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INCLUDEME IN A NUTSHELL

STORIES ON TALENT-ORIENTED EDUCATION

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1. INTRODUCTION

The INCLUDEME eBook presents the key findings and the lessons learnt throughout the project implementation and aims to support the upscaling of the INCLUDEME model and outcomes by providing guided access to practical approaches and actionable resources.

This eBook represents a manifest for talent-oriented education, where individuals are able to cultivate, explore, and employ their unique skills and perspectives that can benefit employers and society. The INCLUDEME approach to talent-oriented education is two-folded and it explores *Talent as an ability* and *Disability as a talent*.

The eBook describes the INCLUDEME model that forms the core of the upscaling strategy and of the policy recommendation.

1.1 INCLUDEME PROJECT OVERVIEW

INCLUDEME project aimed to create an accessible and inclusive online learning environment in which teachers and students of all backgrounds and abilities can co-create gamified learning paths incorporating digital game-based learning as well as providing the means to access mainstream learning content for those that would otherwise be excluded.

INCLUDEME brings its contribution to remove or reduce some vulnerabilities of the education systems, such as:

- Insufficiency of specialized / qualified human resources, including support;
- Insufficient training of teachers for working with classes / groups with diverse composition and for working with children from various vulnerable categories;
- Insufficient investments in infrastructure, equipment, teaching materials, textbooks, supplies;
- Insufficiency and poor representation as diversity of material resources to facilitate individualized educational pathways, for each student;
- Inadequacy and / or inadequate and / or insufficient adaptation of educational resources, for people with disabilities or disadvantaged;
- Elimination of attitudinal barriers in the way of inclusive education;
- Respect for identity, culture and language, to increase the access and availability of inclusive education.

1.2 Objectives

Individual

1   Enable disabled and disadvantaged learners to improve the quality of their lives through the provision of customizable digital learning environments available in both formal and informal settings

2   Invest in the teaching staff skills to optimize the capacity to effectively employ of supporting technologies that foster inclusive education.

Community

3   Support communities to be more inclusive, by increasing awareness and equipping the relevant stakeholders with the knowledge, methodologies and tools needed to address social exclusion and equality issues.

4   Create synergies among local and European communities that drive awareness, change of perceptions, leading to immediate actions and long-term strategies that support inclusive education.

Upscaling

The INCLUDEME model nurtured inclusive practices by deploying low-cost, reusable and accessible customizable digital learning environments for disadvantaged learners, esp. disabled ones, invested in teacher training, equipped stakeholders with the knowledge, methodologies and tools needed to address social exclusion, and created synergies among local and European communities.

The INCLUDEME upscaling strategy:

- *Horizontal scaling up: expand the coverage to new stakeholders and new countries;*
- *Vertical scaling up: build the organisational and political framework needed to reach a larger scale by working with higher level (provincial, national, regional, and even global) institutions and political decision-makers;*
- *Functional scaling up: reach out to new target groups.*

*Policies: **EU strategy for the Danube region (EUSDR)** through the Danube4SEecosystem project implemented in 9 countries that adopts the INCLUDEME model; **Europe's Digital Decade policy programme** through the Erasmus+ LETSMIMIC project implemented in 6 countries.*

1.3   OUR CONSORTIUM

Advanced Technology Systems - ATS

ATS provides software solutions and services for education, public administrations and businesses. Its eGovernment solutions have been implemented by more than 80 public organizations, including ministries and county councils. The products developed by ATS are supported through the activities of its Research and Innovation Department, whose mission is to create new economic and social values. ATS has coordinated and participated as a technical manager in various national and large-scale European research projects targeting technology-enhanced learning such as the BEACONING Project and the Games and Learning Alliance. Its efforts have focused on the development of large-scale learning ecosystems, authoring tools, accessibility solutions, digital games, open repositories, etc. These solutions have been implemented in more than 14 countries. ARIES (The Romanian Association for Electronic Industry and Software) – the largest IT association in South-Eastern Europe; the Romania Advanced Distributed Learning Partnership Lab; the Rural NEET Youth Network.

Hand Free Computing (Ireland) - HFC

Hands Free Computing renewed as Thriiver provides a wide range of Assistive Technology – both hardware and software. Providing dedicated in-house trainers, the company deliver more than 2,000 hours of Assistive Technology training every week, helping individuals get the most out of their equipment. For the areas of working life where technology can't help, or is only part of the solution, Hands Free Computing offer a series of awareness training and coaching sessions. Increased awareness helps empower individuals, managers, teams, and colleagues to unlock their true capabilities and appreciate the strengths of a diverse workforce.

Bremer Institut für Produktion und Logistik - BIBA

The "BIBA - Bremer Institut für Produktion und Logistik" is a research institute focused on engineering science. It was founded in 1981 as one of the first affiliated institutes of the University of Bremen and counts as one of the largest research facilities in the federal state of Bremen. Based on distinct fundamental research, BIBA carries out applied and contract research, both on national and international level, in the areas of production and logistics for relevant industries like logistics, automotive, aviation and wind energy. Furthermore, BIBA is involved in a University of Bremen-based Collaborative Research Center, funded by the German

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Research Foundation, as well as in the Bremen Research Cluster for Dynamics in Logistics (LogDynamics) and the International Graduate School for Dynamics in Logistics. With the LogDynamics Lab, the institute operates a demonstration and application center for innovative mobile technologies in logistics.

University of Thessaly - UTH

The University of Thessaly is the only higher education institution in central Greece. After merging with 2 other higher education institutions, the University of Thessaly currently has over 30 departments and enrols 40.000 students, making it the 3rd largest university in Greece.

The Department of Electrical and Computer Engineering enrols 1.000 undergraduate and graduate students and addresses areas that include electronics, energy, hardware, software, networks, and educational technologies. The informal Creative Technologies Learning Lab integrates emerging design, pedagogies, and ICT for generating innovative, rewarding, and effective learning experiences that build the knowledge and skills needed by industry and society in today's world.

The lab has implemented over 35 R&D projects in the area of technology-enhanced learning focusing on diverse aspects such as game-based learning, learning communities, design thinking, simulations, online collaboration environments, and more. In the context of R&D, the lab has working relationships with educational authorities and educational institutions in the area of Thessaly and beyond.

P.A. College Limited - PAC

P.A. College is the distinct Executive Business School of Cyprus offering specialised university degree programmes which include the unique BSc (Hons) Business Computing and the BA (Hons) Business Administration with specialisations in Accounting and Finance, Marketing and Management.

All programmes have recently been re-accredited by the Cyprus Agency of Quality Assurance and Accreditation in Higher Education (DI.P.A.E.). P.A. College offers 12 ACA exemptions required for the professional qualification of ACA of the ICAEW and maintains strong links with distinct firms in the industry such as KPMG Limited (Cyprus) etc. The Research and Development Department coordinates the research undertaken by academic faculty staff who publish their research in reputable journals and conference proceedings as well as build multidisciplinary teams and combine their specialisations in research projects.

Research work encompasses a range of fields such as the development of a games-based educational platform for intellectually-challenged children, gender inclusivity and gender diversity, mobile computer-supported collaborative learning, development of theoretical models for learner engagement and new methodologies for developing educational games amongst other research areas.

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South-West University "Neofit Rilski" - SWU

The South-West University (SWU) is a state institution that offers training in Bulgarian and English in 80 Bachelor's, 121 Master's and 88 specialized PhD programmes. The university is one of the biggest higher education institutions in Bulgaria. It employs 500 full-time professors, associate and assistant professors. The non-academic staff is around 500. SWU provides training for about 14 000 full-time students and 400 doctoral students. The academic structure includes 9 faculties. There are over 30 laboratories and research centres available at the University. The University implements pro-active international policies involving the cooperation of training and research institutions from all around Europe, the USA and Russia. The University has signed contracts with about 150 universities in Europe under the Erasmus+ mobility program.

Asociația cultural-educativă „Ambasadorii prieteniei" - AAP

The association was set up in 1993. By 2007 it ran various cultural and cultural education projects mainly for pupils. The major partner was the French association Les Amis de Târgovişte in Verneuil sur Avre, who assisted our NGO with various resources (including volunteers). Pupils from Targoviste went to France and their French peers came to Targoviste. Since 2007 the association has been undertaking EDC/HRE and school development projects as well as projects on education of values and local development. We closely work with schools, local in-service teacher training centre, county centre for educational resources, and other NGOs. Between 2008 and 2009 the Friendship Ambassadors Association developed a really innovative project based on the Council of Europe's tool for quality assurance of EDC in schools. **The "Friendship Ambassadors" Association is a member of DARE Network (educators for democracy and human rights in Europe) who currently participates in an Erasmus+ project (DEMOGAMES) aiming to develop analogue and digital games about democracy, a manual for youth workers (ideas to use the games in various educational contexts) and online training courses on game-based learning.**

2. Policy recommendation

The main recommendations with regard to the policy on inclusive and digital education address:

- Educational standards that implement talent-oriented practices
- Digital accessibility o Teachers' competences
- Disadvantaged and disabled student's accessibility to technology and digital recourse
- Digital Education Standards
- Digital educational environment o Regional and national management of the Education system

2.1. Educational standards that implement talent-oriented practices.

The educational system, as well as the labour market remain largely unequipped to accommodate, nurture, and employ the talents of able and disabled individuals. People with talents, as well as people with disabilities have unique skills and perspectives that can benefit employers and society. INCLUDEME view these aspects as:

- Talent as an ability
- Disability as a talent

Talent as an ability

Talent is generally defined as a natural aptitude or skill for a particular activity. Ability is a learned skill that can be acquired through practice and hard work. Talent can be developed and enhanced through training and education. It is important to consider the fact that talents are complex and multidimensional constructs that involves cognitive, affective, and behavioural components.

They are not a fixed or static trait, but rather a dynamic and malleable potential that can be influenced by various factors, such as motivation, interest, feedback, and opportunity. They are not a guarantee of success, but rather a resource that can be utilized and optimized through deliberate practice, goal setting, and self-regulation. Talents can be a solitary phenomenon, but it can also be a social and contextual one that depends on the interaction and collaboration of individuals and groups. Talents are not value neutral concepts, but rather a normative and evaluative one that reflects the values and expectations of society and culture.

Disability as a talent

Disability as a talent is a perspective that builds upon the unique skills of disabled individuals and argue that they can be successfully employed to benefit employers and society. Disability as a talent recognizes the diversity and potential of the disability community, and challenges the stereotypes and barriers that often exclude them from the workforce. It also promotes the inclusion and accessibility of people with disabilities in all aspects of life, such as education, technology, culture, and entertainment. Employing disability as a talent can:

- increase innovation and creativity, as people with disabilities can offer new solutions and approaches to problems;

- enhance customer satisfaction and loyalty, as people with disabilities can better understand and serve the needs and preferences of diverse customers;
- improve employee engagement and retention, as people with disabilities can foster a culture of respect and collaboration among their colleagues

2.2. Accessibility

Accessible education materials must be provided considering the different needs of students with disabilities, including persons in the autism spectrum, with communication impairments and with sensorial disabilities. Accessibility of digital educational materials and new technologies, easy-to-read, subtitling, technical aids and assistive technologies to facilitate communication are needed for an inclusive education.

Investment in access to appropriate technology and alternative and augmentative communication systems to facilitate learning should be supported as well as of adaptions of methodologies and to classroom organization to facilitate inclusion.

Accessible education materials must be provided considering the different needs and digital competences and skills of teachers. - Inclusive education requires educational transformation for the full and effective participation, accessibility, attendance and achievement of not only students but also teachers. A special mechanism is needed to support them in their teaching and classes related to digitalization.

2.3. Teachers' competences

To improve digital competences of teachers with accessibility standards, all teachers working with students with disability or disadvantaged students need to cover minimum of accessibility standards. Therefore, a mechanism related to digitalization is needed to be developed to support educational process and classes

The digital competence of teachers is still not at a high enough level. This should be continuously considered in the initial preparation and continuing vocational development of teachers. The ability to use digital technologies, knowledge of the different media and assistive technologies are important, but equally important is the ability to choose digital learning content and to design an inclusive learning environment that responds to the preferences, competences or skills of individual learners.

2.4. Disadvantaged and disabled student's access to digital education, technology and digital recourses.

Specially trained teachers, educators, instructors, and trainers (both in Special Education and General Education), that will use the INCLUDEME platform and games will gain specific digital competences to support of students with special needs or disabilities.
In terms of accessibility of disadvantaged students, unfortunately, schools and education still lag behind the promise of technology and the relationship between the use of digital technology and resources in schools and students' performance is not straightforward. For that reason, more investments in policy recommendation is not always linked to greater student performance.

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Educational systems have not yet incorporated the use of modern technology in classrooms, and large shares of teachers feel unprepared to cope with this task.

In this regard, one of the challenges is how to improving equity between disadvantaged and disabled students. Helping teachers and schools incorporate technology in learning through clear goals and innovative practices is another step.

Finally, learning from past experiences should help with decisions on future investments in technology, in accessible resources and free access to these resources.

With the inevitable introduction of distance learning, the COVID-19 pandemic has led to deepening educational inequalities, but it also provides a unique opportunity for education reform. This includes better linking schools, parents and communities and improving inclusive digital education for all students. Thus, the INCLUDEME project focuses on providing awareness regarding:

- raising accessible campaigns directed to students with and without disabilities on disability and the benefit of living together, and to parents on the benefits of inclusive education for all.
- raising and education initiatives to address National Governments to remove all barriers to inclusive education for pupils with disabilities. They should ensure the development and delivery of training using new technologies (INCLUDEME platform).

2.5. Digital Education Standards

These Standards will provide the competencies for learning, teaching and leading in the digital education providing a comprehensive roadmap for the effective use of technology in schools. Standards ensure that using technology for learning can create high-impact, sustainable, scalable and equitable learning experiences for all students.

The European Union Digital Education Action Plan, the Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies and the ISO standards related to accessibility will assist schools to understand, manage and implement their digital environment.

These standards will improve digital competences and digital skills of teachers and this will cover the accessibility standards.

2.6. Digital Education Environment

Teachers need support at organizational level (i.e. at school level) in order to obtain the necessary knowledge and guidance. Cooperation between stakeholders – teachers, school leaders, support staff, the wider community, councils in the field of education, policy-makers, families is essential to assess what structures and digital solutions are needed to support each student.

Regional and national management of the Education system

In terms of regional and national management of the Education system, INCLUDEME highlighted the need to:

- Cross-sectoral and multi-level partnerships building bridges between disability-specific, disadvantaged students, professionals and policy makers.

- Transfer of knowledge and expertise from special education to mainstream providers and general exchange of good practices among teachers, educators and other training professionals.
Coordination between all relevant ministries, authorities and bodies as well as family organizations. (National governments must ensure that all teachers are trained on inclusive education. The Consortium should facilitate the exchange of policies and good practices among countries/partners and stakeholders).

Discover our Policy Recommendation

INCLUDEME POLICY

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3. Good practices

This section presents several good practices that can be re-used or serve as inspiration for constructing own accessible and inclusive teaching materials.

GOOD PRACTICE 1: Customizable and reusable Digital Educational Assets to facilitate the construction of inclusive learning environments

Objectives of the good practice:

- Support the creation of DEAs that can be easily and efficiently customized and reused for inclusive education activities, to improve access to education for disadvantaged and disabled learners regardless of their age, disadvantage or disability.
- Increase the availability and readiness of DEAs that can be easily used to author games and gamified learning experiences.
- Capacitate design and development practices implemented with inclusiveness in mind.
- Empower educators and other stakeholders to create customizable and reusable DEAs.
- Facilitate the selection of suitable tools that enable the creation of highly customizable and reusable DEAs and extend the asset life cycle.
- Increase awareness and knowledge on the positive benefits of DEA customization and reuse practices.

GOOD PRACTICE 2: Reinforce teachers' readiness to adopt digital accessibility

The last decade has recorded consistent initiatives of the European Commission that support accessibility efforts:

- The Web Accessibility Directive (Directive (EU) 2016/2102), in force since 22 December - 2016, that provides people with disabilities with better access to websites and mobile apps of public services.
- Two implementing decisions ensuring uniform conditions for the implementation of the Directive adopted in 2018 by the European Commission: (1) Commission Implementing
- Decision (EU) 2018/1523 establishing a model accessibility statement; (2) Commission Implementing Decision (EU) 2018/1524 establishing a monitoring methodology and the arrangements for reporting by Member States.
- A decision on the harmonized standard for websites and mobile applications that provides for the presumption of conformity with the Directive published by the Commission on 12 August 2021

Objectives of the good practice

- Increase awareness on digital accessibility guidelines that can be easily and directly considered, adopted and applied by teachers when creating digital learning content and GLPs.
- Enable teachers apply digital accessibility recommendations.
- Enable teachers use game accessibility options to better the experience of players with disabilities.
- Enable teachers test the accessibility of learning resources using accessibility checkers.

GOOD PRACTICE 3: Sustainable and resilient piloting strategies applicable during and beyond pandemic and quarantine times to nurture inclusive educational practices

Objectives of the good practice

- Support alternative piloting practices that adapt to diverse educational contexts and target - group needs.
- Support the collection of qualitative and quantitative data to determine learner outcomes and satisfaction.
- Provide effective metrics for evaluating the performance of the piloting programme. This document will explain how the expected results of the project have the potential to feed into relevant policy agendas and will focus on accessibility in inclusive digital education.

4. Key research findings

In this section we present the research finding of the INCLUDEME project:

- A Game Design Matrix for evaluating the mobile readiness, ease of use and educational capabilities of Interactive Web-Based Activities – A research carried out by ATS, BIBA and PAC
- Exploring Adaptability and Flexibility of Accessible Content Development Tools - A research carried out by BIBA
- Towards accessible player experiences – A research carried out by ATS, HFC, BIBA and UTH.

4.1. A Game Design Matrix for evaluating the mobile readiness, ease of use and educational capabilities of Interactive Web-Based Activities - A research carried out by ATS, BIBA and PAC

Having an insight into gamification and game design is essential in shaping a contemplative understanding of the capabilities of mobile technologies, as well as capitalizing upon their advantages for learning and learner engagement. Therefore, it is important for teachers to acquire digital content design skills, develop computer-mediated communication competencies, and learn how to utilize available tools for designing mobile, game-based learning activities that fit their students' needs and the learning outcomes, alike. The paper proposes a Game Design Matrix which serves as an evaluation instrument to assist teachers in exploring the appropriateness of various web-based, interactive activities along five key areas and applicability in Bloom's taxonomy, and following two parameters under Gamification features, dynamics and mechanics. Several H5P templates are analysed and evaluated based on the proposed Matrix as demonstration of its analytic function.

This approach eases the burden teachers may face when transiting such interactive activities to mobile environments, and provides International Association for Mobile Learning 200 guidance for the creation of digital resources that can be successfully used in mobile learning settings. The interactive activities analysed herein were created utilizing H5P templates available on Moodle Learning Management System (LMS).

The Game Design Matrix (GDM) has been created to support the analysis and evaluation of interactive activities along five key areas:

- *Ease of use and accessibility* (a rating is applied on a scale of 5 stars). The GDM includes information on the combability with mobile environments (a 3-tired mobile support, where level 1 represents full compatibility for use on mobile devices, and 3 is a low mobile compatibility);
- *Compatibility with mobile environments* (mobile support);
- *Gamification features* (game mechanics and game dynamics);
- *Type of Assessment*;
- *Learning objectives based on Bloom's taxonomy*.

Regarding Gamification features the following parameters were analysed:

- *Dynamics* (narration, levels, challenges, tips/clues, time pressure)
- *Mechanics* (exploration, self-learning, matching, competition, problem solving)

The following six categories are utilized during evaluation: remember, understand, apply, analyse, evaluate, and create. Several H5P templates have been analysed to evaluate their combability for mobile use. The analysis concerned the template structure, and it was carried out in connection with an interactive activity developed with that template. In the following paragraphs we provide a brief description of the particular template, an overview of its design, the features of the interactive activity, the learning objectives and assessment types it serves, International Association for Mobile Learning 203 the main educational objectives and applicability of the particular template, and ultimately its usability and accessibility when used with mobile devices.

Templates	Mobile support	Difficulty (1 to 5 stars)	Dynamics					Mechanics					Bloom's Taxonomy					
			Narration	Levels	Challenges	Tips/Clues	Time pressure	Exploration	Self-learning	Matching	Competition	Problem solving	Remember	Understand	Apply	Analyse	Evaluate	Create
Quiz (question set)	Level 1	*		X	X	X			X	X			X	X	X			
Drag and drop	Level 2	**				X				X			X	X	X			
Course presentation	Level 2	***	X						X			X	X	X				
Interactive video	Level 3	****	X	X				X	X				X	X	X	X		
Virtual tours	Level 2	*****	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

Several good practices were defined to inform teachers on how they can improve the employment of the H5P templates and create activities that can be used on mobile:

(1) Starting from the mechanics and dynamics that can be applied in each template, the learning goals must be designed considering the following characteristics: Behaviour and results; Observation; Specificity

(2) A prior analysis of the template should be carried out prior to the design process to decide how to divide the narratives or the text-based content, considering both the restriction that apply to the template, but also the fact that the text will be displayed on mobile devices.

(3) Choosing images or any graphic elements for the activities should not be an after-thought. A relevant image is considered as a powerful instructional method that drives students' engagement and motivation, reduces the cognitive load of the students, and helps to more efficiently fulfil of the learning objectives.

(4) Students engagement is a key priority in both teaching and learning, but understanding how to engage the students and what methods can be used in the learning process can be difficult sometimes. An interactive training video allows students to click, drag, scroll, swipe, and hover over the content, revealing more details with each interaction and thus engaging students throughout the entire process and stimulating their creativity and curiosity.

(5) One of the unique things with H5P activities is that H5P tool allows interactive content to be editable and reusable for everyone. Taking into consideration this aspect, it is International Association for Mobile Learning 206 recommended to use images, graphic elements, videos for which you have copyright rights, the same applies to the text used.

(6) The Content types recommendations maintained by H5P lists all the templates provided by the tool that appear to support WCAG 2.1 level A and AA accessibility standard (https://www.w3.org/TR/WCAG21/). A key recommendation for all templates is to follow the

WCAG 2.1 level A and AA accessibility standards regarding the usage of images (provide always alternative text) and ensure good colour contrast.

The research was published in the Conference Proceedings of 22nd International mLearn/iTLT Conference - The Mobile Teaching & Learning Journey: Re-thinking our thinking and actions. 9-11 October 2023 The Capital Pearls, Umhlanga, South Africa (Hybrid).

4.2. Towards accessible player experiences - A research carried out by ATS, HFC, BIBA and UTH

The path towards digital accessibility in educational setting has proved to be a challenging one. Accessibility has been considered too hard to achieve and the accessibility standards requirements have been considered too difficult to meet. As a result, a significant amount of digital education resources has limited to no accessibility features. Digital Education Games represent a telling example of how problematic accessibility remains. However, statistics shows how critical digital accessibility is. Access to education should be provided to every individual, regardless of his/ her disability even if his/ her disability falls under the cognitive disability's spectrum. Cognitive disorders include individuals with mild to severe dyslexia, with attention-deficit disorders, such as ADD or ADHD, and anyone with an information-processing disorder.

The paper tackles issues concerning the design of accessible games and presents examples of serious games created for learners with cognitive disabilities. The research target games as most games are applications delivered as such, with limited or no customization features that address specific accessibility-related player needs. The design patterns presented herein consider the fact that some learners respond better to audio and visual cues, while others get distracted by the visual elements of videos, or might have issues with auditory processing. In this context, the authors discuss the need for maintaining consistent user experiences across the digital learning activities, as well as the necessity to provide more flexible applications, including games, that include at least basic customization features a teacher can use to adapt a game to specific, critical learner needs.

By following the gaming accessibility guidelines relevant features were considered during the INCLUDEME minigames design and development processes, focusing mainly on options to change the sensory load, translation and mode of interaction. The accessible online games created within the INCLUDEME Project are designed to include learners with special needs, and anyone who uses assistive technology to access a computer or device using technology such as switches, touch screens or mouse.

The games help students learn at their own pace, enjoy success and progress significantly and are designed to target specific goals, but are all suitable for individuals of any age with specific learning disabilities, multiple disabilities, autism, physical disabilities, visual impairments, developmental delays, deafness and hearing impairments, mental delays, and speech and language impairments. It is important to be fully focused on the needs of the learners by keeping the games simple, clean, with low stimulation screen design. The content and graphic interface relate to the learners' known environment and everyday lives. These online games develop, and practice skills associated with Cause and Effect, Timing, Mathematics and Basic Skill Training.

- *The Cause and Effect minigames* help learning the linkage between cause and effect, from basic to progressive levels, by using all kinds of input devices such as switches, touch screen etc. and obtaining reinforcing feedback. Cause & Effect activities are the foundation of

computer use. They serve as a basic and joyful tool that is further used throughout all the other activities on the INCLUDEME portal.

- **The Basic Skills minigames** are enjoyable activities that teach basic skills such as visual object and colour identification, sorting, visual memory etc. from basic to more challenging. Basic skills activities are the foundation of learning reading, writing and mathematics.
- **The Timing minigames** focus on the development of skills such as timing, impulsiveness moderation and help improving attention and concentration. Timing activities are essential for single switch users and a good starting point for learning and computer use.
- **The Mathematics minigames** allows practice of basic mathematics knowledge from pre-school to second grade level. The minigames are highly effective and supportive of students at early stages due to unique game structure of clean screens and objects.
- **The Speech & Language minigames** focus on auditory, verbal, and linguistic skills: following auditory memory, concepts, prepositions, definitions etc.

The research has focused on analysing patterns for designing accessible digital games that develop and facilitate practicing skills associated with Cause and Effect, Timing, Math and Basic Skill Training. The accessibility features are associated with customization options that teachers can access directly in the game settings to adapt the game to specific needs of learners with cognitive disabilities. These games are all accessible in the sense that they have multiple control modes such as Mouse, Keyboard and Switch Control. They can be customized to have audio descriptions, feedback and interfaces in multiple languages. Sensory interaction can be turned on/off for background images/ effects, and the level of difficulty can be chosen for the user. All these games are geared towards those with Neurodivergent difficulties and age range from 3 – 12 years.

The research was published in the Conference Proceedings of the 19th International Scientific Conference eLearning and Software for Education Bucharest, April 27-28, 2023.

4.3. Exploring Adaptability and Flexibility of Accessible Content Development Tools - A research carried out by BIBA

Exploring Adaptability and Flexibility of Accessible Content Development Tools - A research carried out by BIBA

The paper *Exploring Adaptability and Flexibility of Accessible Content Development Tools* explores possibilities in using accessible content development tools for meeting some of the needs of visual impaired students. Our focus is this contribution is on colour blindness, since this is the largest group of students we have. The research questions we would like to address and contribute to are:

- Research Question 1: How do different tools used for content development differ in terms of adaptability and flexibility of colour-blindness?
- Research Question 2: To what extent is it possible for a domain expert to design content easily accessible using the above-mentioned tools?
- Research Question 3: Based on the previous how to design more accessible gamification?

In order to address these, the authors used a mixed research approach followed by a systematic literature review and experimental workshops.

The objective of research was to examine how various content development tools differ in their adaptability and flexibility regarding colour-blindness or visual impairments and foster discussions for improving the accessibility of learning experiences. To address the research questions, a mixed research method was employed:

- A literature review following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was conducted. This literature review aims to analyse current literature to explore the differences in adaptability and flexibility among different content development tools for colour-blindness or visual impairments.
- Using an online questionnaire to collect anonymous feedback. The objective of utilizing this online questionnaire was to gather direct anonymous feedback from the workshop participants on the efficacy of INCLUDME outcomes in the creation of accessible and inclusive learning materials. We utilized an online questionnaire to gather feedback from "16" school girls and "1" teacher. The questionnaire was generated using the Survio tool, which enabled us to pose four questions during the discussion session and directly capture them.

The findings from both the literature review and the feedback collected through the online questionnaire provide valuable insights into the current landscape of content development tools for addressing accessibility and inclusivity in learning environments. These insights offer several implications for educational practice and future research.

Firstly, the literature review presents features of tools that cater to diverse learning styles for the visually impaired. The emphasis on auditory and tactile methods, along with the importance of sound in conveying colour distinctions, underscores the significance of incorporating multimodal elements into learning materials. This aligns with Research Question 1, which seeks to examine the adaptability and flexibility of these tools regarding colour-blindness or visual impairments. The positive feedback regarding the effectiveness of the INCLUDEME platform and the customizable H5Ps indicates promising potential for enhancing the accessibility of learning materials. However, it is crucial to critically assess whether these tools sufficiently address the diverse needs of learners, particularly those with visual impairments or colour-blindness. While they offer features like high colour contrast and text/audio descriptions, their effectiveness may vary based on individual preferences and requirements.

Secondly, the literature review identifies key features within the existing tools such as customizable sound options and font/background colour customization as essential for enhancing accessibility. These findings resonate with Research Question 2, which aims to explore the extent to which domain experts can design easily accessible content using these tools. The participant responses further validate the effectiveness of these features, with a majority expressing satisfaction with the accessibility of learning materials created using the INCLUDEME platform and H5P tools.

Lastly, the emphasis on real-time feedback with visual and audio cues in the literature review promotes engagement and learning. This aligns with Research Question 3, which focuses on designing more accessible gamification strategies. While the participant feedback indicates overall satisfaction with the effectiveness of content development tools, suggestions for minor improvements underscore the need for continuous enhancement and innovation in educational accessibility solutions.

The research presents the significance of adaptable and flexible content development tools for improving accessibility in education. By addressing the needs of individuals with colour-blindness and visual impairments, more inclusive learning environments could be created, ensuring equitable access to educational materials for all learners.

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INCLUSIVE DIGITAL ENVIRONMENTS TO ENABLE HIGH-QUALITY EDUCATION FOR DISADVANTAGED AND DISABLED LEARNERS

4.4.   Constructing Seamless Learning through Game-Based Learning Experiences - A research carried out by ATS, UTH and PAC

Constructing Seamless Learning through Game-Based Learning Experiences – A research carried out by ATS, HFC, BIBA and UTH.

The goal of this paper is to explore how game-based experiences can be leveraged through mobile technology to activate learner engagement and achieve a seamless connection between formal and informal learning. The paper presents a mobile game authoring tool that enables educators to create gamified lesson paths (GLP), drawing on the concept of atomic learning. Preliminary evaluation revealed three main findings. First, mobile games constitute a key driver in seamlessly blending informal, unguided learning that is driven by natural human curiosity with learning experiences which are driven by defined, formal learning objectives. Second, ensuring learning elements are suitable for direct use, and reuse, within game-based tools, requiring learning content with high granularity. Third, the success of gamified learning depends on visual and audio impact, along with an appropriate blend of challenges, rewards, learning content, and assessment units that form the narrative backbone.

The proposed approach builds on two premises: (i) play and playful learning can drive learner engagement, interest, and motivation; (ii) formal and informal experiences can equally help in broadening the acquired knowledge and skills, enhancing user experience, and improving the learning outcomes. The purpose behind the GLP design is to replicate the unguided learning patters of individuals, and explore the concept of play as a fundamental tool of human learning. The focus is on the exploration and on playing, learning occurring as a side benefit of the adventure.

The paper describes the ALM that facilities the GLP creation, as it is a model that refines content to higher granularity, making it suitable for direct use, and reuse within game-based tools. The GLP are structured to pick the interest and curiosity of learners. The purpose of all these endeavors is to improve the capabilities and skills of individuals, and to improve upskilling and reskilling opportunities.

4.5. Redesign with Accessibility in Mind - A research carried out by ATS and BIBA

Redesign with Accessibility in Mind: A visual impairment study – A research carried out by ATS and BIBA

The role of the teacher is to help students improve their knowledge and skills. While it is acknowledged that learning occurs within specific activities and contexts, the adaptation of learning settings to distinct didactical objectives and learner needs remains a challenge. Under these premises, the authors explore the demanding endeavor of creating and tailoring game-based learning activities for specific subjects. The design and personalization of rich media applications require an extra effort on the teacher side and imply advanced skills. The paper explores the opportunity to re-use gamified lesson plans using an authoring pipeline that reunited authoring tools, game narratives and mini-games.
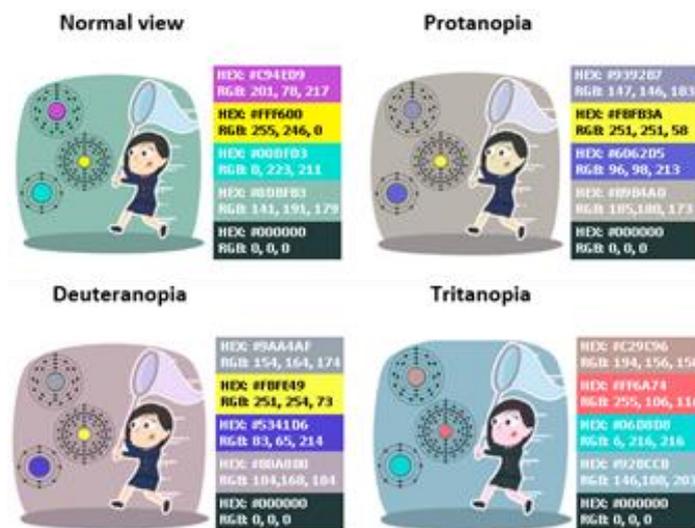
The research was published in the Conference proceeding of Joint International Conference, JCSG 2021, Virtual Event, January 12–13, 2022. http://dx.doi.org/10.1007/978-3-030-88272-3_5

Discover all our research

INCLUDEME ARTICLES

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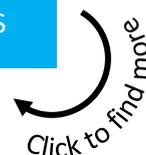
5. Accessible Minigames

INCLUDEME project provides a repertoire of fully accessible games that can be played separately or added within the H5P template structure, which cover more broad learning objectives such as cause and effect, timing and basic skills training as well as being fun and engaging.

Accessible games for children with special needs have to follow certain rules or concepts to be effective and engaging. This is why they are all simplistic in their design, easy to follow all incorporate multiple control modes such as Mouse, Keyboard and Switch Control. They can be customised to have audio descriptions, feedback and interfaces in multiple languages. Sensory interaction can be turned on/off for background images / effects, and the level of difficulty can be chosen for the learners.

All games are geared towards those with Neurodivergent difficulties and age range from 3 – 12 years.

The minigames are designed by the partner Hands Free Computing / Thriiver Ltd.

Let's take a closer look at the games created.

5.1. Match Card Game
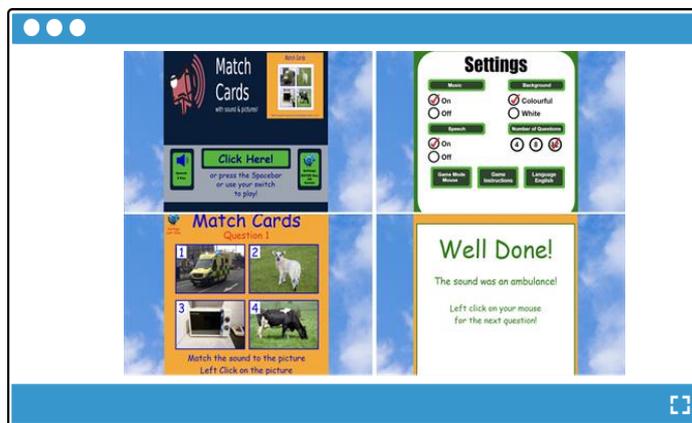
Quick info!

The minigame is suitable for acquiring skills audio and visual recognition as well as for stimulating thinking and creativity. The minigame is based on 4 different cards, matched with a corresponding sound. The student must match the sound with correct image to move to the next one question.

PLAY THE MINIGAME	ACCESS THE MINIGAME

Click to find more
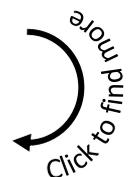
This is a Basic Skill Training game for audio and visual object recognition as well as stimulating thoughts and creativity. The game is suitable for learners with specific learning disabilities such as Dyslexia and ADHD, autism, physical disabilities, developmental delays, mental delays and speech and language impairments.

The learner is presented with 4 different cards each displaying a different image (an object, everyday item, sport, activity etc). Alongside this an audio clip will be played. The learner must match the audio clip to the correct image match card to progress to the next set of cards.

Match Card in Mouse Mode

Once the learner correctly matches all the card sets to the audio, they will complete the game.

Card Progression Game   *Completion Feedback*

There are multiple customisation and accessibility options available that can be configured in the settings menu.

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Firstly, the game can be customised to reduce distractions such as removing background music and background colours. This is particularly useful for those with ADHD and specific learning difficulties. The game has audio text to speech built in as default. This means that all screens with instructions and text are read back to the player which reinforces understanding but is also an excellent accessible feature to benefit low vision and dyslexic users. This can be switched on or off in the settings menu.

The Difficulty of the game can also be changed in the settings menu by changing the number of questions needed to complete the game to either 4, 8, or 12. This is useful for those with specific learning difficulties and mental delay.

One of the most important accessibility features in the game is the ability to change the input/game controller method for the learner. The Game Mode is set to Mouse control by default but can be changed to either Keyboard control or Switch Control.

If the learner has difficulty in using mouse control, then the mode can be set to Keyboard Control. This then makes selection and playing available by using the Spacebar and Enter Keys on the keyboard.

Keyboard Mode also enables Switch control for learners with physical disability. With Switch mode an adaptable switch can be plugged in and is mapped to the Spacebar and Enter keys for easy control and play.

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Settings

Music — On / Off
Background — Colourful / White
Speech — On / Off
Number of Questions — 4 / 8 / 12
Game Mode Keyboard | Game Instructions | Language English
Use the SPACEBAR to select and then use the ENTER KEY to change settings

Match Cards

Match the sound to the picture!

Press the SPACEBAR to tab between the pictures and press the ENTER KEY to select one

OR use your Switch – you need two Switches

Let's Go!
Press the SPACEBAR to start!

Match Cards
Question 1

Match the sound to the picture
using the SPACEBAR to tab between pictures and then press the ENTER KEY to select one

Within the game reinforcing feedback is given on each answer. This feedback is both audible and visual to encourage the learner to proceed and recognise achievements.

Well Done!

The sound was an ambulance!

Press the Spacebar for the next question!

Oh No!
that's not right!

Why not try Again?

Left Click on your mouse to continue!

The language of the game can be changed too. The language setting will alter all menus, instructions screens and audio text to speech to that language selected.

Settings

Music — On / Off
Background — Colourful / White
Speech — On / Off
Number of Questions — 4 / 8 / 12
English / German / Romanian
Bulgarian / Greek / Turkish
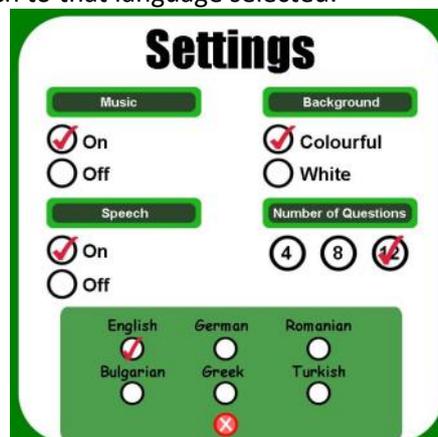
5.2.   Bowling Game
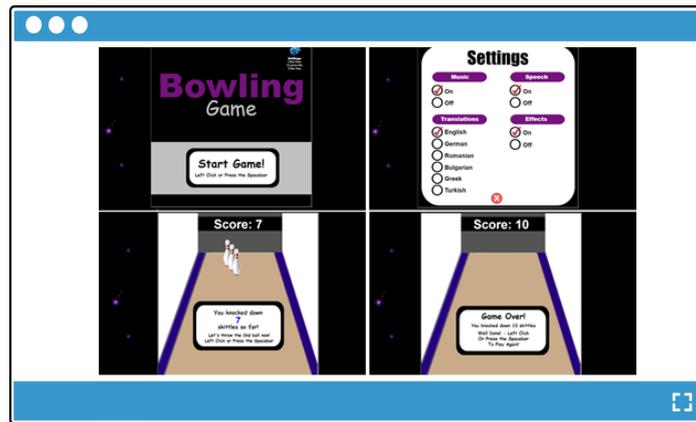
Quick info!

The minigame is a simple cause-and-effect minigame, which develops hand to eye coordination and is fun to play. The students have two attempts to throw the bowling ball to knock down as many skittles as they can. This is a fun and repetitive game intended for players with neurodivergent difficulties.

PLAY THE MINIGAME	ACCESS THE MINIGAME

Click to find more

This is a simple cause and effect ten pin bowling game to develop precise hand to eye co-ordination and addition skills. A fun, simple and repetitive game geared towards users with specific learning disabilities such as Dyslexia and ADHD, autism, physical disabilities, developmental delays, mental delays, and language impairments.

The learner gets two throws of the bowling ball to knock down as many skittles as they can.
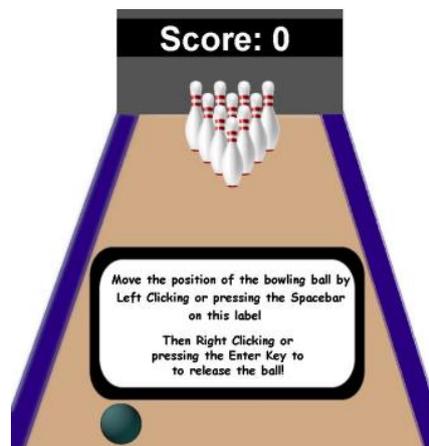
From the main dashboard the learner can access the settings via the cog icon.

The Bowling Game is configured to work with multiple input devices as default. These include being able to control the game via mouse control, keyboard control and Switch Adaptable controllers. Instructions are clearly displayed on each screen for the control methods.

Further customisation can be made in the settings menu before the game starts. For learners with specific learning difficulties such as Dyslexia and ADHD, Autism distractions such as removing background music and effects can be set.


The game has audio text to speech built in as default. This means that all screens with instructions and text are read back to the learner which reinforces understanding but is also an excellent accessible feature to benefit low vision and dyslexic users. This can be switched on or off in the settings menu.

This text to speech can be further changed by choosing the desired language of the game. When a particular language is set then all menus and instruction screens are changed as well as the accompanying text to speech dialogue. This is fantastic for low vision learners who find it difficult to read text and follow instructions on screen.
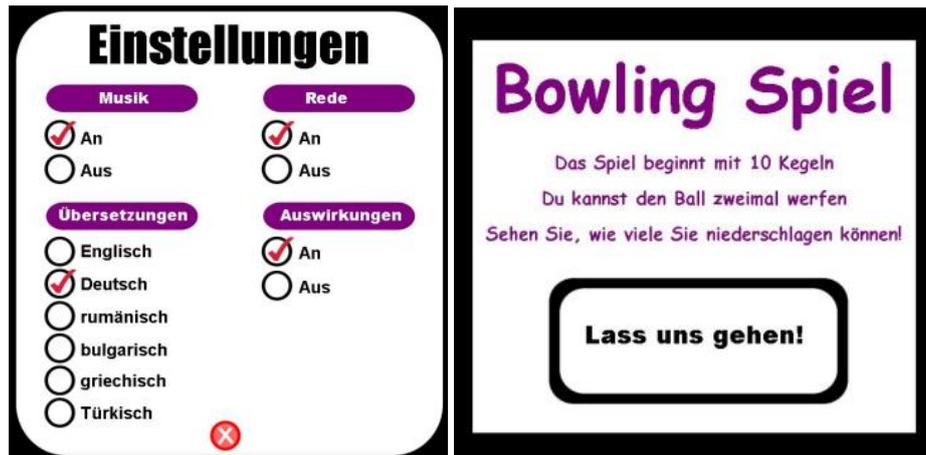
The learner has two throws of the bowling ball to knock down as many skittles as they can. The bowling ball can be positioned and thrown using mouse, keyboard, or switch control.
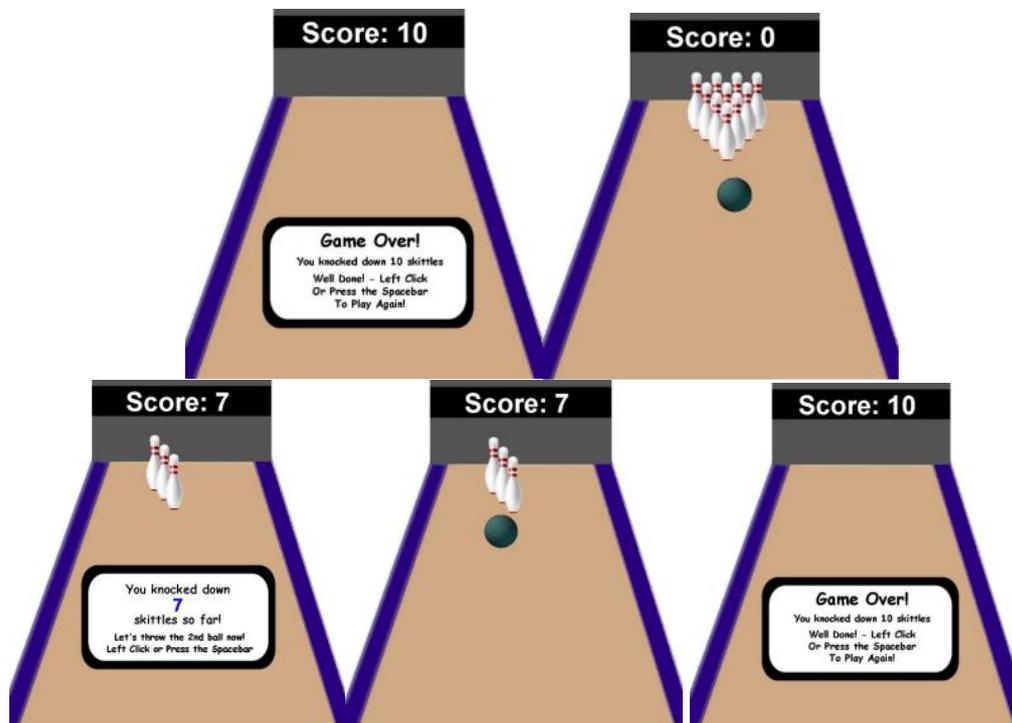
Bowling Game Sequence

Feedback is given throughout with the use of crowd noise and effects as well as text to speech encouragement and positive text script.

The rest of the games follow the same structure in terms of customisable settings, interface layout and learning concepts. This is important to maintain consistency, simplicity and familiarity within the user audience.

They incorporate single switch cause and effect gaming such as the Balloon and Pin Game, Dual switch Games such as Bowling and Penalty Shootout Games, cognitive based games such as the Match Card game, more advanced switch and cognitive games such as Farm Counting, and co-ordination and movement games such as Treasure Game with Dino and Friends.

5.3. Balloon and Pin Game

Quick info!

The minigame is a cause-and-effect minigame designed for acquisition of coordination skills. Using their chosen control method, the user must inflate the ball without popping it. The aim of the game is to get the inflated balloon as close to the pin before it pops.

PLAY THE MINIGAME	ACCESS THE MINIGAME

Click to find more

This is a cause and effect game which develops hand to eye co-ordination and is fun to play.
Using their chosen control method, the learner must inflate the balloon without popping it. The aim of the game is to get the inflated balloon as close to the pin before it pops.
The minigame is configured to work with multiple input devices as default. These include being able to control the game via mouse control, keyboard control and Switch Adaptable controllers. Instructions are clearly displayed on each screen for the control methods.

For learners with specific learning difficulties such as Dyslexia or autism distractions such as removing background music and effects can be customised in this minigame.

The minigame has audio text to speech built in which can be activated using the letter A from the keyboard or right click from the mouse. This means that all screens with instructions and text are read back to the learner which reinforces understanding but is also an excellent accessible feature to benefit learners with vision impairments and dyslexic learners. This can be switched on or off in the settings menu.

This text to speech can be further changed by choosing the desired language of the game. When a particular language is set then all menus and instruction screens are changed as well as the accompanying text to speech dialogue. This is fantastic for low vision users and players who find it difficult to read text and follow instructions on screen.
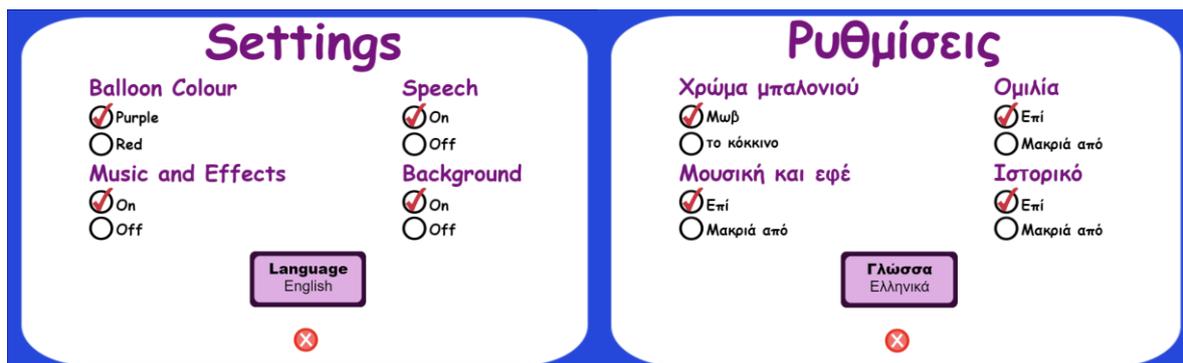
Within the minigame, both text-based and audio-based feedback is given when the balloon pops and the learner can try again to play the minigame.

5.4.   Penalty Shootout Game

Quick info!

This is a simple cause and effect football game to develop precise hand to eye coordination. The user gets two option to shot on goal. This is a fun and repetitive game geared towards users with Neurodivergent difficulties.

PLAY THE MINIGAME	ACCESS THE MINIGAME

Click to find more

Following the same kind of control methods and structure of the bowling game, the Penalty shootout minigame provides a fun, competitive and heart stopping action, all with dual action switch control available. The aim of the game is to win a penalty shootout by scoring as many goals as possible.

The minigame has audio text to speech built in which can be activated from the setting option and is configured to work with multiple input devices as default such as mouse control, keyboard control and Switch Adaptable controllers. Further customisation can be made in the settings menu before the

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game starts. For learners with specific learning difficulties such as Dyslexia and ADHD, Autism distractions such as removing background music, turn off the noise and the effects can be set.

In the minigame offers the learner fivechances to shoot and different scenarios can occur such as:
- The learner hit the goalpost and no point can be obtained.
- The learner shoots in the middle and the goalkeeper saved in the shoot
- The learner shoots and score a goal

At the end of the gameplay, a text-based feedback is given with the number of goals obtained and the learner can play again the minigame.

5.5. Farm Counting

Quick info!

A fantastic math skills game promoting basic adding skills, visual recognition and concentration. The students must count how many animals appear on the screen, after which they have to click on the correct number to move to the next level.

Click to find more

PLAY THE MINIGAME	ACCESS THE MINIGAME

A fantastic math skills game promoting basic adding skills, visual recognition and concentration.
The user has to count how many different animals run across the screen. The will then be asked to give their answer to progress to the next level.
Each level gets increasingly more difficult with a different number of animals.
Fully customisable for difficulty, control method, background effects and sound.

5.6. Dino Game
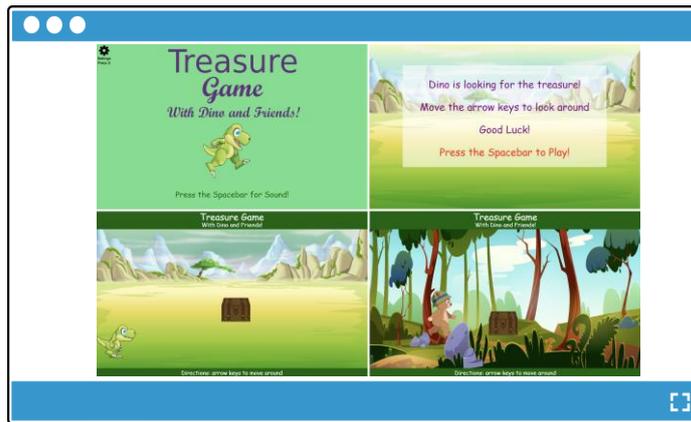
Quick info!

A fantastic math skills game promoting basic adding skills, visual recognition and concentration. The students must count how many animals appear on the screen, after which they have to click on the correct number to move to the next level.

PLAY THE MINIGAME	ACCESS THE MINIGAME

Click to find more

Join Dino and his friends on his adventure to find the treasure!
This is a visually rich timing game which develops co-ordination, creativity and reaction speed.
Control the character through the different scenes to find the treasure chest.
Progress to the next level where things become more difficult in having to avoid obstacles and get to the treasure without being hit.

Dino and Friends Co-ordination Game

The great thing about having the games on a separate website as well as the INCLUDEME platform is that new games can be easily added to the site and will be instantly available to users. In fact, a new game called Roboshark is imminent! So, watch this space.

6. AccessAngel

It has been important to make the H5P activities within the INCLUDEME portal multilingual so that as many children from different countries can benefit from the resources. However, the INCLUDEME portal itself, which is based with the Moodle framework, has its own interface and text information which is predominately in English. Therefore, in order for the platform to be truly accessible to all, there was a need to provide some accessibility features to the site, and very importantly, the ability to translate the content into your desired language.

This is where the AccessAngel toolbar came in and was able to be installed directly onto the portal site, enabling users to customise the content of the page to their needs. The AccessAngel toolbar, enables users to customise their experience by incorporating numerous features which can be used in conjunction with one another, to make the website more usable and inclusive. AccessAngel is an easy to use, website accessibility toolbar designed to instantly enhance the usability of any website.

The features within are very broad in order to support the widest cross section of users to access your website, in a format best suited for them. These features include:

Text to Speech – Provides a seamless content reading experience
* All website written content (including PDF) read aloud
* Over 40 different language options

Speech Recognition – Communicate through a variety of channels
* Dictate in over 100 languages
* Speech recognition to input text into fields such as live chat sessions and contact forms

Page Translation – Allows access to an international audience
* Highly accurate dictation in different languages
* Written translation into over 100 languages

Magnification & Reading
* 50-500% levels of magnification
* Customisable reading enhancements – mask & pinhole ruler

Text Styling
* Increase and decrease text size
* Choose from 14 different fonts
* Customisable line and letter spacing

Accessibility
* Presets to support users with different conditions including: dyslexia, ADHD, visual impairment, epilepsy & colour blindness

The page translation feature of AccessAngel has been widely used in the pilots amongst users and feedback in general for the accessibility toolbar has been very positive.

The inclusion of AccessAngel gives the whole project a boost in terms of making the content accessible to all and reaching our target groups.
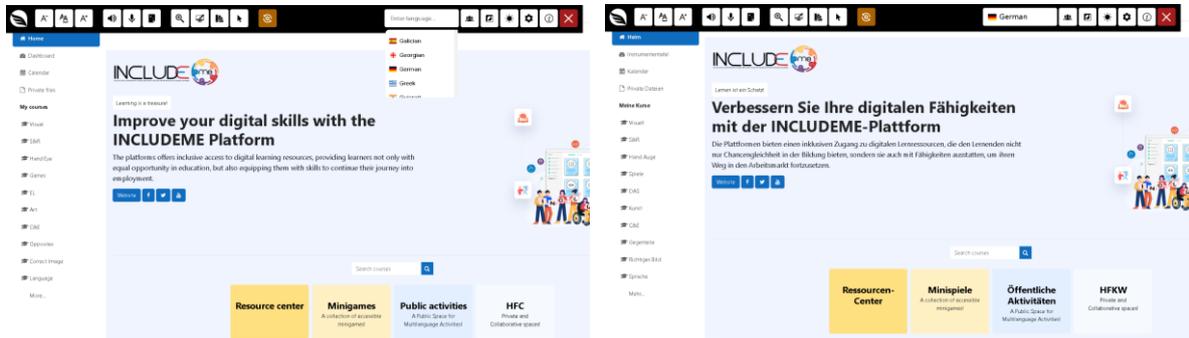
7. H5P in action

H5P (an abbreviation for HTML5 Package) is a free, open-source framework whose aim is to make it easy and straightforward for everyone to create richer interactive web-based, mobile friendly content; to reuse and modify content directly on a browser; and to share content seamlessly across any H5P compatible site (h5p.org). H5P makes it easy to create interactive content by providing a range of content types for various needs, and this content can be integrated on VLEs and LMSs. Interactive videos enriched with user interactions, branching scenarios introducing dilemmas and self-paced learning, Augmented Reality (AR) scavenger fun activities, drag and drop tasks with images, image hotspots and interactive images, QR codes, memory games, interactive 360o virtual tours, and quizzes are only a few of the available templates (h5p.org).

In INCLUDEME the H5P tool provided a successful gamified learning experiences depend on a blend of attributes including personalised challenges, customised rewards and assessment units, multimedia leaning content, and intriguing game narratives. Particular emphasis was placed on the need to incorporate content with visual impact, engaging animations, and immediate audio feedback. The H5P framework provided a rich set of templates that educators could use to reuse, adapt or create a digital interactive activity. The H5P was identified as a successful tool for educators to act as digital learning content creators and game designers.

Create richer HTML5 content using predefined templates

Reuse the existing content on the platform at any time

Share content seamlessly across any H5P capable platform

What you can create?
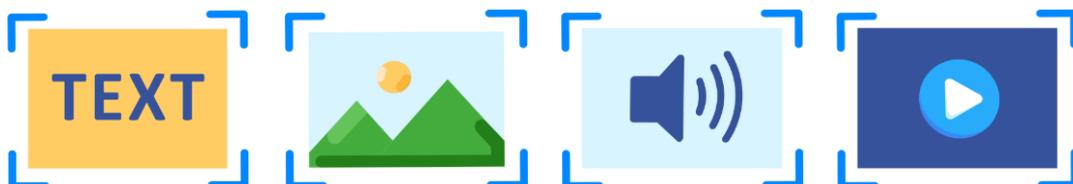
TEXT

Interactive Digital Activities based on text, images, audio, video

& Accessible activities

The goals of these exercises are to help children and teenagers: - learn things they need in ordinary circumstances of their daily life,

- discover the linkage between assignments they got at school and the needs and interests of their out of school life,

- be more motivated, autonomous and analytical (meaning thinking logically and connecting information/facts/etc.) in the activities taking place their entire life: learning and communication.

Discover examples of activities

INCLUDEME PLATFORM

Click to find more

7.1.   DRAG AND DROP DIGITAL ACTIVITIES

The Drag and drop template allow authors to create activities where two or more elements need to be associated to make logical connections.

Learners have to drag a text or an image and drop it in the corresponding drop zones, to identify features and group elements.

The template enhances fine motor activities as an effective way to improve hand-eye coordination as well as reinforcing concepts based on text and/or images.

Key points

- Make sure to define from the start the size of the task (Task size from Step 1). If you modify afterwards the size, the Drag and Drop zones or other content added in Step 2, will be will be repositioned and must be arranged again.

- Always fill in the Alternative text for images to allow screen readers to view the content.

- All the Drag zones of text or images must have selected all the Drop zones.

- A Drop zone must have only one Drag zone.

- When defining a Drop zone always activate the following options: o This drop zone can contain only one element. o Enable auto-align.

- On Behavioural settings always have activated the option Enable Full Screen, to allow the activity to be displayed properly on mobile devices.

Check the video tutorial

Check the video to see how a Drag & Drop activity can be created.

DRAG & DROP TUTORIAL

Click to find more

Take a look!

Click to see the activity

Click to see the activity

Click to see the activity

Click to see the activity

Click to see the activity

Click to see the activity


Click to see the activity

Click to see the activity

Click to see the activity

Click to see the activity

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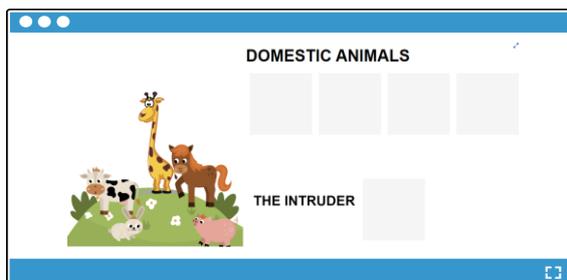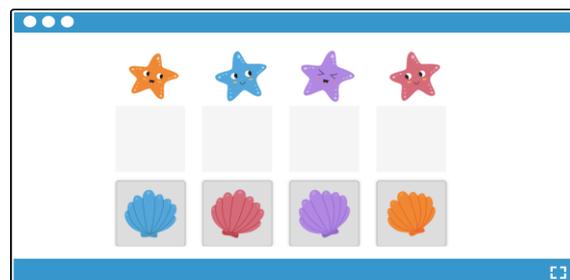
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Activity in action!

Working days – Weekend

The activity is included in the **English language learning category**, Course **Days, weeks, months,** and is designed using the Drag and Drop template.

The activity presents a list of words related to the days of the week in a random order and Learners have to drag and drop in the correct boxes the words for the two categories defined: *Working days* and *Weekend*, in the correct order.
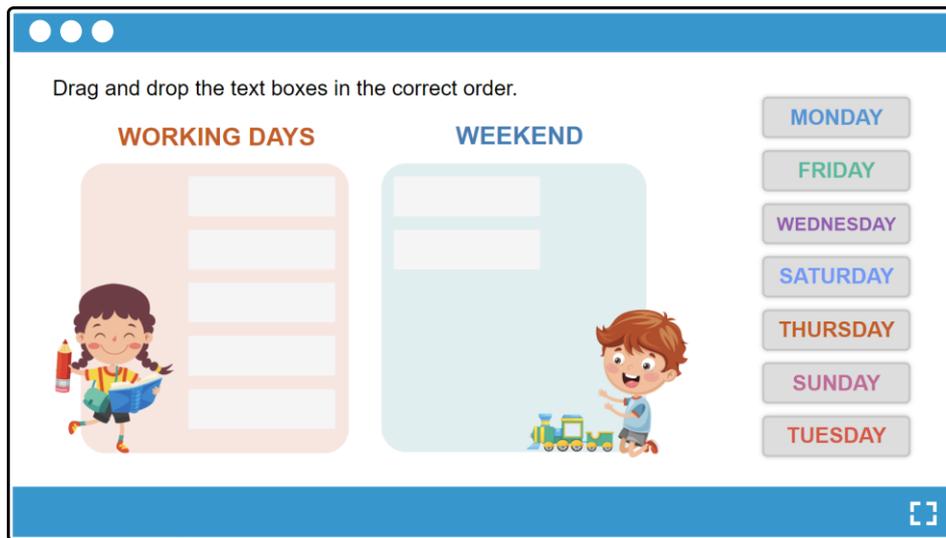
After ordering the words in the boxes, the learners must click on the Check button to verify the answers.

If the learners answered correctly, the platform gives the result 7 Stars from 7, which corresponds to the number of words (answers).
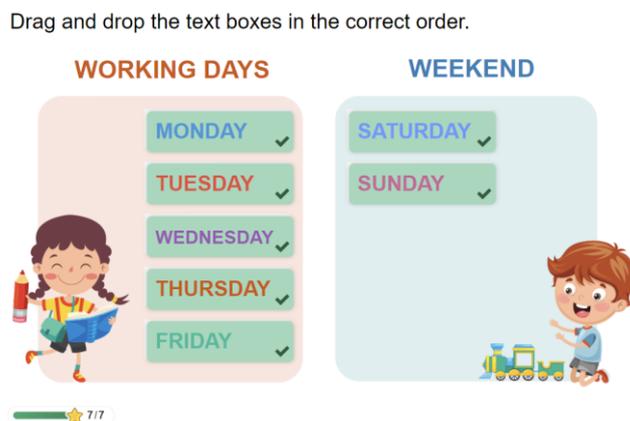
If the answer is wrong, the platform gives as a result the number of stars obtained only from the words placed correctly and displays the Retry button, allowing learners to try again the activity.

Drag and drop the text boxes in the correct order.

WORKING DAYS

WEEKEND

MONDAY ✓

SUNDAY ✗

THURSDAY ✗

SATURDAY ✗

WEDNESDAY ✓

TUESDAY ✗

FRIDAY ✓

3/7   ↻ Retry   Retry the task. Reset all responses and start the task over again.

CHECK THE ACTIVITY

Click to find more

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7.2. IMAGE CHOICE DIGITAL ACTIVITIES

The Image choice template allows authors to define question, where the answers are in the form of an image. The richness and diversity of this section is coming from the popularity of visual elements and simple fast gestures among learners

Learners must click on one or more questions, as defined, to answer to the question.

This is a set of H5Ps that ask the user to choose the correct image or images based on the question asked. They all are based on a different subject, for example sports, vehicles, animals and require the user to use visual selection skills as well as referring to their everyday environment to pick the correct answers. It further enhances fine motor movement and mouse /keyboard skills as well as reinforcing concepts as well as learning new valuable pieces of knowledge.

Key points

- If you add an image in the question section as well, make sure the image is at a low resolution, no more than 200px.

- Always add alt text for images in the answer section.

- A question can have one or more answers. Activating the correct answer is done by ticking the option *Correct*, which is in the box for each answer.

- To reduce the size of the images that appear in response, click on the Behavioural changes section and select the 16:9 option from the Aspect ratio field.

Check the video tutorial

Check the video to see how an Image choice activity can be created.

IMAGE CHOICE TUTORIAL
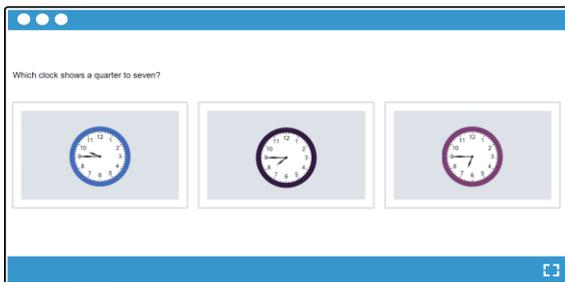
Click to find more

Take a look!

Click to see the activity

Click to see the activity

Click to see the activity
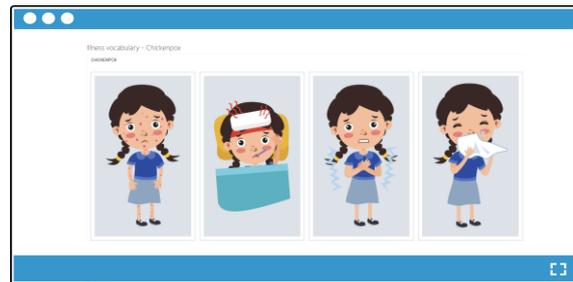
Click to see the activity

Click to see the activity
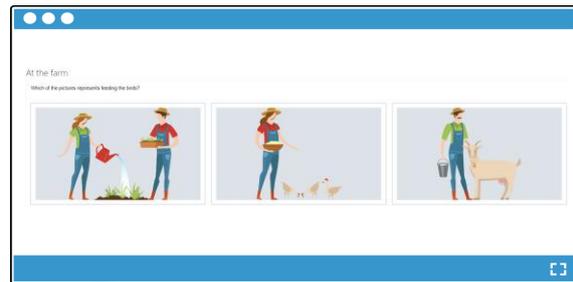
Click to see the activity

Activity in action!

Rodents

The activity is included in the *English language learning category – HFC language learning*, Course *Choose the Correct Image,* and is designed using the Image choice template.

The activity presents a list of different images with animals in a random order and learners have to click on the images that represent rodents.

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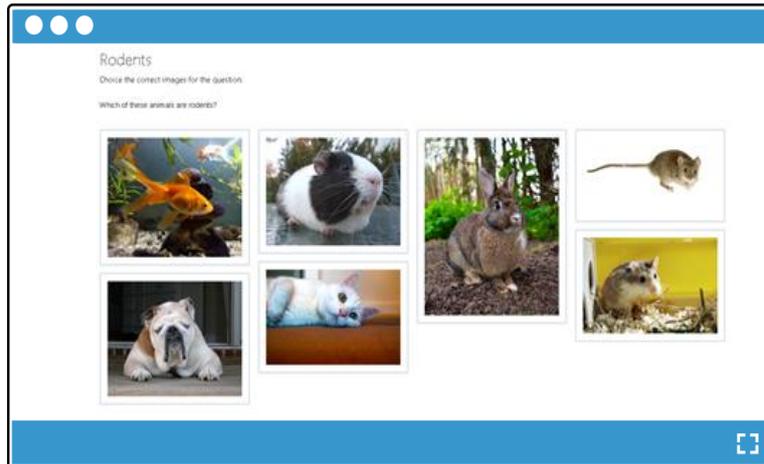
After selecting the images, the learners must click on the Check button to verify the answers.

If the learner answered correctly, the platform gives the result 3 Stars from 3, which corresponds to the number of correct images (answers). Multiple selection can be made and then the Learners can submit their choices. Feedback is then given and encouragement and gamification awarded.

If the submitted answer is wrong, the platform gives as a result a certain number of stars, deducting 1 star from the total number of stars for each incorrect answer. Thus, if the learners select all the correct images but also select an incorrect image, from the total of 3 stars that can be obtained, 1 star will be deducted for the incorrect answer given. The platform also displays 2 buttons, *Show solution* for the learners to see the correct answers and Retry to try again the activity.
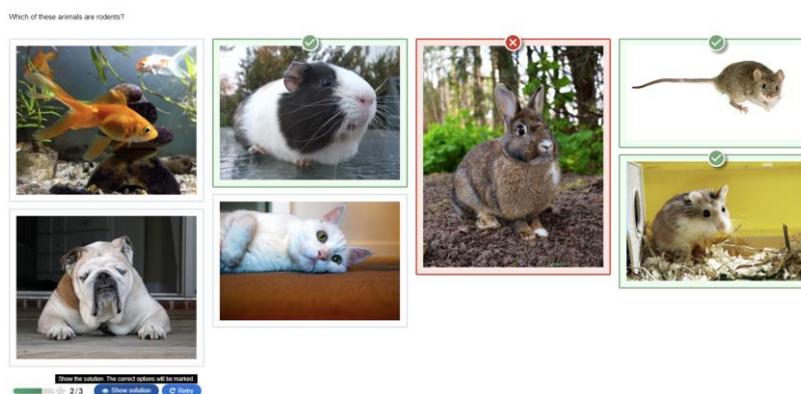
CHECK THE ACTIVITY

Click to find more

7.3. IMAGE PAIRING DIGITAL ACTIVITIES
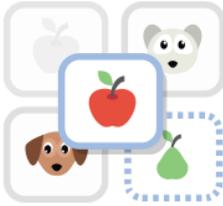
The Image pairing template allows authors to create pairs of images to be matched. With this template, teachers can test the understanding of a relation between two different images, since it is not required for both images in a pair to be the same. Anything coming in pairs can be used for this template. Undoubtedly, images are the first elements that got children's attention, but it's worth raising the stake of this activity by using less obvious criteria (physics principles, chemical reactions, cause-effect relationship, etc.).

Learners are presented with the unpaired images and have to either use drag and drop or click on the images they think matches.

Key points

- Provide a short description regarding the idea behind the pairing of the image.
- Always fill in the Alternative text for images to allow screen readers to view the content.
- Keep the images as simple as possible for the learners to be able to associate them.

Check the video tutorial

Check the video to see how an Image pairing activity can be created.
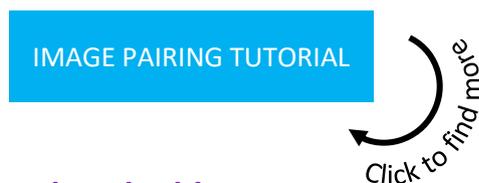
IMAGE PAIRING TUTORIAL

Click to find more

Take a look!

Click to see the activity   Click to see the activity

Click to see the activity   Click to see the activity

Activity in action!

Solve the addition with 1

The activity is included in the **Mathematics category**, Course **Addition,** and is designed using the Image pairing template.

The activity is divided in 2 columns, the column from left representing different additions and the column from right representing the results for the additions defined as images.
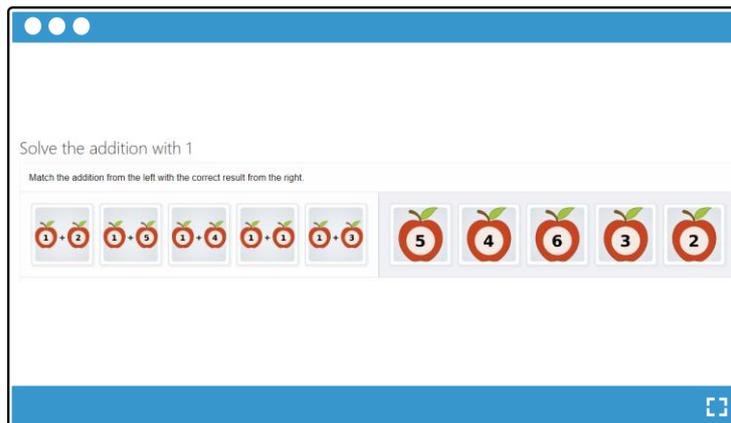
In order to play the activity, the learners must click or drag and drop each image from the left to pair it with the correct result from the right. Once the matching is completed, the platform associates the 2 images in the right column. The images from the left column will be displayed in grey, announcing the learners that the match was completed. In addition, the learners have the possibility to click again on the images paired if they consider that the match is not correct and the platform, recolour the image from the left column.

To verify the answer, the Learners must click on the Check button. If the learners answered correctly, the platform gives the result 5 Stars from 5, which corresponds to the number of correct pairs.

If the submitted answer is wrong, the platform gives as a result a certain number of stars, which correspond to the number of correct pairs identified. The platform also displays 2 buttons *Retry* for the learners to try again the activity and *Show solution* to see the correct pairs.

CHECK THE ACTIVITY

Click to find more

7.4.   IMAGE SEQUENCING DIGITAL ACTIVITIES

The Image sequencing template allows authors to create activities based on image sequencing, which need to be arranged in a particular order.

Learners are presented different images which are displayed in a random order and have to use drag and drop actions to reorder them based on the task description and on the correct order. The challenge of these exercises is to identify the elements illustrated in order to put them in the right sequence.

Key points

- Always fill in the Image description for images to allow screen readers to view and read the content. Note that the description will appear below the image.

- You can upload an audio file associated to the image or to help learners to identify the image.

- You can allow learners to resume the activity at the current stage they are by activating the option ☑ Add button for resuming from the current state .

Check the video tutorial

Check the video to see how an Image sequencing activity can be created.

IMAGE SEQUENCING TUTORIAL
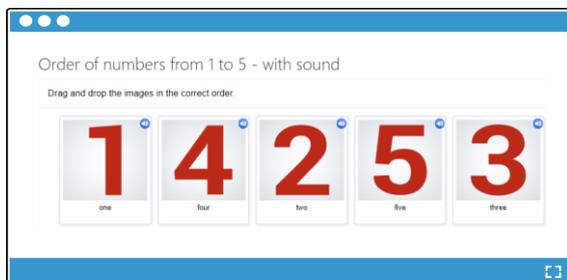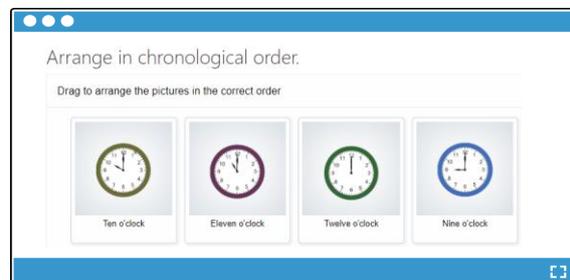
Click to find more

Take a look!

Order of numbers from 1 to 5 - with sound

Drag and drop the images in the correct order

1 4 2 5 3
one   four   two   five   three

[Click to see the activity](#)

Arrange in chronological order.

Drag to arrange the pictures in the correct order

Ten o'clock   Eleven o'clock   Twelve o'clock   Nine o'clock

[Click to see the activity](#)

Click to see the activity

Click to see the activity
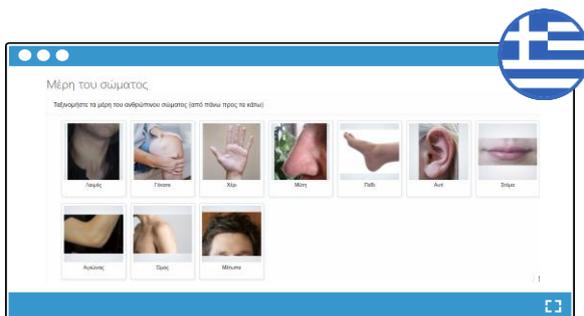
Click to see the activity
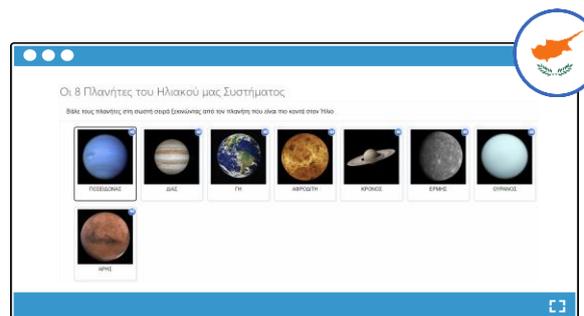
Click to see the activity

Click to see the activity
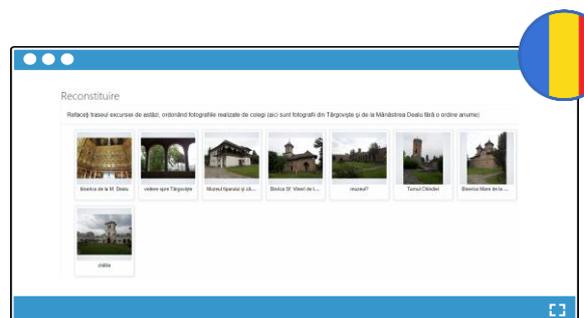
Click to see the activity

Activity in action!

Days of the week

The activity is included in the ***English language learning category***, Course ***Days, Weeks, Months,*** and is designed using the Image sequencing template.

The activity consists of 7 images which include the name of the day as text and have attached an audio, and when the learners click on the audio icon, the name of the day can be heard.
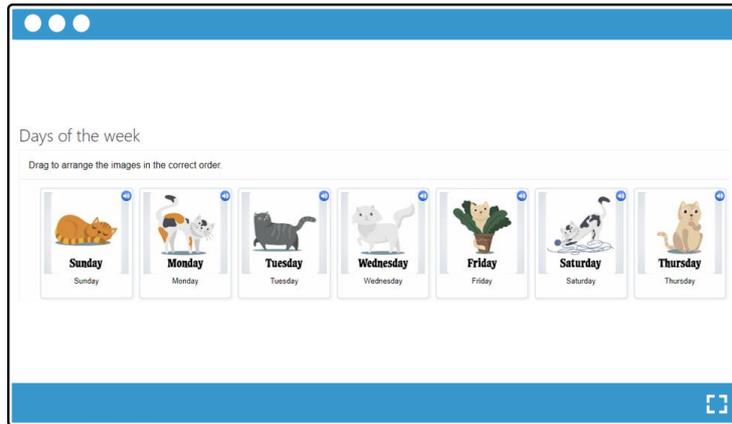
In order to play the activity, the learners must drag and drop the images in the correct order according to the instructions provided.
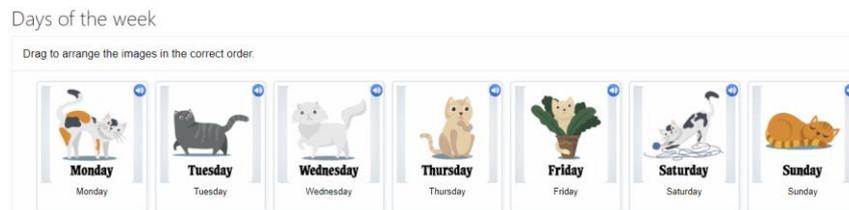
To verify the answer, the learners must click on the *Check button*. If the learners answered correctly, the platform gives the result 7 Stars from 7, which corresponds to the number of images arranged in the correct order.
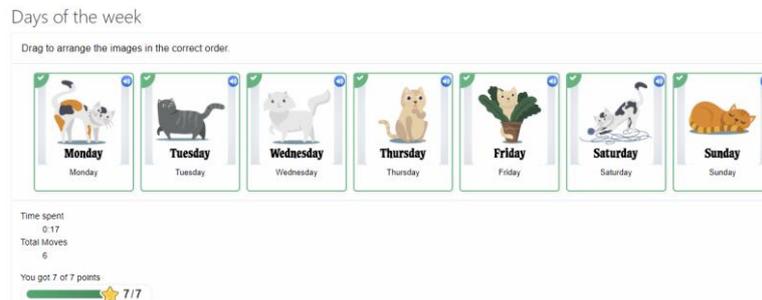
If the submitted answer is wrong, the platform gives as a result a certain number of stars, which correspond to the number of the images identified correctly. The platform also displays 2 buttons *Retry* for the learners to try again the activity and *Show solution* to see the correct order for the images.

CHECK THE ACTIVITY

Click to find more
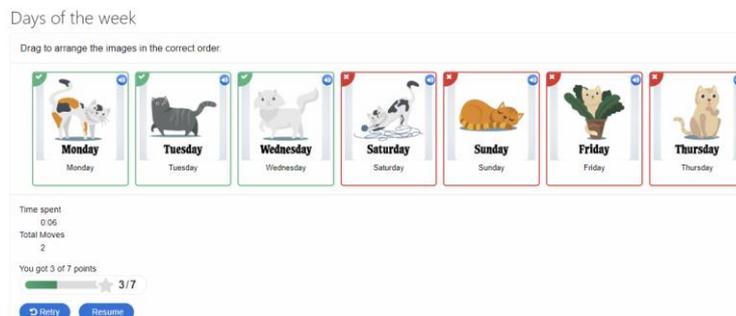
7.5. QUIZ (QUESTION SET) DIGITAL ACTIVITIES

The Quiz (Question set) template allows authors to create a sequence of various quiz types, including Multiple choice questions, fill in the blanks, Drag and drop, Mark the words or True/False questions. Questions, the most common education means, have their rich life in the digital world, too.

This type of activity allows learners to solve different types of quizzes in a single flow. Learners can answer several types of questions. The attractiveness of these activities stems from the knowledge realms or some intriguing images.

Key points

- If you want to create activities with the same type of question, create the structure of the first question and duplicate it and change only the text.

- Always add alt text for images if you provide any.

Check the video tutorial

Check the video to see how a Quiz (Question set) activity can be created.

QUIZ QUESTION SET TUTORIAL

Click to find more

Take a look!

Click to see the activity   Click to see the activity

The alphabet - from A to J

Letters - Animals, birds, plants and objects

Drag and drop the image in the corresponding box.
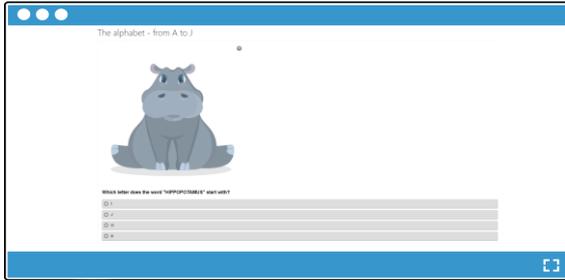
Click to see the activity   Click to see the activity
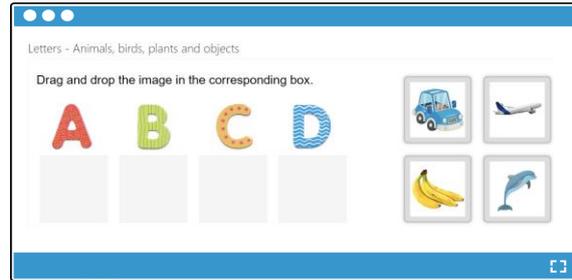
Activity in action!

Count with me from 1 to 10

The activity is included in the **Mathematics category**, Course **Counting,** and is designed using the Quiz (Question set) template.

The activity consists of 10 frames all designed with drag and drop features provided by the *Drag and Drop template* whose functionalities are embedded in the Quiz (Question set) template.

Each frame is designed as a standalone drag and drop activity and includes the base image for the learners to recognize, a box for dropping the correct image and 4 designed as draggable images, which correspond to the answer variants.

Count with me. From 1 to 10 (multicolor)

Drag and drop the correct number in the box.

Gift

3   7   1   4

In order to play the activity, the learners must read the instructions, look at the base image and count how many objects are displayed in it. Then the learners must drag one of the images provided as answer and place it in the droppable box.

Count with me. From 1 to 10 (multicolor)

Drag and drop the correct number in the box.

Gift

1   3   7   4

To verify the answer, the learners must click on the *Verify button*. If the learners answered correctly, the platform gives the result 1 Stars from 1, which corresponds to the number of the correct answer.

After verifying the learners can move to the next frame and answer to the next activity, by either clicking on the blue arrow button displayed on the right , or by clicking on the next progress dot .

If the submitted answer is wrong, after clicking on the Verify button, the platform does not offer any star and displays the *Try again* button for the learners to try again. This latter action is not mandatory, because the learners can skip this step and at the end the platform will display their progress including the wrong answers given.
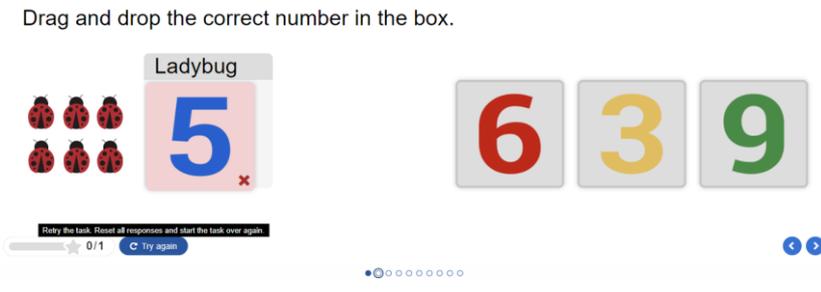
Then the learners can access the next frame, repeating the steps until the end of the activity. When reaching the final frame and after answering to the final activity, the platform displays the *Finish button.* By clicking on it, the learners can see their progress and how many stars they have obtained. The platform also displays 2 buttons *Show solution* for the learners to see the correct answers and *Retry* for the learners to try again the entire activity.
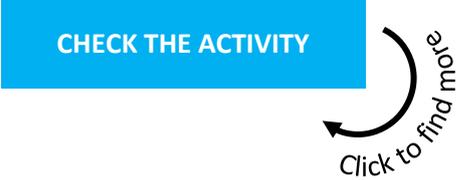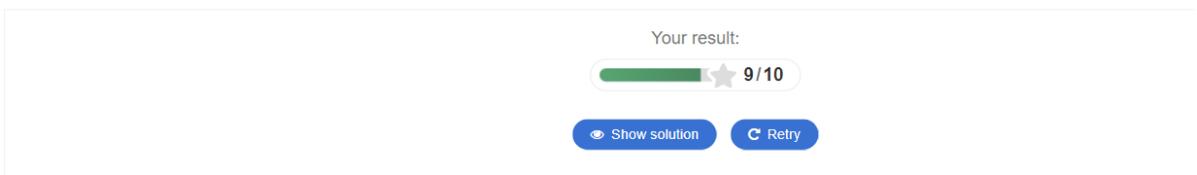
7.6. DIALOG CARDS DIGITAL ACTIVITIES

The Dialog cards template allows authors to create activities based on images, sounds and text which can help learners to memorize words, expressions or sentences. Learners are presented a card with two sides. On the front side of the card, it can be displayed a hint for a word or expression and on the back of the card the learners can reveal a corresponding word or expression.

Key points

- Keep the Hint text as simple as possible.

- Always fill in the Alternative text for the image to allow screen readers to view and read the content.

- You can upload an audio file associated to the hint to help learners to identify the word or the expression.

- You can randomize the sequencing of the cards by activating the option
  ☑ Randomize cards
  Enable to randomize the order of cards on display. .

Check the video tutorial

Check the video to see how a Dialog cards activity can be created.

DIALOG CARDS TUTORIAL
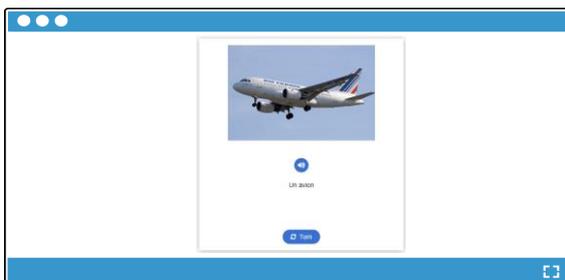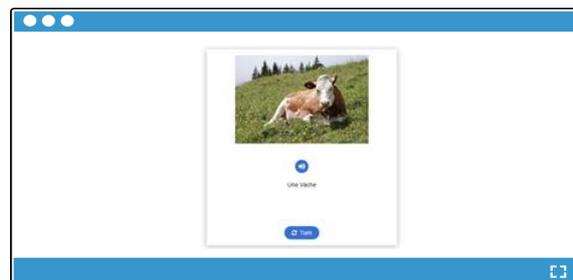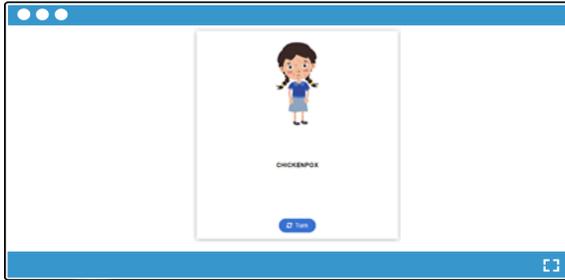
Click to find more

Take a look!

Click to see the activity   Click to see the activity

Click to see the activity

Click to see the activity
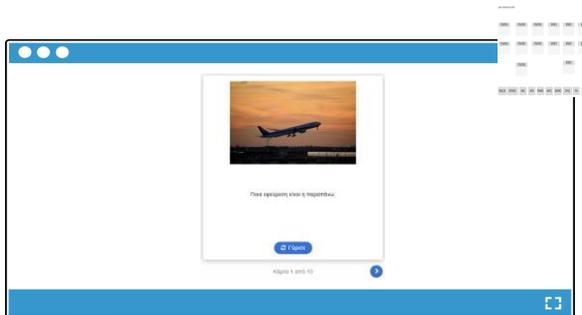
Click to see the activity
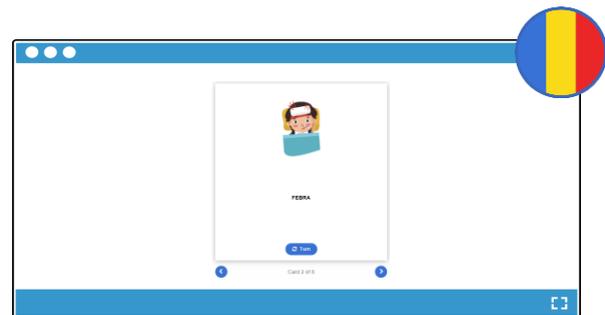
Click to see the activity

Activity in action!

Learn French Fruit Names

The activity is included in the ***English language learning category – HFC language learning***, Course ***Learn a language,*** and is designed using the Dialog cards template.

The activity consists of 8 double-faced cards. On the front, each card contains an image, a text in French and the audio file with the related text. On the back side, each card displays the image and the corresponding text in English, without an audio file.
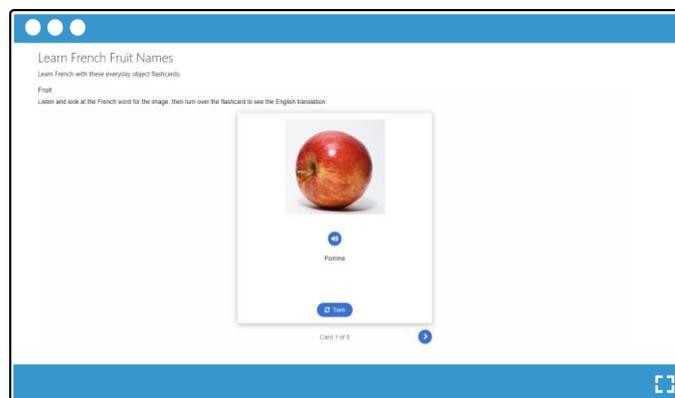
In order to play the activity, the learners must look at the image, read the text and/or listen to the audio file and then try to guess the corresponding word in English, by spelling it aloud. The activity is combination between digital and traditional learning.

To verify the answer, the learners must click on the *Turn button* and the platform will display the correct word.
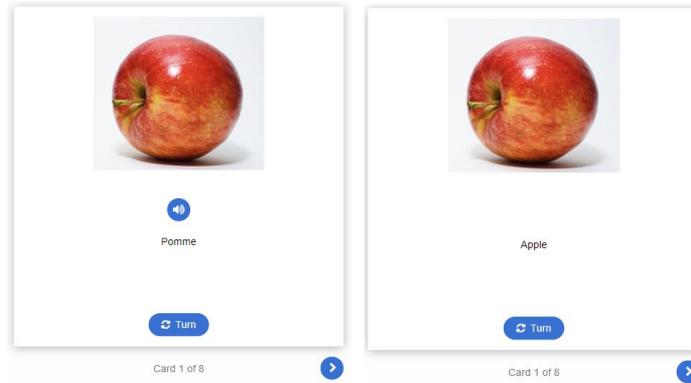
The learners then can click on the blue arrow button displayed on the right to view the next card, repeating the steps until end

CHECK THE ACTIVITY

Click to find more

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

INCLUDE me
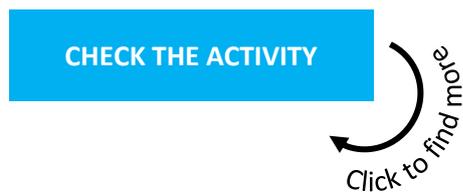
7.7.   FIND THE HOTSPOT DIGITAL ACTIVITIES

The Find the hotspot template allows authors to create activities based on an image, on which various hotspots can be placed, corresponding to details or sections of the image, as answers to a given question. Learners are presented with the image designed as a sequencing of different object and they have to click on a certain place (the correct spot) on the image to discover the correct answer. The activity offers a personalized feedback whether the action of the learner was correct or incorrect, according to the task description.

Key points

- When designing/choosing the base image, keep it as simple as possible. Note that the displayed objects must have a suitable left and right spacing to be able to define the hotspots, to avoid possible overlapping errors.

- Hotspots can either be defined as correct or incorrect, and you must provide appropriate feedback text in both cases.

- You can provide a feedback if the learners click on an empty spot on the image.

Check the video tutorial

**Check the video to see how a Find the hotspot activity can be created.**
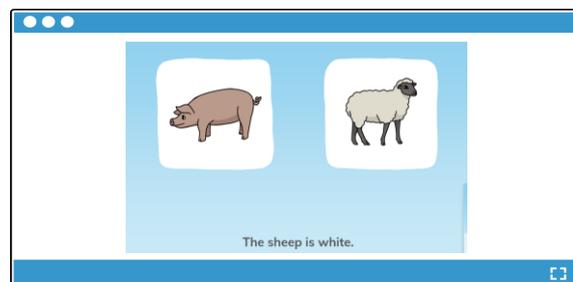
FIND THE HOTSPOT TUTORIAL

Click to find more

Take a look!

Click to see the activity

Click to see the activity
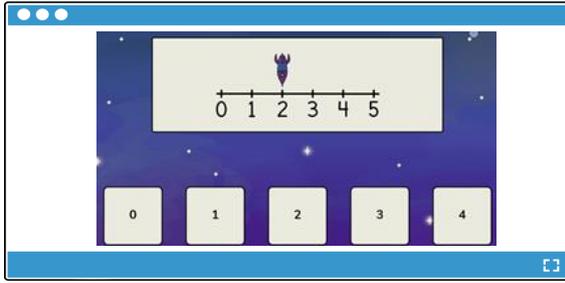
Click to see the activity   Click to see the activity
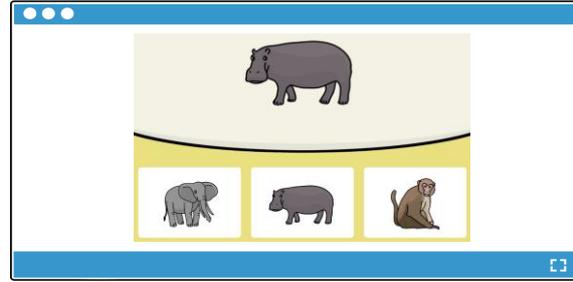
Activity in action!

Letter A

The activity is included in the **English language learning category**, Course **The alphabet,** and is designed using the Find the hotspot template.

The activity consists of an image which includes 4 letters. The image was designed with gaps between letters to allow the placement of the hotspots to avoid the overlapping issue.


In order to play the activity, the learners must click on one letter, corresponding to the instruction provided, and the platform will display automatically a certain feedback to the learners. If the answer is correct the platform offers 1 star which corresponds to the number of correct answer and the feedback provided by the teacher/author of the activity.

If the answer is wrong, the platform displays a certain feedback provided by the teacher/author of the

activity and a button to try again to answer.

Letter A

Where is the letter "A"?

No. This is letter J

0 / 1

CHECK THE ACTIVITY

Click to find more

7.8. CROSSWORD DIGITAL ACTIVITIES

The Crossword template allows authors to create activities that consists of a grid of black/dark blue and white squares. Learners are presented with a list of clues for each entry, where the white square in each entry is numbered to correspond to its clue. They must enter words into the grid, crossing each other horizontally ("across") and vertically ("down").

Key points

- You can create simple or complex grids, but it is recommended to define no more than 12 entries.

- A more complex grid can be personalized by providing the number of entries to be shown. Provide the number of entries in the option below

  Number of words to be shown

  Create a randomized batch of words from the pool. The batch will always contain at least all the words that were fixed on the grid regardless of this setting. An empty value or 0 means to use all words.

- You can personalize the grid by changing the theme colours.

- You can fix the entries on the grid if you want to create a static crossword. If the option is not checked, the crossword will rearrange the entries each time the activity is played.

Check the video tutorial

Check the video to see how a Crossword activity can be created.

CROSSWORD TUTORIAL

Click to find more
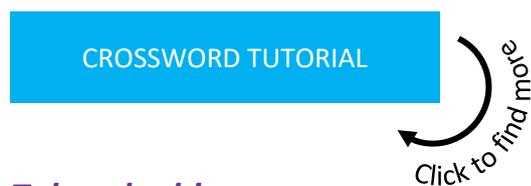
Take a look!
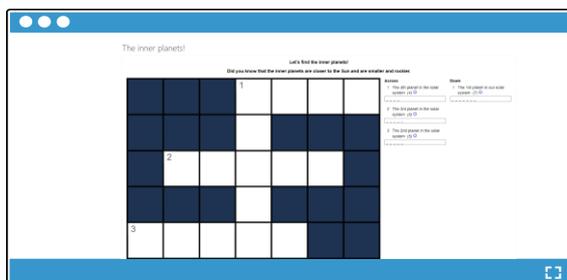
Click to see the activity
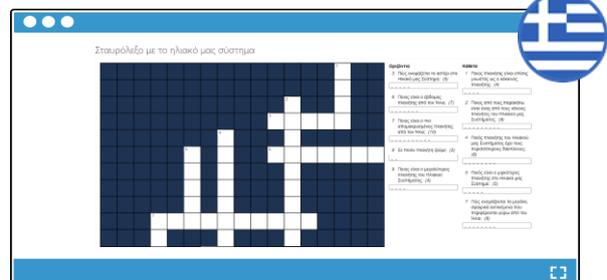
Click to see the activity

Activity in action!

The body systems

The activity is included in the **Science**, Course **Human body,** and is designed using the Crossword template. The activity consists of 5 entries, numbered from 1 to 5. Each entry has a corresponding definition which represents the clue that the learners must read in order to fill in the entries.
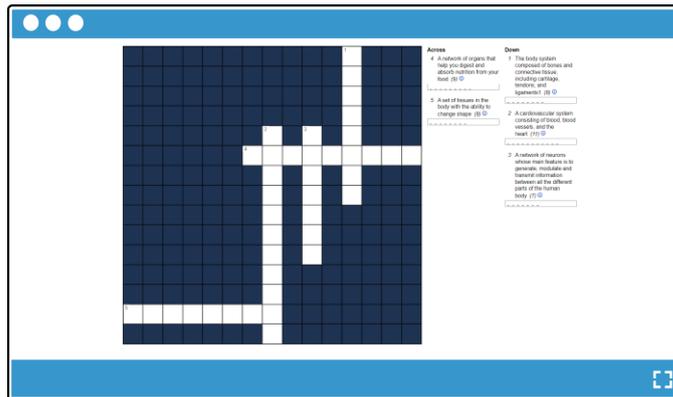
In order to play the activity, the learners must read the clues from the right side and fill in the white squares which correspond to each entry. When filling in the squares from the crossword, the text will be displayed automatically below the corresponding clue.
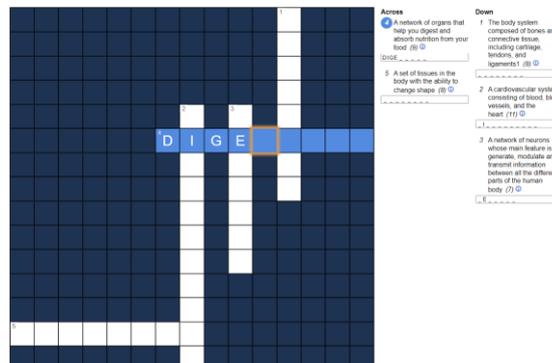

After filling in the last entry and if all the answers are correct the platform will automatically inform the students about the given answers. The platform will display the answers in green and will offer 5 stars which correspond to the number of correct answers.

In one of the answers is incorrect, the platform will display the check button, and the learners must click on it to verify the answers. The platform will display in the crossword and in the blank space below the clue, the wrong answer.

The learners can click on the button Show solution to view the correct answer. If the learners click on the button *Retry*, the platform will reset the crossword and the learners have to fill in again each entry.

CHECK THE ACTIVITY

Click to find more
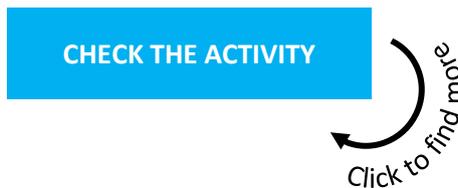
## 7.9.   COURSE PRESENTATION DIGITAL ACTIVITIES
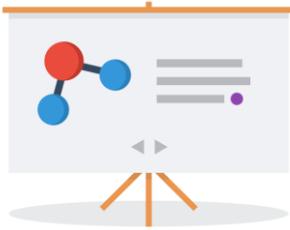
The Course presentation template allows authors to create digital activities that have the structure of a PowerPoint presentation. Through this template teachers or content creators can create teaching, assessment or combined activities, storytelling activities, add audio files or videos to create more interactive activities. In the case of activities that also include the assessment part, the student must go through the narrative part/instructions/text that appears in each slide and respond according to the specifics of each assessment activity (e.g. click on a text/image, drag and drop the text/image in the correct space, write).

Key points

- From the menu bar you can add in the slide assessment activities such as: single choice, multiple choice, true/false questions, fill in the blanks, drag & drop or summary activities.
- Other options for adding text, interactive elements or other assessment activities, can be found by accessing the icon
- You can duplicate the layout/arrangement of elements of a slide by using the Clone slide option icon.

Check the video tutorial

Check the video to see how a Course presentation activity can be created.

COURSE PRESENTATION TUTORIAL
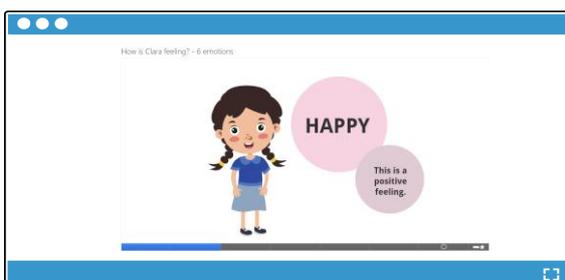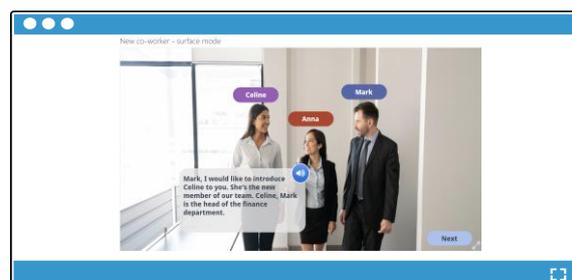
Click to find more

Take a look!

HAPPY

This is a positive feeling.

How is Clara feeling? - 6 emotions

New co-worker - surface mode

[Click to see the activity](#)   [Click to see the activity](#)

[Click to see the activity](#)

[Click to see the activity](#)

[Click to see the activity](#)

[Click to see the activity](#)

Activity in action!

An ordinary star

The activity is included in the *Science*, Course *Planets, space and galaxy,* and is designed using the Course presentation template.

The activity is designed as a dialog between 2 characters which present interesting facts about the sun. The activity is divided in 10 content-based slides, 1 assessment slide designed with the Single choice set template that contains 4 questions/statements and 1 summary slide with the results of the activity.

In order to play the activity, the learners must access each slide and read the dialogs. Each dialog provides important clues for the assessment part. After reaching the assessment slide, the learners must read the sentences/questions and try to answer by clicking on one of the answer options.
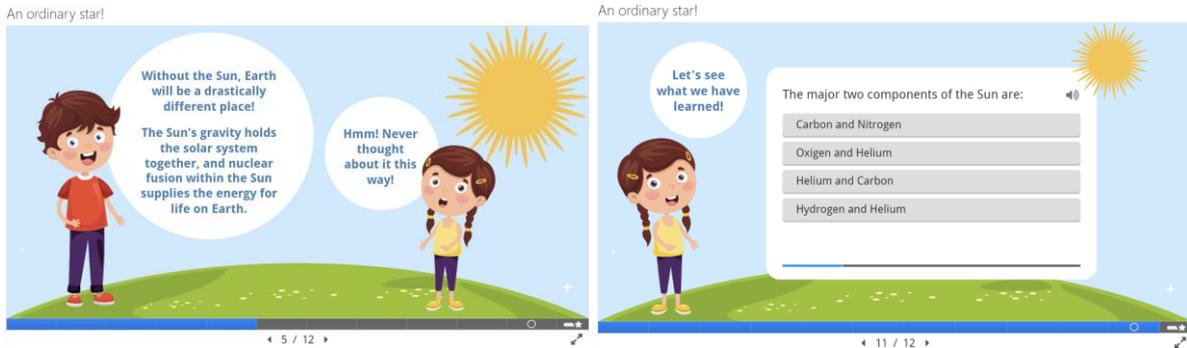
After clicking on one of the options, the platform will automatically inform the students about the given answer. If the answer is correct, the platform will mark the given answer in green, a sound specific to a correct answer will be heard and after a few seconds, it will move on to the next question.

If the answer is wrong, the platform will mark the given answer in red, a sound specific to a wrong answer will be heard and after a few seconds, it will move on to the next question, without the possibility to allow learner to try again at this stage.


After answering to the last statement/question, the platform will automatically display the summary slide, and the learners can see their progress in the activity. In this stage two scenario can occur:

1. If the learners answered all the questions correctly, the platform will display 4 stars which correspond to the number of correct answers.

2. If the learners answered wrong to the questions, the platform will display a certain number of stars, according to the correct answers given and 2 buttons - *Retry* for the learners to try again the assessment activity and *Show solutions* to see the correct answers.

CHECK THE ACTIVITY

Click to find more

7.10. INTERACTIVE VIDEO DIGITAL ACTIVITIES
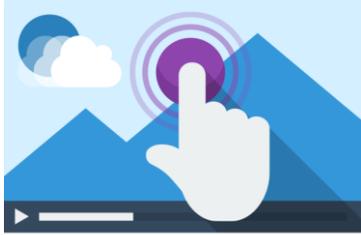
The Interactive video template allows authors to create digital activities that have a video attached. Through this template, combined teaching-assessment activities can be created that allow the learners to dynamically interact with the video. In these activities, students have to listen and watch the video and according to the set sequences, they need to answer to the assessment activities (e.g. click on a text/image, drag and drop the text/image in the correct space, etc).

Key points

- From the menu bar you can add in the video assessment activities such as: single choice, multiple choice, true/false questions, fill in the blanks, drag & drop or summary activities.

- Other options for adding text, interactive elements or other assessment activities, can be found by accessing the icon ⋮

- It is important to set the display time of the button of the assessment activity, according to the specifics of the sequence in the video that you want to evaluate. Example: At minute 2:05 there is a sequence with a cat and you want the student to answer which animal he/she saw. When you add the rating button to the selected video sequence, the start date is automatically set in the first box of the Display time field. You only need to manually add the end date, in the second field to disable the button. The button is usually set to disappear before moving to another sequence in the video.

Take a look!

Click to see the activity

Click to see the activity

Click to see the activity

Click to see the activity

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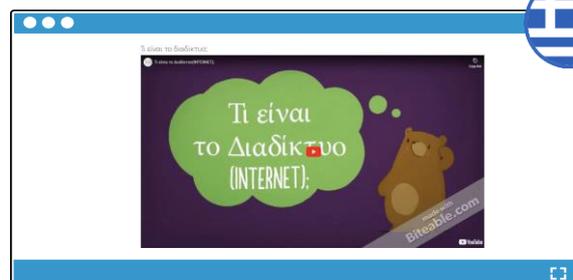
INCLUDE me

Activity in action!

Learn About Dinosaurs

The activity is included in the ***English language learning category – HFC language learning***, Course Learn about Dinosaurs***,*** and is designed using the Interactive video template.

The activity provides a video learning content to the learners and ask the learners to answer a question at the end of the sequence. Learning about dinosaur facts is fun and keeps the user interested too!

The learners can press play and the first video sequence will start. First up is Diplodocus. There is audio accompanying the video with text to speech and dinosaur sound effects. Facts about that particular dinosaur will appear and then a question for the user to answer at the end of the video sequence.
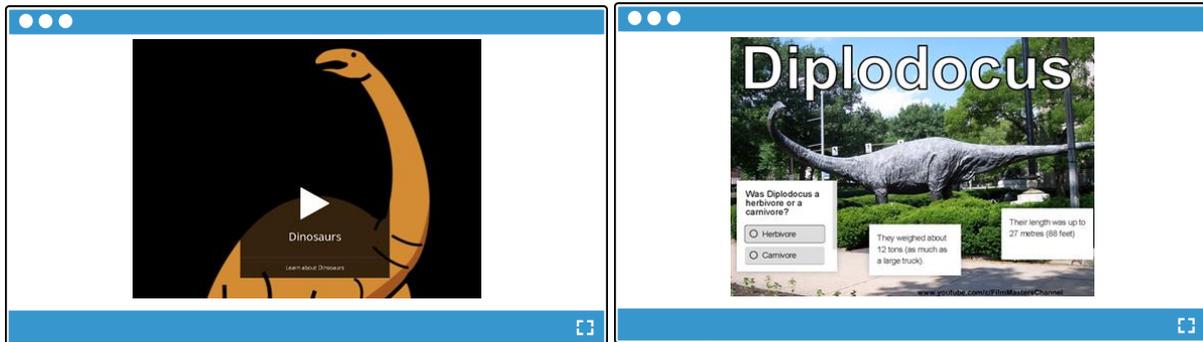
Feedback will be given if the answer id right or wrong. The answers can then be submitted to the user profile and move onto the next dinosaur video quiz.
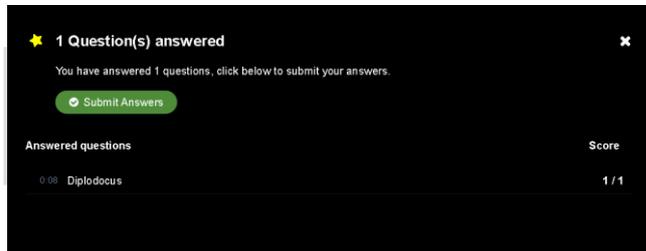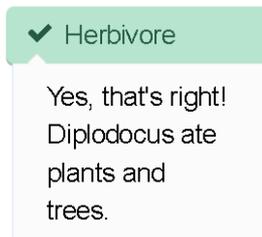
By the end of this set of activities it is hoped that the user can pronounce the names of the dinosaurs properly, identify whether they were herbivores or carnivores and have learnt many interesting facts about their origin, weight, height and behaviours.

CHECK THE ACTIVITIES

Click to find more

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INCLUDE me

Activity in action!

Robo and the angles

The activity is included in the **Mathematics**, Course Robo and the angles**,** and is designed using the Interactive video template.

The video presents theoretical information about angles, such as the definition, how to form an angle, what is the magnitude of an angle and examples of different types of angles which have attached an interactive text which presents interesting facts and clues about the respective angle. At the end of the video, the activity includes a short quiz designed with the *Single choice set* template.
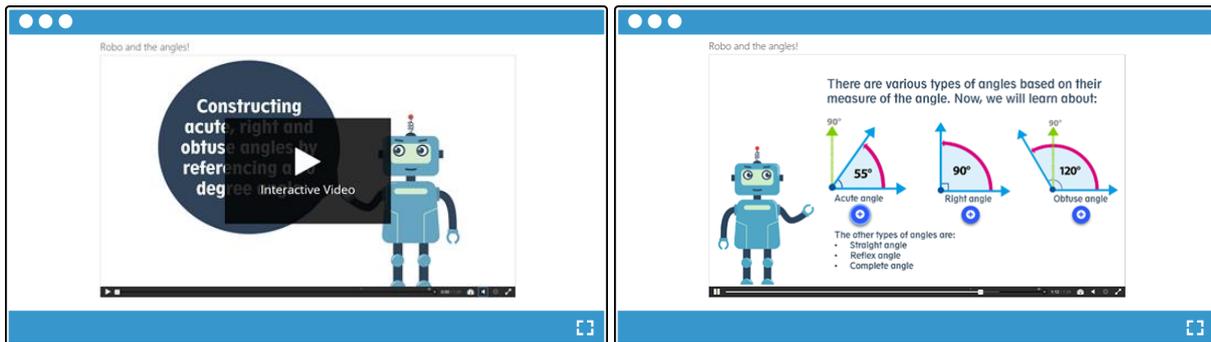
In order to play the activity, the learners must watch the video, read the content and pay attention to the clues. At the end of the video sequence the learners must click on the *Solve the quiz* button and then try to answer to the quiz.

After clicking on one of the options, the platform will automatically inform the students about the given answer. If the answer is correct, the platform will mark the given answer in green, a sound specific to a correct answer will be heard and after a few seconds, it will move on to the next question.

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INCLUDE me

If the answer is wrong, the platform will mark the given answer in red, a sound specific to a wrong answer will be heard and after a few seconds, it will move on to the next question, without the possibility to allow learner to try again at this stage.

After answering to the last statement/question, the platform will automatically display the summary slide, and the learners can see their progress in the activity. In this stage two scenario can occur:

1. If the learners answered all the questions correctly, the platform will display 4 stars which correspond to the number of correct answers and then the learner must click on the *Continue* button to finish the activity.
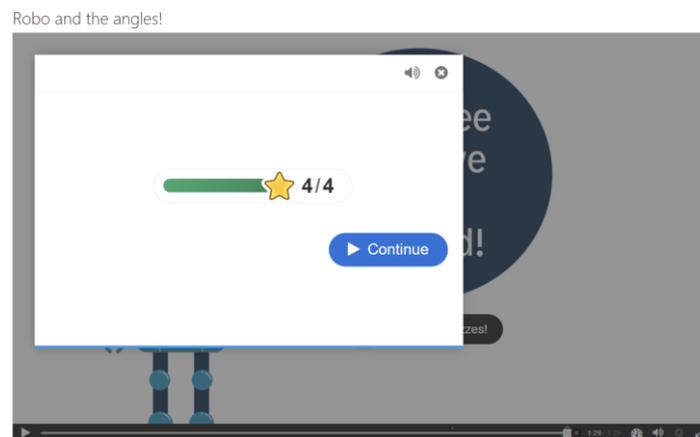
2. If the learners answered wrong to the questions, the platform will display a certain number of stars, according to the correct answers given, and 3 buttons - *Retry* for the learners to try again the assessment activity, *Show solutions* to see the correct answers and *Continue* to finish the activity.

CHECK THE ACTIVITY

Click to find more
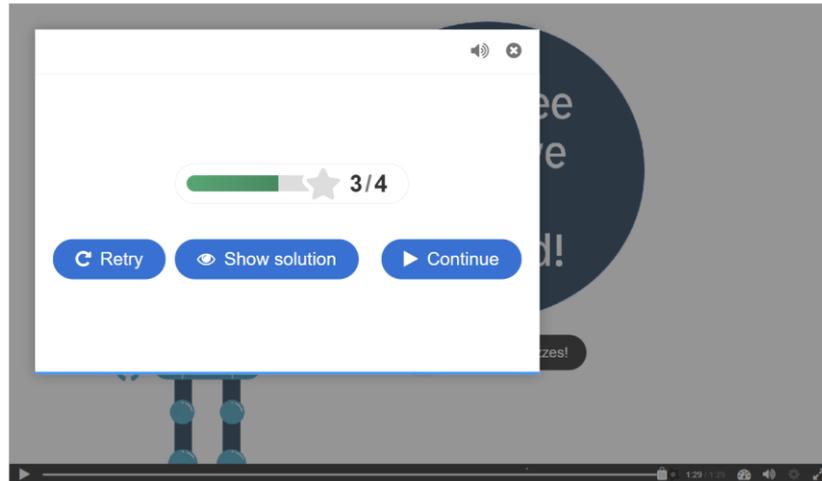
8. Case studies

The Case Studies were a significant tool for project reporting as they provided information on quality metrics and KPIs. During piloting the partners have reached out to key target groups, both direct and indirect. In particular, participants in DTG1 (Socio-economically disadvantaged students (aged 14-24)) and DTG3 (School leaders and teaching staff in high-schools and universities) were directly involved in piloting. In turn, they also involved other key stakeholders in DTG2 (Students with disabilities (Health-related needs)), ITG1 (Primary and secondary education organizations). The age range of participants reached through piloting (directly or indirectly) spans a big age range between 3-53 years old.

8.1. A case study designed by Advanced Technology Systems - ATS

The piloting activity had the objective to allow vulnerable groups, structures and systems to fight discrimination and harmful stereotypes, to recognize diversity, to encourage participation and to overcome the educational barriers.

The case study carried out by ATS derived from a summer school organized in collaboration with a local Romanian NGO for disadvantaged learners, specifically Roma children.

The case study was applied within the INCLUDEME project – Inclusive Digital Environment to Enable High-Quality Education for Disadvantaged and Disabled Learners.

Participants

The summer school the summer school took place over two months and 27 children from Roma community, with ages between six and 13, where three of the children were no longer enrolled in any form of education.

The children enrolled in the summer school were involved in the activities organized both using the INCLUDEME platform and mini games and traditional materials, like printed worksheets for basic language learning and mathematics, as well as cardboard games, puzzles, and more.

The children could choose from over 150 H5P minigames with different subjects and learn through play, practicing reading, writing, mathematics, etc. The necessary equipment for participating in the digital activities was provided by ATS. A username and a password were created for each participant. and personal data was collected.

 None of the children had used a laptop and a mouse before. It was therefore necessary to first carry out a basic training session, to explain how to interact with technology and how to play the digital activities and the minigames. Because most of them had no knowledge of reading, the H5P minigames had to be customized to have less text with basic instructions, and some also included audio sequences. Even if most of the children needed assistance through all the sessions, and could not play entirely on their own, the progress they made during all the sessions was remarkable.

Materials and tools

- Computers/laptops with internet access
- Content development tools: INCLUDEME platform and minigames
- Traditional learning materials: printed worksheets, cardboard games, puzzles, etc

Feedback

Feedback was collected via direct discussions with the children to understand better what type of activities they prefer, digital or traditional and what they want to learn. From the discussions held and from the interaction during all the sessions, several aspects were identified

- The content units have to be well structured, simple, and contain as little text as possible because most children do not know how to read.
- If is possible, the H5P activities should contain an audio version of the text.
- To achieve consistent progress, some children needed one-on-one assistance.

Most of the H5P minigames were based on drag and drop and point and click actions, and the progress was evident after each session. For minigames that required written input from the children, the progress was limited, with a slight improvement towards the end of the summer school for a quarter of the participants. Since some of the children did not know the alphabet, they needed assistance during all the meetings. Their vocabulary was very limited. They were not able to name animals, fruits or vegetables. Learning through trial and error greatly improved their performance.

8.2. A case study designed by Hands Free Computing - HFC

Hands Free Computing contacted a number of special education schools and dedicated schools for more complex needs.

Following the guidelines created by the partners we conducted initial interviews and awareness sessions to gain a declaration of participation in the project from 2 schools.

Participants

The first school was one with children with complex needs including cerebral palsy, learning impairments and limited movement. Two teachers were trained and introduced to the Moodle INCLUDEME platform, shown the accessible games and H5P activities that would be suitable to play with the young adults. Initial feedback was good, especially for the six mini games that were deemed suitable for the young adults to play and engage with. This was deemed the route to be taken along with the apps from Sensory House, as using and reusing the existing H5Ps was not suitable due to the limited customisation and size options for that target group.

There were 25 pupils involved in the pilot activity. A set of H5Ps based on Mathematics were played and the results were positive, especially with the customisation options available and the accessibility options for teachers provided by AccessAngel for navigating and administrating the portal. Further take up of the platform has not been achievable however due to teacher and staff commitments within the curriculum and staff illness.

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Materials and Tools

- Computers/laptops with internet access
- Content development tools: INCLUDEME platform
- Minigames
- AccessAngel

Feedback

Results were mixed from the target group. This was mainly due to the complexity of the needs and control methods needed by the young adults to play the games. Whilst the accessible mini games were successful it was thought easier to play them outside of the Moodle platform as presentation was bigger and access easier. For this reason, and the fact that the sensory apps can be accessed on the internet outside of the INCLUDEME portal as well, further take up of the INCLUDEME platform was not required from this pilot establishment.

The second piloting activity was with a special educational school for pupils with communication and neurodiverse difficulties. Again, initial feedback on the training of the platform to 2 teachers was excellent and it was set that the teachers would carry out a session with the pupils playing the H5Ps together, as well as navigating the INCLUDEME Platform itself with the help of AccessAngel.

8.3. A case study designed by Bremen Institute for Production and Logistics - BIBA

The case study derived from the workshop organised within the research paper *Exploring Adaptability and Flexibility of Accessible Content Development Tools* offers direct feedback from participants and a comprehensive understanding of the effectiveness of various tools and specifically INCLUDEME results in developing inclusive learning materials.

The INCLUDEME platform offers inclusive access to digital learning resources, providing learners not only with equal opportunity in education but also equipping them with skills to continue their journey into employment.

The main goal of the INCLUDEME project is to promote accessible and inclusive design. Therefore, parts of these project outcomes were presented during an exploitation workshop, emphasizing the importance of good, inclusive, and accessible design. Participants at the workshop were presented with insights and hints into how the INCLUDEME results help in achieving the objectives of the workshop to create accessible learning material. By responding to the questions, visitors contributed to understanding how useful the tools are for constructing accessible and inclusive learning material.

Participants

The workshop was attended by "16" girls and "1" teacher from high school as part of the Projekttage MINT4girls Workshop, at BIBA.

Materials and Tools

- Computers/laptops with internet access
- Screens/projectors for presentations
- Content development tools: INCLUDEME platform
- Various H5P templates for interactive content creation (e.g., Virtual Tour, Drag and Drop, Branching Scenario).
- Survio tool to generate a questionnaire

Feedback

Feedback was collected through the questionnaire consisting of four questions distributed at the end of the workshop. Participants' responses were observed to understand the effectiveness of the content development tools in constructing accessible and inclusive learning materials. A total of "17" feedback responses were collected.

The questionnaire results yielded valuable insights into participants' views on the effectiveness of content development tools in enhancing accessibility and how effective were certain aspects of the INCLUDEME results aided in developing an accessible learning material. While three questions provided predefined choices, the fourth allowed for detailed responses, enriching the feedback. These findings showed participants' direct feedback, providing a holistic understanding of how these tools contribute to fostering inclusive learning environments.

The workshop participants expressed overall satisfaction with the effectiveness of content development tools, notably the INCLUDEME platform, in fostering accessibility and inclusivity in learning materials. While minor improvement suggestions were noted, the feedback highlighted the tools' relevance. The following chapter will further discuss these findings, exploring implications and potential enhancements for advancing educational accessibility and inclusivity.

8.4. A case study designed by University of Thessaly - UTH

The case study derived from a training and piloting event organised by University of Thessaly in collaboration with the Special Education Vocational High School of Nea Ionia from Volos.

The Special Vocational High School visited the Department of Electrical and Computer Engineering of the University of Thessaly (THMMY).

The event had dual purpose, aiming on the one hand to train educators on the INCLUDEME Platform and on the other to pilot project outcomes with students in real-life educational contexts. The content was available through the platform developed within the framework of the INCLUDEME project and emphasizes accessibility by providing, among others, the possibility of presenting content in large font or through audio.

The content consists of digital puzzle-based exercises, pattern recognition, categorization, memory training, and interactive videos that can be flexibly integrated to address broad topics such as languages, critical thinking, geography, and science. The digital learning platform offers the opportunity for direct use of digital learning content developed by INCLUDEME project partners as well as the creation of new ones through the available functionality.

Participants

Approximately 40 high school lyceum students (16 – 18) and 10 educators participated in digital educational activities held at the Department of Electrical and Computer Engineering of the University of Thessaly lab.

Materials and Tools

- Computers/laptops with internet access
- Content development tools: INCLUDEME platform
- Various H5P templates for interactive content creation (pattern matching, word discovery, interactive videos, interactive puzzles).

Feedback

The exercises helped building knowledge and skills related to language education, critical thinking, geography, and sciences. The event received positive feedback, with the students being very engaged. Students particularly enjoyed the playful nature of the activities as well as the puzzles that challenged them to provide answers to questions inspired by school curricula.

Participants deployed user-friendly digital content that encourages active participation in educational processes through playful approaches and high interactivity.

8.5. A case study designed by PA College - PAC

The case study derived from a teacher training event organised with special education staff (including psychologists, speech therapists, occupational therapists, physiotherapists, special trainers, and music therapists) organised by PA College, in Cyprus.

For speech therapists, speech pathologists, music and occupational therapists and other specialist educational staff teaching students at the special education school, multimedia content is key. The use of rewarding sounds, animations, and audio feedback is crucial for high learning impact and increased engagement.

In terms of usability, high contrast, simple or plain background for the H5P gamified activities, and audio feedback are essential aspects to consider. Immediate feedback for correct or wrong answers is preferred over accumulated mark/score at the end of an activity. Another important element is for the content, learning materials, H5P activities to be available offline and also available as printable activity pages. Commonly used learning activities or educational games used with students include: language games, activities with sounds, activities with images, memory games, and puzzles, amongst others.

Participants

Approximately 11 special education specialists including psychologists, speech therapists, occupational therapists, physiotherapists, special trainers, music therapists, art teacher, practical knowledge teacher.

Materials and Tools

- Screens/projectors for presentations
- Computers/laptops with internet access
- Content development tools: INCLUDEME platform
- Various H5P templates for interactive content creation.

Feedback

Special Education staff (including psychologists, speech therapists, occupational therapists, physiotherapists, special trainers, and music therapists) highlighted the key role technology plays. Children love technology, they are attracted and fascinated by computer games, and they are very talented in terms of their digital skills. The practical challenges have to do with the design of the games and gamified activities as well as the content. From teachers' point of view the challenge is to create a resource which is easily adjustable while also allowing teachers to track their students' engagement. For example, it is important to know how many times they played a game, up to which level they have reached so they can trace their development, how much time they have engaged, and other useful information. Another important element is for the content, learning materials, H5P activities to be available offline and also available as printable activity pages. From the students' point of view the

challenge is to ensure that content is at the appropriate level (e.g., based on intellectual age or skill level), and at the appropriate level of detail (i.e., in terms of background and graphics used).

The INCLUDEME Platform can support special education in manifold ways. Firstly, it can serve as a primary source of learning content in some subjects (e.g., speech and language therapy, art, music). Secondly, for some subjects it can serve as a supplementary tool to enable further practice (e.g., practical knowledge, special training for hand-eye coordination). Finally, the INCLUDEME Platform can play an auxiliary role. For example, students can be given the opportunity to play a game (e.g., memory game or puzzle) as a reward, or during relaxation time. Teachers reported they are satisfied or highly satisfied with the INCLUDEME Platform in terms of its response rate, quality and richness of the available content, innovativeness, ease of interaction with the platform, easy of used and effectives, flexibility, help and guidance provided through the platform, and finally overall look and feel int terms of the user interface.

8.6.   A case study designed by South West University "Neofit Rilski" – SWU

The case study derived from a teacher training event organised by the South West University "Neofit Rilski" with teachers who work with students with disabilities.

One fully day of training session was organized with teachers. working with student with disabilities, teachers of Bulgarian language, mathematics, computer science or primary school teacher.

Regarding their profile the teachers mentioned that they do not have an additional certificate to work with student with disabilities, which can lead to a conflict of interest between parents and professionals.

Participants

Approximately 28 teachers who work with students with disabilities participated in digital educational activities organised by South West University "Neofit Rilski" from Bulgaria.

Materials and Tools

- Screens/projectors for presentations
- Content development tools: INCLUDEME platform
- Various H5P templates for interactive content creation.

Feedback

The majority of the participants stated that the content of the H5P activities needs to be adapted for each different case. Thus, by allowing teachers to reuse and personalize existing activity, INCLUDEME platform covers a major objective identified by the participants, which is the individual approach.

The participants state that it is also important to ensure that all teachers have the same goals for every student with special needs. For instance, the successful games, applications would be those who use more colours, music and audio.

Almost all of the respondents have experience in using switch-based access to digital learning and environmental. Regarding the tools and approaches that would contribute to improving the communication and social interaction with students with special needs most of the respondents answer that they need information about students with disabilities and an explanation of the problems, expectations of children. It is not only important that they put themselves in mainstream schools, there must be a specific plan for what happens to them after they finish their education. "They should be involved in the extracurricular life of the school so that they do not feel isolated - excursions, projects, celebrations" – (a woman teacher with three years of experience).

When students participate in the teaching of new material through games, they learn more easily, when students with disabilities see a positive example from their classmates, they make more progress.

Although the gamification is applicable and preferred by Bulgarian teachers, parents have a slightly different point of view. They think that their children sit in front of the screens a lot. It's true, but at the moment most of their time is spent with Tik-Tok, Facebook and other social networks. These students are sitting in front of the screen anyway. Access to technology is the biggest barrier for disadvantage students, especially those from poor families.

Regarding the INCLUDEME platform, the participants mentioned that the platform is easy to use for both teachers and students, but teachers need a special training before testing it. Using technology in the learning process is necessary to achieve our goals for our students in special education, but there is a luck of digital devises at schools. Easy teaching process when using new materials through games.

8.7.   A case study designed by Asociația cultural-educativă "Ambasadorii prieteniei" - AAC

The case study derived from a piloting and teacher training event organised with education staff form several local gymnasium institutions, organised by AAC, in Romania.

During the event the organizer presented the ease of use of the H5P application by people not specialized in IT, but also the obligation to strictly observe the rules for retrieving images, etc. from the Internet.

Teachers mentioned that such tools are very useful in stimulating students with learning difficulties, diversifying the motivation of regular students, bringing learning closer to children's daily challenges, more learning autonomy in class and at home, facilitating self-evaluation and collaboration.

Participants

Approximately 19 high school and secondary school teachers participated in the piloting and teacher training activities.

Materials and Tools

- Computers/laptops with internet access
- Content development tools: INCLUDEME platform
- Various H5P templates for interactive content creation.

Feedback

The feedback received from the participants were positive but some ideas for improvement regarding the method of accessing and structuring the activities were reported, such as: a more rigorous structuring of the proposed activities, according to ages, levels of competence and concerns, corresponding to the subjects of study.

The participants agreed with the importance of cultivating the autonomy of students (normal or with learning difficulties) in the context of decreasing interest in school and classical knowledge, and they appreciated the use of numerous topics and templates to structure the content provided by the INCLUDEME platform, to transform students into co-authors of their own learning: turning to episodes and experiences from their lives as a pretext or subject for analysis-study, the organization of more consistent learning contexts in the community (visits, interviews, performances, etc.) based on precise roles taken on by the students (they themselves providing the support materials of the learning - photos , films, opinions, etc.) etc. The central idea of the H5P activities is for students to see any element of their environment (natural, social, technical, cultural, etc.) as an opportunity and learning tool and to feel comfortable using it to autonomously build the most diverse correlations, situations-solutions.

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9. Conclusions

The INCLUDEME experience has highlighted the need to:

1. Invest in sustainable, inclusive Open Educational Resources, which can enable richer learning experiences for disadvantaged and disabled learners, and can empower teachers to act as digital authors. Such efforts need be correlated with accessibility aware and aging-software design practices that nurture cost-efficient actions. Digital asset customization and reuse must form core pillars of inclusive education, enabling not only the personalization of digital resources to meet specific needs of target groups, but also increasing teachers' readiness to act as digital authors.

2. Create a European hub where organisations can register as entities interesting to participate in piloting and exploitation activities, substantially improving project implementations and outcomes.

3. Reshape and update the curricula, the assessment methods, as well as the dissemination and exploitation strategies and interventions to activate, accommodate, and nurture enablers that directly foster, and sustainably cultivate talent-oriented educational practices where disabilities are explored as talents and talents are not perceives as disabilities.

Teachers who participated in the piloting, teacher training and exploitation activities represented different levels of education (including Higher Education, Secondary Education, and Primary Education), and different specialisations (including specialisations such as special educators, educational psychologists, music therapist, occupational therapists (ergotherapists), and physiotherapists amongst other experts). In addition, both General Education Teachers and Principals and Special Education Teachers and Principals were involved in the project activities, in order to get a more holistic view and understand how different learning disabilities and individual cases are accommodated in different school environments.

Key Points & Lessons learnt from piloting and teacher training activities

- For speech therapists, speech pathologists, music and occupational therapists and other specialist educational staff teaching students at the special education school, multimedia content is key.

- Learning activities must be closely aligned with the learning materials/curriculum covered in each level/year, and the particular disability and severity/spectrum, amongst other aspects.

- Immediate feedback for correct or wrong answers is preferred over accumulated mark/score at the end of an activity.

- Content, learning materials, H5P activities could be made available offline for a wider engagement and also available as printable activity pages.

- If is possible, the H5P activities should contain an audio version of the text.

- To achieve consistent progress, some children (especially the children with disabilities) needed one-to-one assistance.

The INCLUDEME Platform can support special education in manifold ways. Firstly, it can serve as a primary source of learning content in some subjects (e.g., speech and language therapy, art, music). Secondly, for some subjects it can serve as a supplementary tool to enable further practice (e.g., practical knowledge, special training for hand-eye coordination). Finally, the INCLUDEME Platform can play an auxiliary role. For example, students can be given the opportunity to play a game (e.g., memory game or puzzle) as a reward, or during relaxation time. Teachers and other stakeholders involved in the piloting activities reported they are satisfied or highly satisfied with the INCLUDEME Platform in terms of its response rate, quality and richness of the available content, innovativeness, ease of interaction with the platform, easy of used and effectives, flexibility, help and guidance provided through the platform, and finally overall look and feel int terms of the user interface

10. CALL FOR ACTION

If you want to be part of the INCLUDEME community, do not hesitate to contact us:

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Project website: **https://includeme-project.eu**

The INCLUDME Platform: **https://mdl.includeme-project.eu**

11. REFERENCES

- Authors: Ioana Andreea Ștefan, Jannicke Baalsrud Hauge, Niina Sallinen, Antoniu Ștefan, Ancuța Florentina Gheorghe**. Accessibility and education: are we fulfilling state of the art requirements?**. eLSE Conference 2021 - The 17th International Scientific Conference eLearning and Software for Education Bucharest, April 23-24, 2021
- Authors: Ioana Andreea Ștefana, Antoniu Ștefan , Hariklia Tsalapatas , Olivier Heidmann Ancuța Florentina Gheorghe. **Collaborative decision-making in software research projects: the innovation challenge**. ITQM 2020 & 2021 - Information Technology and Quantitative Management, July 9 - 11, 2021
- Authors: Jannicke Baalsrud Hauge, Ioana Andreea Stefan, Jakob Baalsrud Hauge, Antoniu Stefan, Ancuța Florentina Gheorghe**. Redesign with Accessibility in Mind: A Visual Impairment Study**. JCSG 2021 - Serious Games: Joint International Conference, January 12 - 13, 2022.
- Authors: Jannicke Baalsrud Hauge, Ioana Andreea Stefan, Niina Sallinen, Jakob A. H. Baalsrud Hauge. **Accessibility Considerations in the Design of Serious Games for Production and Logistics.** IFIP WG 5.7 International Conference, APMS 2021, Nantes, France, September 5–9, 2021.
- Authors: Andriani Piki, Markos Markou, Vladislava Lendzhova, Ioana Andreea Ștefan **Piloting Guidelines for Gamified Learning Technology Towards Inclusive Education.** eLSE 2022 - The 18th International Scientific Conference eLearning and Software for Education Bucharest, May 12th – 13th, 2022.
- Authors: Ioana Andreea Ștefan, Antoniu Ștefan, Ancuța Florentina Gheorghe, Jannicke Baalsrud Hauge. **Enablers of Game Accessibility.** eLSE 2022 - The 18th International Scientific Conference eLearning and Software for Education Bucharest, May 12th – 13th, 2022.
- Authors: Vladislava Lendzhova, Boris Manov, Valentina Milenkova, Dilyana Keranova. **Digital Environments to Enable High-Quality Education for Disadvantaged and Disabled Learners in Bulgaria**. AHFE 2022 - 13th International Conference on Applied Human Factors and Ergonomics, July 24th – 28th, 2022
- Authors: Jannicke Baalsrud Hauge, Fatima Sundus. **Design Considerations of Learning Resources: Improving Learning and Engagement of Students with Visual Impairments.** JCSG 2022 - Serious Games: Joint International Conference, September 22 - 23, 2022.
- Authors: Ioana Andreea Stefan, Ancuta Florentina Gheorghe, Antoniu Stefan, Andriani Piki, Hariklia Tsalapatas, Olivier Heidmann. **Constructing Seamless Learning through Game-Based Learning Experiences.** mLEARN 2022 - The 21st World Conference on Mobile, Blended and Seamless Learning, October 10 - 12, 2022.
- Authors: Jannicke Baalsrud Hauge, Heinrich Söbke, Heiko Duin, Ioana Andreea Stefan, Barbara Göbl. **Current Opportunities and Challenges of Digital Game-Based Learning**. ICEC 2022 21st IFIP TC 14 International Conference, November 1–3, 2022.
- Authors: Ioana Andreea Stefan, Ancuta Florentina Gheorghe, Jannicke Baalsrud Hauge, Antoniu Stefan, Catalin Radu. **Constructing Gamified Learning Experiences.** GALA 2022 - The 11th Games and Learning Alliance Conference, November 30 - December 2, 2022
- Authors: Vladislava Lendzhova, Andriani Piki, Markos Markou, Valentina Milenkova, Boris Manov. **Affordances and Constraints of Game-Based Learning for Learners with Disabilities: Perspectives From Educators in Bulgaria and Cyprus.** The 19th International Scientific Conference eLearning and Software for Education Bucharest, April 27-28, 2023

- Authors: Ioana Ștefan, Antoniu Ștefan, Neil Judd, Lawrence Howard, Jannicke Baalsrud-Hauge, Cătălin Radu, Olivier Heidmann. **Towards Accessible Player Experiences.** The 19 th International Scientific Conference eLearning and Software for Education Bucharest, April 27-28, 2023.
- Authors: Ioana Andreea Ștefan, Antoniu Ștefan, Ancuța Florentina Gheorghe, Jannicke Baalsrud-Hauge, Ștefănel Roșcan, Andriani Piki. **Modding Interactive Digital Assets.** The 19 th International Scientific Conference eLearning and Software for Education Bucharest, April 27-28, 2023.
- Authors: Ioana Andreea Ștefan, Ancuța Florentina Gheorghe, Andriani Piki, Jannicke Baalsrud-Hauge, Antoniu Ștefan. **A game design matrix for evaluating the mobile readiness, ease of use and educational capabilities of interactive web-based activities**. mLEARN 2023 - International Association For Mobile Learning Mlearn_Itlt Conference, October 09-11, 2023.
- Authors: Andriani Piki, Markos Markou. **Digital Games and Mobile Learning for Inclusion: Perspectives from Special Education Teachers.** BESC 2023 - 10th International Conference on Behavioural and Social Computing, October 30 November 1, 2023.