anonymized and treated in the strictest confidence; no individual or school will be identifiable in the published reports. In case you have any further questions or comments, don't hesitate to contact us: kourias@uth.gr

Thank you very much for your time and effort in responding to this questionnaire. Your valuable collaboration is highly appreciated

Yours sincerely, The rAn project team





Raising awareness about natural disasters through the development of best practices and serious games			
What is your age? *			
C Less than 30 y.o.			
🔿 31-40 у.о.			
○ 41-50 y.o.			
🔘 51-60 у.о.			
○ 60+ y.o.			
In which country do you live and study at the moment? *			
Greece			
O Portugal			
🔿 И.К.			
🔿 Spain			
Other			
What is your level of education? *			
O Tertiary level / University			
O Postgraduate			
Doctoral			



100100	
Les	s than 5
6-1	5
0 16-3	25
25+	
What b	est describes your level of technology expertise in the classroom? $^{*}$
🔿 l'm	very uncomfortable using technology in my classroom
🔿 I'm	fairly uncomfortable using technology in my classroom
🔿 l'm	fairly comfortable using technology in my classroom
🔿 l'm	very comfortable using technology in my classroom
In your	country, what options are available (formal and informal) for the lifelong training of
In your teache	country, what options are available (formal and informal) for the lifelong training of * rs on digital skill building? (Multiple answers apply)
In your teache	country, what options are available (formal and informal) for the lifelong training of * rs on digital skill building? (Multiple answers apply) mal courses / workshops
In your teacher For Cor	country, what options are available (formal and informal) for the lifelong training of * rs on digital skill building? (Multiple answers apply) mal courses / workshops iferences
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What ICT i	infrastructure is available in your school? (Multiple answers apply) $^{\star}$
Person	al computers
Tablets	3
Mobile	devices
Interac	tive boards
Video o	conferencing systems (Skype etc.)
Audio e	equipment
Digital	photo and video cameras
Educat	ional applications
Other	
	***
l use ICT a	and innovative technology in the classroom (multiple answers apply): $*$
mainly	for administrative tasks
mainly	as a teaching/learning tool
mainly	for gathering information / teaching material
for all t	the aforementioned reasons





What are the typical practices for raising awareness about natural disasters in your country as * part of the national school curricula?
Long answer text
What are the typical practices for raising awareness about natural disasters at your school? $^{\star}$
Long answer text
"Serious Games". Are you aware of this term? *
Yes, I know exactly what it stands for
Yes, but I'm not sure what it stands for exactly
No, I have never heard of it
Serious games are digital games designed specifically for use in learning (not for entertainment). * They address specific learning objectives. Do you use serious games for training?
U Yes
Νο





۰۰۰ Which of the following you think can be potentially achieved through the deployment of serious * games in classroom? (Multiple answers apply)			
Knowledge building on specific subjects			
Applying in practice theoretical skills			
Experimentation (e.g. simulations)			
Analytical skills			
Creativity			
Decision making			
Digital skills			
Problem solving skills			
Collaborative skills			
Self-awareness			
What do you expect from this project? *			
I will become aware of natural disasters and their prevention			
I will explore new ways of deploying innovative technologies in classroom			
I will explore new ways of getting my class prepared in case of an emergency			
I don't expect anything specific			
How possible do you think it is to adopt the tools, methodology and practices developed by rAn $$ in your classroom			
1 2 3 4 5			
Not at all O O O O Definitely sure			





## B. rAn questionnaire for students/learners

Retrieved at: <u>https://forms.gle/pMHwKTrZJHxE8Wvj7</u> Answered by 283 students as of 2/10/2020

# rAn project, Learning requirements survey (Children)

Hello there kids!

We are creating a new game that will help you learn a lot of useful things about natural disasters and we would like to make you a few questions to help us create something that you like. Let us know what you think about it. Thank you very much for your time!

The rAn project team

Image title



Co-funded by the Erasmus+ Programme of the European Union

Raising awareness about natural disasters through the development of best practices and serious games





What is your age? *
🔘 6-7 у.о.
🔘 8-9 у.о.
🔵 10-12 у.о.
In which country do you live and study at the moment? *
Greece
O Portugal
О И.К.
O Spain
Other
Do you know what a "natural disaster" is? *
→ Yes
○ No
If you know, please write a few words that remind you of what a "natural disaster" is.
Long answer text
::: Do you know what to do in case of an emergency (e.g. earthquake, fire)? *
◯ Yes
○ No
I'm not sure, maybe.



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<ul> <li>Do you know of any modern technologies that offer a smart solution for preventing natural disasters?</li> <li>Yes</li> <li>No</li> </ul>
In your school, are there any activities that teach you what to do in case of a natural disaster? *  Yes No I don't really know
<ul> <li>In your school, are there any activities that teach you how to predict/prevent dangerous * situations?</li> <li>Yes</li> <li>No</li> <li>I don't really know</li> </ul>
If yes, can you please tell us a little about them? Short answer text
Does your School offer a lesson/course about preventing or facing natural disasters? * <ul> <li>Yes</li> <li>No</li> <li>I don't really know</li> </ul>











What do you think about your school's laboratories and technological tools? *
C Excellent
O Very good
Sufficient
Not good enough
I don't like it at all





"Serious Games". Do you know what a serious game is?
Yes, I know exactly what it means
Yes, but I'm not sure what it means
No, I have never heard of it
Serious games are games through which you learn while you play. Have you ever played a game like this in your classes yet?
◯ Yes
O No
What do you think you can learn from a serious game? (you can tick as many answers as you want)  I can learn specific things in I can use the knowledge I already have I can test a lot of things that otherwise could be impossible (e.g. fly a plane, drive an F1 etc.) I can be creative
I can learn how to make correct decisions
I can learn to use many modern technologies
I can learn how to solve various problems
I can learn how to work well with others
What is your favourite video game? *
Short answer text





<sup>۲۱۱</sup> Please write down three things that you think would make a video game, the best game in the \* world.

Short answer text



