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**“Reaching Education 5.0 via further teachers' training on upgrading green and digital competences of learners with disabilities and special needs via integrated phenomenon-based learning approach”  
(TEACH-PHEN)**



Work package n°2 - Project deliverables - training materials for teachers, students with mild disabilities and pilot realisation

**RESULT 1 - “Teachers’ supportive handbook on phenomenon-based learning concept combining science, geography, mathematics, history”**

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**Authors:**



**BULGARIAN  
INCLUSION  
SUPPORT  
TEAM**



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## Preamble

***Welcome to the “Teacher's supportive handbook for Phenomenon-based learning”!***

This comprehensive guide (short version) is designed to assist educators in teaching the 21<sup>st</sup>-century skills by integrating phenomenon-based learning into their teaching practice. It particularly focuses on the interdisciplinary approach that combines science, geography, mathematics, and history. The handbook includes knowledge and material for designing inclusive, phenomenon-based learning experiences and instruction that supports all learners, including those with disabilities and special needs.

The pedagogy of this handbook is grounded in three key pedagogical concepts that aim to enhance the learning of 21<sup>st</sup>-century skills for all learners, including those with special needs. These approaches include phenomenon-based learning (PhBL), multidisciplinary learning, and Universal Design for Learning (UDL).

### **What is Phenomenon-Based Learning (PhBL)?**

Phenomenon-based learning is regarded as an innovative way to teach 21<sup>st</sup>-century skills (Lonka, 2018a) and about complex issues like climate change (Yli-Panula et al., 2020). Phenomenon-Based Learning is an educational approach that centres around real-world phenomena or events as a starting point for learning. It encourages learners to explore complex issues interdisciplinarily from multiple perspectives. Along with subject-based knowledge, it fosters 21<sup>st</sup>-century skills, such as critical thinking, problem-solving and a deeper understanding of interconnections across various disciplines.

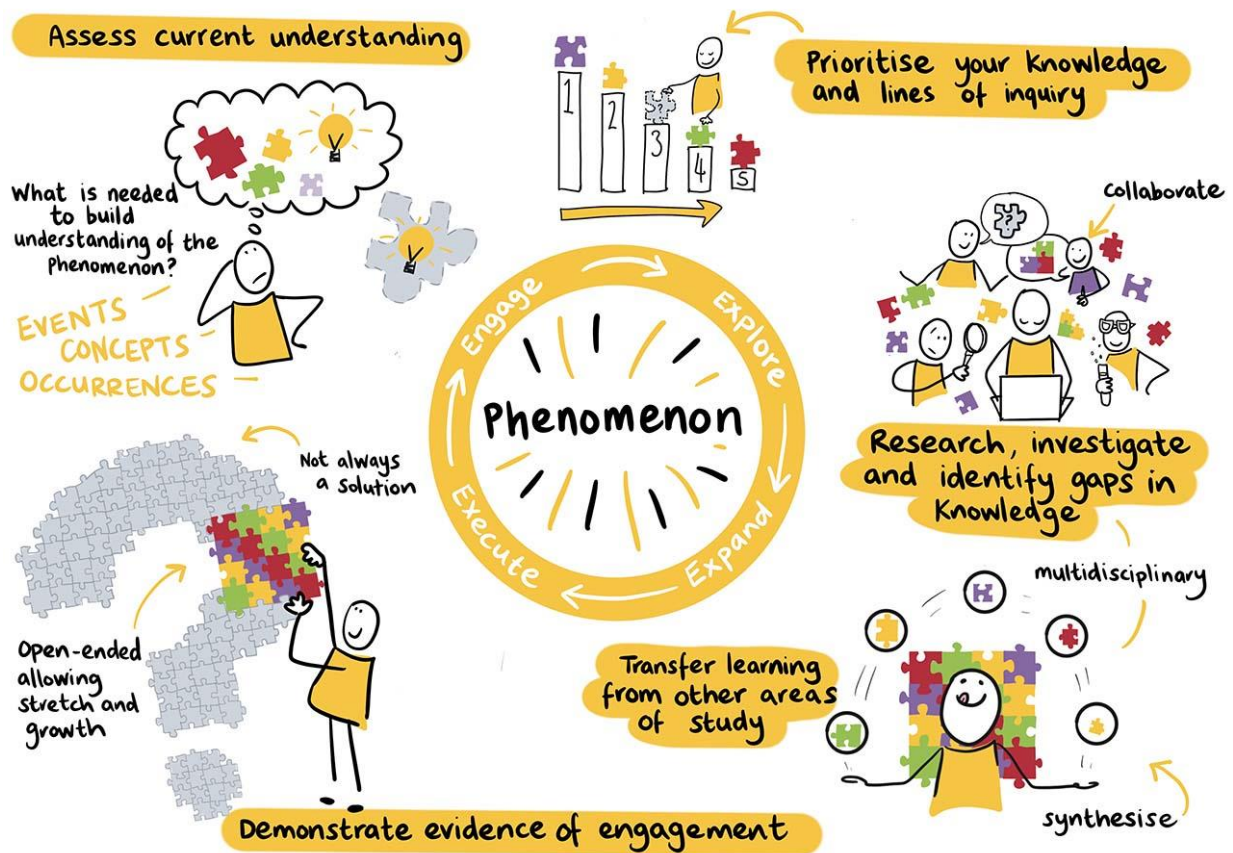


Figure 1 Phenomenon based learning / Source: Staffordshire University / Harper Adams University

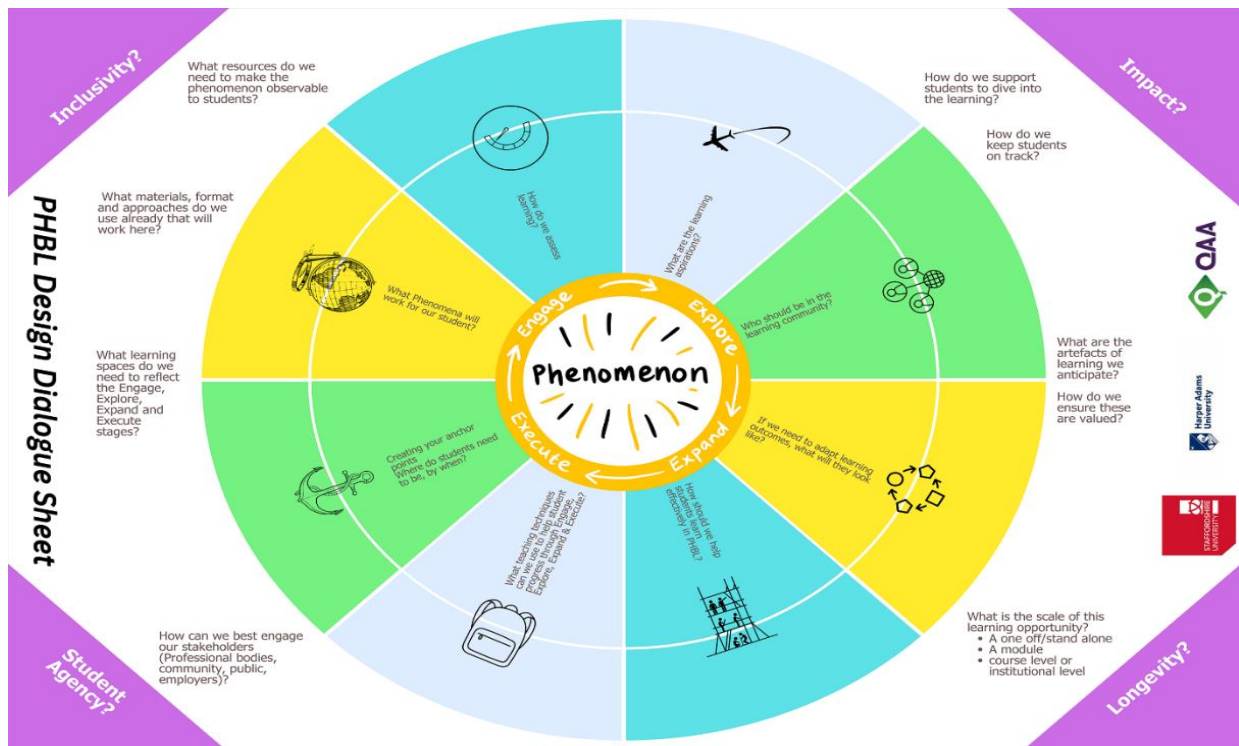


Figure 2 PHBL Design Dialogue Sheet / Source: Staffordshire University / Harper Adams University





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### **Why we combine Science, Geography, Mathematics, and History?**

By integrating these four subjects, we aim to provide a more holistic view of the world. Through multidisciplinary learning, learners will learn how scientific principles interact with geographical landscapes and how historical events have been connected to mathematical developments, and vice versa.

This interdisciplinary approach enriches the educational experience and prepares learners with skills needed to navigate the complexities they encounter in real-world situations.

### **What does equity in education mean and how can I as a teacher foster it?**

Equity in education is a fundamental objective highlighted by UNESCO (Ariza & Hernández Hernández, 2025) and the OECD (OECD, 2023). Equity is at the core of the Sustainable Development Goals (SDGs). SDG 4 aims to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' (United Nations, 2025). Additionally, the OECD (2023) emphasises that equitable education systems are crucial for enabling every student to reach their full potential regardless of their personal or social background. Equity in education means that every student is provided with the specific support they need for their learning. It should be distinguished from equality in education which indicates that all learners are provided the same instruction irrespective of their needs.



*Figure 3. Equity in education provides the necessary support for everyone to learn /Source: Freepik*



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Well-designed support for learning is especially beneficial for learners with disabilities and special needs, who often encounter specific challenges such as difficulties with language, mathematics, and executive functioning in information-rich settings. From primary through higher education, these learners frequently lack the same opportunities for participation, engagement, and retention, e.g. in the disciplines of science, technology, engineering and mathematics and arts, as their non-disabled peers (see e.g. Ariza & Hernández Hernández, 2025; Griffiths et al., 2021). At the same time, studies show that learners with special needs often exhibit lower scores in most 21<sup>st</sup>-century skills than their peers and that these gaps typically widen until they reach postsecondary education (Vaknin-Nusbaum & Rachevs.ki, 2024). Consequently, it is essential to prioritise equity and inclusion in education to ensure that all learners have equal opportunities for future success.

Thus, it is crucial that the goals of disability and discrimination policies are aligned with teaching practices. This ensures that all students, including those with disabilities, can develop their competences and skills. In instruction, this can be supported by Universal Design for Learning (UDL) approach. This handbook incorporates UDL into phenomenon-based learning and shares knowledge and tools on how to make phenomenon-based instruction and learning more inclusive and accessible for all students.

### **How to use this handbook?**

This handbook is intended to be a practical tool for recent and future teachers (those who are studying pedagogical subjects at bachelor's or master's degree level). Feel free to adapt and modify the materials to suit your specific needs and the unique characteristics of your learners. We encourage you to share your experiences and insights with colleagues to foster a collaborative learning community. We hope this handbook serves as a valuable resource in your journey towards implementing PhBL in your classroom. By embracing this innovative approach, you are empowering your learners to become lifelong learners who can tackle complex challenges with confidence and creativity. For more information, you can look on the full version separately.

**We wish you a nice time exploring phenomenon-based learning! Happy teaching!**

**The TEACH-PHEN Consortium**

## Introduction to 21st Century Skills

Worldwide, the operating environments are constantly and rapidly changing. We are faced with lots of information and a data-intensive reality that is increasingly driven by algorithms. Additionally, we are increasingly confronted with complex phenomena and wicked problems in our current reality. These include, for example, sustainable development, climate change, and the global economic crisis, which are inherently interdisciplinary phenomena. Traditional subject-based teaching, which often focuses on memorising content knowledge, often falls short in preparing learners to face this reality. Solving the wicked problems and adapting to the current complex reality requires holistic, systemic and interdisciplinary thinking. Therefore, it is increasingly important to develop general information processing skills. Terminologically, these skills have been framed as 21<sup>st</sup>-century, transversal, generic or broad-based skills (Binkley et al., 2012; Halinen & Jääskeläinen, 2015; Lonka, 2018a). In this handbook, we refer to them as 21<sup>st</sup>-century or transversal skills. The 21<sup>st</sup> century skills can be broadly categorized into four main areas: 1) ways of thinking, 2) ways of working, 3) tools for working and 4) living in the world (Binkley et al., 2012).

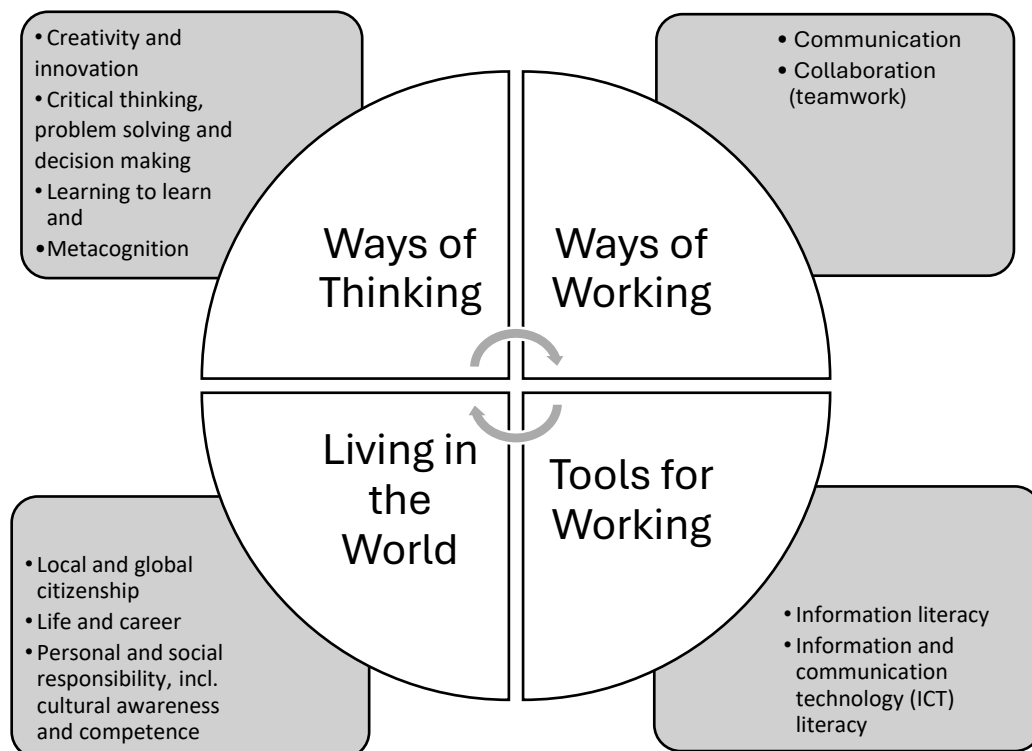


Figure 4. The Framework of 21<sup>st</sup>-century Skills by Binkley et al. (2012)





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The category "Ways of Thinking" encompasses the skills crucial for navigating the complexities of the modern world. Creativity and innovation involve generating, refining, and evaluating new ideas, and then implementing them effectively in collaboration with others. Critical thinking, problem-solving, and decision-making skills require the ability to reason, apply systems thinking, make informed judgments, and address problems by identifying knowledge gaps and posing meaningful questions. Learning to learn and metacognition focus on understanding one's own learning preferences, strengths, and weaknesses, and managing the learning process through goal-setting, time management, self-assessment, and critical reflection on learning experiences. (Binkley et al., 2012)

The category "Ways of Working" involves crucial skills for effective communication, collaboration and teamwork. Communication skills encompass both verbal and written proficiencies in the learner's native language and other foreign languages. This involves allowing individuals to listen effectively, articulate their thoughts clearly, make arguments and utilise various types of media to share ideas. Additionally, collaboration and teamwork skills involve working and interacting efficiently with other people and in diverse teams, utilising social and cultural diversity to foster creativity, managing projects, and guiding others towards shared goals. (Binkley et al., 2012)

The category "Tools for Working" includes skills such as information literacy and information and communication technology (ICT) literacy that equip individuals to navigate digital environments efficiently. Firstly, information literacy involves the ability to access, evaluate, and effectively use information, data and concepts from various sources deliberately and systematically. ICT literacy, on the other hand, refers to the ability to use digital technologies effectively and ethically to access, use, manage and communicate information. It also includes the ability to assess the usability of these tools and utilise them to solve problems, create new knowledge and media products. (Binkley et al., 2012) With the rise of Artificial Intelligence (AI), it has been suggested that 21<sup>st</sup>-century skills involve also AI-related competences, such as 1) innovation and creative design with and for AI, learning to act autonomously with and for AI and 3) co-creation with and through AI (Ehlers et al., 2023).



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The category "Living in the World" encompasses skills essential for acting for democracy and navigating complex social and professional landscapes. It includes local and global citizenship (local and global), which is about understanding the roles and responsibilities of citizens living in democratic societies nationally and internationally, demonstrating solidarity by taking part in solving problems locally and globally, and showing respect for cultural differences. Life and career skills focus on the ability to adjust to change, demonstrate flexibility in interacting with others, manage goals and time and projects, work in a self-oriented way, and interact effectively with others in diverse groups and various roles. Personal and social responsibility involves demonstrating ethical behaviour, integrity, and social responsibility, including cultural awareness and competence, as well as the ability to communicate constructively in diverse social situations.

Acquiring these 21<sup>st</sup>-century skills is essential for all learners, including those with disabilities, to navigate the complexities of modern life, work effectively in diverse teams, and adapt to new challenges. By integrating these skills into learner-centred and inclusive education practices and providing appropriate support and accommodations, educators can empower all learners to reach their full potential and contribute meaningfully to society.



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# Phenomenon-based learning as a modern pedagogical approach

## Traditional vs. modern pedagogy

Over the past two decades, a transition has occurred from traditional pedagogy to modern pedagogical approaches. This has brought a significant shift in educational philosophy and practice. While traditional pedagogy focuses on transmitting knowledge through structured lessons and teacher-led direct instruction, modern pedagogical approaches, such as PhBL, emphasise student-centred, experiential, inquiry-driven and competency-based approaches that centre around real-world phenomena.

|                               | <b><i>Traditional pedagogical approaches</i></b>                                                                                                                                                                       | <b><i>Modern pedagogical approaches</i></b><br><b><i>e.g. PhBL</i></b>                                                                                                                                    |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Definition</i></b>      | <ul style="list-style-type: none"> <li>• A teacher-focused method that emphasises the delivery of knowledge and learners' passive reception</li> </ul>                                                                 | <ul style="list-style-type: none"> <li>• A learner-focused method that highlights active involvement, personalized learning, and practical application.</li> </ul>                                        |
| <b><i>Characteristics</i></b> | <ul style="list-style-type: none"> <li>• Teacher-led</li> <li>• Knowledge transfer from the teacher to learners</li> <li>• Passive student role</li> <li>• rote memorisation</li> <li>• Teacher assessments</li> </ul> | <ul style="list-style-type: none"> <li>• Learner-centred</li> <li>• Active engagement</li> <li>• Customised learning</li> <li>• Practical application</li> <li>• Collaboration and interaction</li> </ul> |
| <b><i>Advantages</i></b>      | <ul style="list-style-type: none"> <li>• Well-structured and organized</li> <li>• Clear expectations</li> </ul>                                                                                                        | <ul style="list-style-type: none"> <li>• Boosts interest and intrinsic motivation</li> </ul>                                                                                                              |



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|                      |                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                        |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Disadvantages</b> | <ul style="list-style-type: none"><li>• Effective for large groups</li><li>• Comparability of learning outcomes across schools and regions</li><li>• Efficient in delivering large volumes of information</li></ul>                                                                             | <ul style="list-style-type: none"><li>• Fosters creativity and critical thinking</li><li>• Addresses individual needs</li><li>• Enhances practical skills</li><li>• Encourages collaboration</li></ul> |
|                      | <ul style="list-style-type: none"><li>• Low learner engagement</li><li>• Lack of personalization in learning</li><li>• Dependence on external rewards</li><li>• Limited practical application in real-world contexts</li><li>• Minimal collaboration and interaction between learners</li></ul> | <ul style="list-style-type: none"><li>• Requires teacher training</li><li>• Needs additional resources and technology</li><li>• Can be challenging to implement uniformly</li></ul>                    |

Table 1. Adapted and enhanced based on (Yue, 2024)

Traditional and innovative learning models differ in their approach to:

- learning /teacher-centred or student-centred approach/;
- teaching styles;
- the degree of personalization of training;
- learning styles;
- the digital and smart-digital technologies used.

Traditional and innovative learning models have many differences but also share some similar characteristics.

## Similarities between traditional and innovative learning models

- **Aim to acquire knowledge** and forming skills / both types of models strive for quality education with effective acquisition of knowledge and formation of skills.
- **Use of learning materials** - textbooks, teaching aids, study notebooks /including digital/, lectures and discussions are inherent to both traditional and innovative learning models.
- **Leadership role of the teacher** – regardless of the model, the teacher remains the key to the learning process.
- **Multidimensional roles of the teacher:** in both traditional and innovative learning models, the teacher performs multidimensional roles, presented in Figure 1.

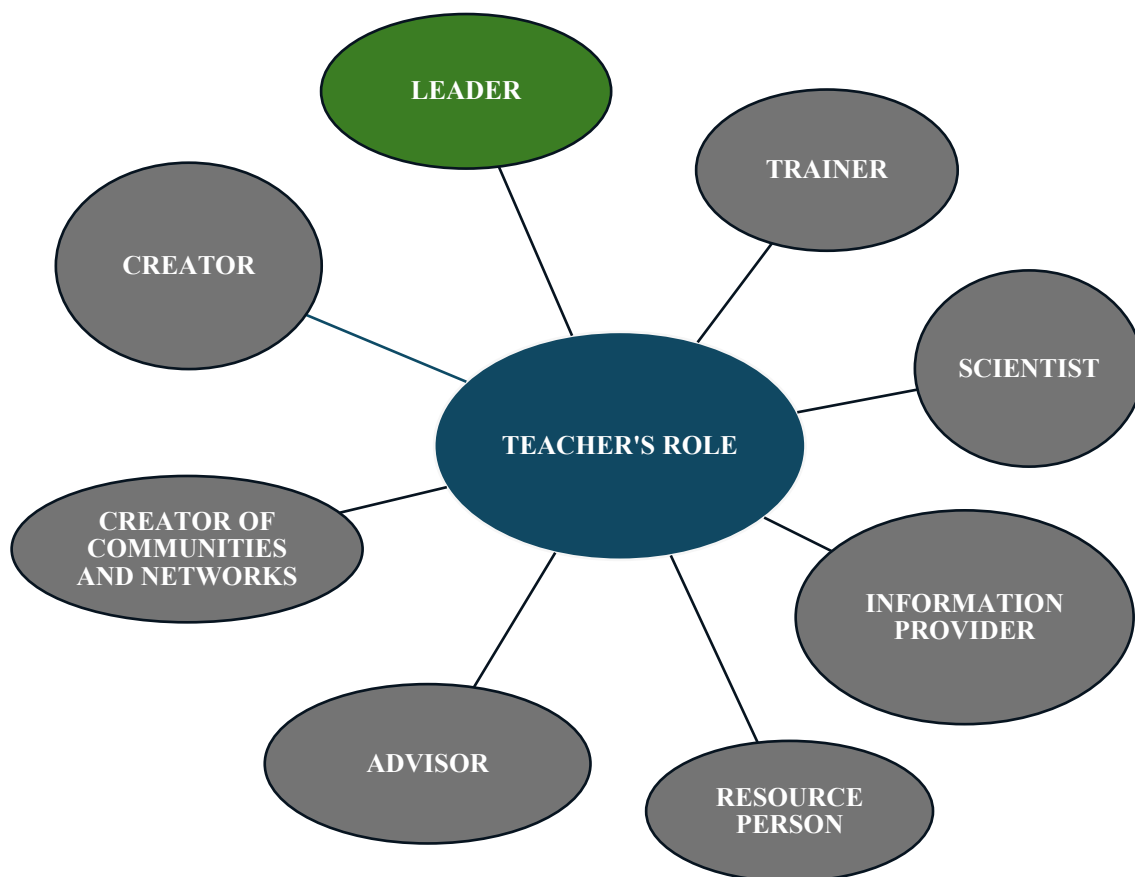


Figure 5. Teachers' characteristics



The teacher as a classroom leader has the responsibilities outlined in Figure 2.



Figure 6. Teachers' responsibilities

## Differences between traditional and innovative models

| Traditional learning models                 | Innovative learning models                               |
|---------------------------------------------|----------------------------------------------------------|
| Fixed curriculum                            | Flexible and adaptive learning paths                     |
| Passive listening to the lesson by students | Active student participation through interactive methods |
| Teacher-student interaction                 | Team interactions: teacher-student-student               |
| Standard tests and exams                    | Adaptive testing and dynamic feedback                    |
| Textbooks and written materials             | Digital resources, digital technologies                  |



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| Traditional learning models           | Innovative learning models                                                |
|---------------------------------------|---------------------------------------------------------------------------|
| A universal approach for all students | Personalized training according to individual needs                       |
| Limited technology integration        | Using artificial intelligence, virtual classrooms and mobile applications |
| Formal assessment by the teacher      | Formative assessment by the teacher, peer assessment and self-assessment  |

*Table 2 Traditional vs. Innovative learning models, Lazarov, 2025*

## Key advantages of innovative models

- Increased student engagement through interactive methods;
- Better adaptation to individual needs;
- Expanded online and hybrid learning options;
- Using artificial intelligence to analyse progress.

Traditional learning models have been used since the dawn of education. Undoubtedly, education is also undergoing transformations and is evolving with the development and implementation of innovative teaching methods that transform learning into **a more engaging, personalized, and effective process.**

## Phenomenon-based learning

Phenomenon-Based Learning (PhBL) is an innovative educational approach focused on a central phenomenon that serves as the cornerstone for learning. PhBL emphasises authenticity, interaction, constructivist learning, self-directedness, and interdisciplinarity. In addition, it aims to support learners in developing their skills in learning to learn, metacognitive awareness, and media literacy. Phenomenon-based learning can be applied through various methods, such as inquiry-based learning, problem-based learning, project-based learning and portfolio-based learning (Aarnio, 2016). PhBL has been integrated into



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various levels of education, ranging from early childhood education to higher education (Wolff, 2022).

While traditional pedagogy has its merits in terms of efficiency and standardisation, phenomenon-based learning offers a more engaging and relevant approach to education. As subject-based teaching provides a limited perspective to the real world, PhBL aims to provide a holistic view and deeper understanding by integrating multiple subjects. This encourages learners to explore and understand the interconnectedness of different disciplines. As approaches to implementing PhBL, integrative education and multidisciplinary learning provide insight into the connections between various subjects and fields. In general, integrative education aims to facilitate the learners' understanding of links and interdependencies among the studied subjects and topics. Multidisciplinary learning modules are "learning units that integrate topics from different fields of knowledge and are based on the cooperation of different subjects". (Peltomaa, 2021) In this handbook, this kind of multidisciplinary PhBL-based entity is referred to as PhBL project.

Unlike in traditional knowledge-based instruction, which often emphasises memorisation and repetition, the development of 21<sup>st</sup>-century skills is a slower, more complex process. However, it promotes more profound understanding, better problem-solving abilities, and learners' ability to transfer skills into different contexts. It is essential to allocate sufficient time to develop these skills. (Luostarinen & Peltomaa, 2016)

According to Sillander (2015), the key dimensions of phenomenon-based learning are holisticity, authenticity, contextuality, inquiry-based learning, and the learning process. Holisticity means that different subjects are combined to create a complete and connected learning experience. Authenticity refers to the learning tasks that are real-world, practical and relevant to everyday life. Contextuality in learning means that learning is tied to meaningful situations or environments, which makes learning more relatable. Problem-based inquiry focuses on learners' questioning and exploration to solve real-world problems. In PhBL, the focus is on the learning process that involves learning tasks that guide and facilitate learning. According to Sillander's (2015) rubric on PhBL, the depth and effectiveness of the PhBL experience depend on how extensively these dimensions are addressed in the pedagogical



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design of a PhBL project. It is advisable to apply the method in a manner and to an extent that supports the teacher's familiarity with the method and the learners' skill level.

By focusing on a single phenomenon, such as climate change, learners engage in inquiry-driven and experiential learning, asking questions and seeking answers through hands-on activities and investigations. This approach fosters curiosity and a holistic understanding and emphasises both formative and summative assessments throughout the learning process. As learners delve into the phenomenon from various angles, they develop a deeper conceptual understanding and make interdisciplinary connections, moving beyond practical applications to grasp the broader implications of the subject matter.

The key differences between traditional pedagogical methods and phenomenon-based learning

|                                    | <b>Traditional pedagogical methods</b>              | <b>Phenomenon-based learning</b>                                                      |
|------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Focus</b>                       | Knowledge transmission from the teacher to learners | Learner-centred inquiry and discovery                                                 |
| <b>Role of the teacher</b>         | Authority figure, primary source of information     | Facilitator, guide, mentor, emotional supporter, inspirer                             |
| <b>Role of the learner</b>         | Passive recipient                                   | Active participant, explorer, critical thinker, creative agent, innovator, researcher |
| <b>Instructional Method</b>        | Lectures, direct instruction                        | A variety of methods, e.g. inquiry-based learning                                     |
| <b>Curriculum Structure</b>        | Linear, structured                                  | Flexible, adaptable                                                                   |
| <b>Assessment</b>                  | Tests, exams, and rote memorisation                 | Formative and summative assessments, self- and peer assessments                       |
| <b>Level of Learner Engagement</b> | Low or moderate                                     | High                                                                                  |



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|                                    |                               |                                               |
|------------------------------------|-------------------------------|-----------------------------------------------|
| <b>Depth of Understanding</b>      | Surface level                 | Deep, connected understanding                 |
| <b>Skill Development</b>           | Basic skills                  | Higher-order skills (critical thinking, etc.) |
| <b>Relevance to the Real World</b> | Limited real-world connection | Highly relevant to real-world contexts        |

Table 3 Traditional vs PhBL methods, Lazarov, 2025

## Theoretical roots and pedagogical applications

Phenomenon-based learning (PBL) is an educational approach that uses real-world phenomena or events as the starting point for learning (Lonka, 2018a). As a modern pedagogical approach, it is rooted in educational psychology, constructivist learning theories, inquiry-based learning, problem-based learning, and phenomenology (Schaffar & Wolff, 2024) and sociocultural learning theory (Lonka, 2018b).

A phenomenon can be defined as:

*“a fact or situation that has become an object of observation and is affected by several factors working independently in the background. Also, temporary movements, events and fashion trends are also often called phenomena.” (Sitra, 2025)*

As an example, climate change is a phenomenon that carries the following meaning:

*“The ongoing anthropogenic climate change is mainly caused by an increase in the amount of greenhouse gases, especially carbon dioxide, in the atmosphere. If emissions continue to rise at the present rate, the global average surface temperature will rise between two and six degrees by the end of this century due to the amplification of the greenhouse effect. In some parts of the world, changes in precipitation will lead to more severe droughts and in others, an increased risk of flooding” (Climateguide, 2025).*

From a learning perspective, a phenomenon must be observable to exist. Phenomena can vary greatly in their nature, characteristics, and attributes. They can be, for example, cultural, mathematical, or physical, or they can be an event or a series of events. For learning, a phenomenon is optimal when it is sufficiently diverse in terms of subjects and learning goals,



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and can be examined using different scientific disciplines or fields. (Lonka et al., 2015). For a teacher, it is beneficial to choose a phenomenon that is relevant to the locally-taught curriculum and can be approached from many subject-specific standpoints (Aarnio, 2016).

Moreover, the selected phenomenon should align with local curriculum goals while also reflecting the school's educational values. Established traditions and school-wide practices can serve as a foundation for expanding into broader learning experiences. To make PhBL-based learning more engaging and relevant, they can be designed to involve locally important themes and timely issues. For example, in a community where forestry is a key industry, forestry-related themes can be incorporated into the phenomenon. Learning can be made timelier and more relevant for learners by addressing current societal issues, political discussions, or global trends that help connect learning to real-world contexts. (Luostarinen & Peltomaa, 2016)

Before integrating a PhBL, learners need to have the basic skills and concepts needed to study the phenomenon in question. For example, when exploring climate change as a phenomenon, it is important to make sure the learners are familiar with relevant concepts, such as the atmosphere, the ozone layer, and greenhouse gases, as well as key knowledge in history and physics. (Sanomapro, 2025) For effective learning, it is crucial, yet challenging, to narrow down the phenomenon enough, but not too much. (Sanomapro, 2025). Honkonen and Lehmuskoski (2015) advise that a too widely defined phenomenon can be unmotivating or challenging to make sense of. In turn, if a phenomenon is defined too narrowly, it may restrict the exploration of different perspectives.

PhBL emphasises learners' agency and engagement in their own learning process. In PhBL, the learner is regarded as a researcher and explorer. They are given an active and creative role to "act as a cognitive and motivational captain of their own learning, which enhances a coherent and meaningful learning experience" (Lonka 2018). The key focus of PhBL is on the learner's ability to observe phenomena and the learner's insights that arise from it. Learning is centred on how learners adopt information through their senses and process it based on their experiences, prior knowledge, and personal goals (Kauppila, 2007). Learner's





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agency refers to their “effectiveness in regulating their cognitive, affective, and behavioural processes.” (Code, 2020).

The teacher’s role in PhBL shifts from being a primary source of knowledge to acting as a facilitator, mentor, coach, emotional supporter, and inspirer (Lonka et al., 2015; Taimela, 2017). A significant part of the teacher’s time is dedicated to supporting learners as they navigate their own learning journeys, offering individualised guidance and encouragement. (Luostarinen & Peltomaa, 2016) In addition, the teacher’s role requires planning the structure of content knowledge and skill building by determining the learning environment, setting learning goals, and selecting learning tools. On the other hand, the teacher’s role is to foster a safe and encouraging learning atmosphere and support learners in their learning process. (Lonka et al., 2015; Luostarinen & Peltomaa, 2016)

In PhBL, the teacher guides and encourages learners to take ownership of their own learning, collaborate, set appropriate questions, conduct research, think critically and creatively, develop their learning skills together, describe and present their learning process and evaluate themselves and their peers. Teacher also executes assessment continuously during the learning and gives individual support for learning when needed. (Taimela, 2017) As PhBL is based on learners’ responsibility and agency, it is important to pay attention to learners’ motivation. A teacher can enhance motivation in learners by encouraging and inspiring them to learn.

Besides fostering the development of content knowledge and skills, it is essential to actively involve and engage learners in shaping their learning experience. This can be supported by providing opportunities for them to contribute ideas, whether by selecting themes, choosing topics of interest, or suggesting learning methods. Allowing learners to have a say in the tools, activities, and assessment methods used can further increase motivation. Learning experiences should begin with learners' existing knowledge, interests, and strengths, and the purpose of the subsequent learning process is to broaden their perspectives. Teachers play a key role in expanding learners’ understanding by providing new viewpoints and methods for exploration. (Luostarinen & Peltomaa, 2016)



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The extent of collaboration between teachers in creating a multidisciplinary learning module at different educational levels depends on how deep subject-specific expertise is required from the teachers. Typically, a class teacher has specialisation in many subjects, which may require little or no collaboration with other teachers (e.g., a special education teacher). However, in the context of secondary and higher education, teachers typically have expertise in one or a few subjects. Consequently, creating a multidisciplinary project in this context requires more intensive collaboration between teachers. (Luostarinen & Peltomaa, 2016)

Whenever collaboration between teachers is needed, it is beneficial to build it on trust, shared expertise, and teamwork. Ideally, it entails an ongoing iterative cycle of improvement that consists of planning, implementation, evaluation, and returning to planning with new learnings and insights. Successful cooperation means being open to colleagues' ideas during brainstorming, lesson planning, guiding learners, managing challenges, and conducting assessments. It involves committing to joint efforts, navigating uncertain situations proactively together, taking responsibility for both individual and collective tasks, maintaining a positive team dynamic, celebrating achievements, and ensuring effective communication. It is also beneficial to recognise each teacher's strengths, such as skills in educational technology or learner engagement, and make use of them. (Luostarinen & Peltomaa, 2016)

Co-creating modules enables educators to learn from one another, exchange expertise, and experiment with new teaching approaches within their school environment. When suitable, multidisciplinary projects can be extended beyond the classroom, incorporating partnerships with local stakeholders, such as businesses and organisations. (Luostarinen & Peltomaa, 2016)

Since PhBL is often an emotionally activating approach, it challenges learners' emotional capacity. For learners unfamiliar with this approach, the shift from traditional approaches may be initially overwhelming. To develop an active learning mindset and take responsibility for their learning, learners need to practice self-regulation, resilience, and adaptability. (Luostarinen & Peltomaa, 2016) Consequently, teachers need to be ready to guide and support learners with emotional regulation, especially in the case of negative feelings, such as anxiety and uncertainty (Lonka et al., 2015). For learning, it is crucial that the learning



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environment feels psychologically safe and everyone feels welcome to participate and contribute their ideas (Aarnio, 2016).

There are no detailed instructions for constructing or implementing a phenomenon-based learning process. Thus, each teacher can adjust PhBL to suit their style of teaching (Lonka, 2018b). PhBL can be implemented through a variety of pedagogical approaches (Wolff, 2022), such as inquiry-based learning, problem-based learning, project learning, portfolio-based learning (Aarnio, 2016) or engaging learning environment model (ELE) (Lonka, 2018b). According to Lonka et al. (2015), especially inquiry-based learning (see e.g. Pedaste et al., 2015) provides a well-rounded methodological approach for applying PhBL.

Inquiry-based multidisciplinary learning encourages learners to explore topics through active participation, fostering curiosity while offering diverse ways to learn and develop skills. The emphasis is on collaboration, problem-solving, and real-world applications that introduce a variety in teaching strategies, learning environments, and instructional tools. (Luostarinen & Peltomaa, 2016)

In inquiry-based learning, instruction is built on four key phases: orientation, conceptualisation, investigation and conclusion (Pedaste et al., 2015b). Each phase can be designed to cover methodology that supports the development of the targeted skills and subject content.

The purpose of the orientation phase is to introduce the phenomenon and spark inherent curiosity, engagement and interest in learners. Orientation can involve visiting a place (e.g., an organisation, a natural location, a theatre play, or a science museum), inviting expert guests to discuss the phenomenon, or providing other orientation materials, such as art or textual pieces relevant to the phenomenon being examined.

In the conceptualisation phase, learners are guided to explore the topic and formulate questions and hypotheses based on their explorations. Learners can be guided and encouraged to ask questions from different perspectives and be involved in defining and narrowing down the phenomenon being studied. These can involve examining the phenomenon with questions from political, geological, chemical, mathematical, historical, and biological perspectives. (Aarnio, 2016) Learners can be assigned to groups based on their

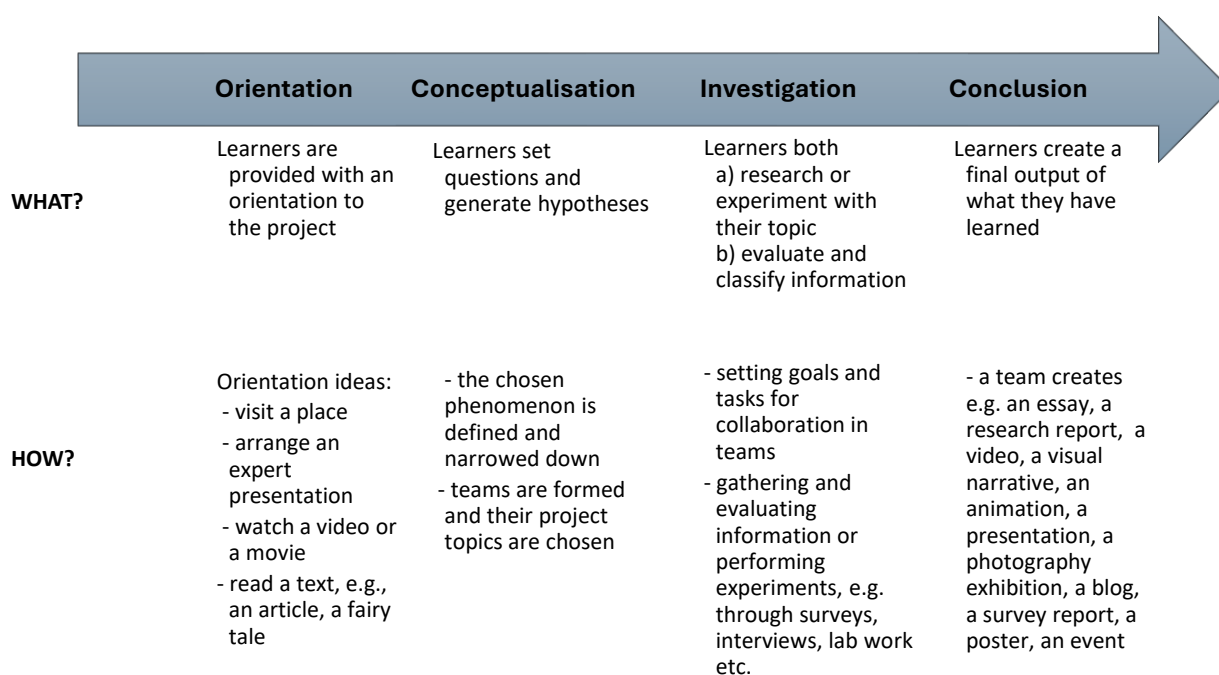


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interests and questions. For this, the teacher can encourage learners to ask questions about the phenomenon. Then, these questions can be used to organise learners into groups based on their interests. This phase can also include goals for diagnostic evaluation, such as the use of mind maps to assess learners' prior knowledge. These mind maps can be used in the later phases as assessment material of what has been learned during the process. (Taimela, 2017)

In the investigation phase, learners plan and execute their research project or experiments. The teacher's role in this is to help groups set joint goals for learning about the phenomenon, define the tasks, roles of participants, and the division of labour. It is also important that the teacher makes sure that all learners are learning the key learning objectives (Aarnio, 2016) The group's topic can be examined by gathering and evaluating information or performing experiments, e.g. through surveys or interviews, lab work etc. (Taimela, 2017)

The conclusion phase typically includes creating final outputs, presenting findings and reflections of the learning process. In this phase, it is beneficial for learners to have the opportunity to choose their preferred form of output. The options for final outputs can involve preparing a presentation or a poster, writing an essay or a blog post, preparing a research or survey report, creating a visual representation (e.g., through video, animation, or photography), or organising an event, such as a school fair. (Aarnio, 2016; Pedaste et al., 2015b; Taimela, 2017)





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*Figure 7. Phases of inquiry-based learning and their practical application ideas in phenomenon-based learning (adapted from Pedaste et al., 2015b; Taimela, 2017)*

For learners to engage deeply with key concepts and work purposefully, PhBL projects should be planned with adequate time for exploration. It is recommended that a module should last approximately the number of hours a learner spends at school in one week. In Finland, for example, the recommended length of a module is 19-20 hours for first and second graders and 27-30 hours for seventh to ninth graders. The module can be structured as an intensive week-long experience or designed to spread over multiple weeks, such as an eight-week period. (Luostarinen & Peltomaa, 2016)

### Assessing the learning process in Phenomenon-based learning projects

Assessment is the most crucial pedagogical instrument for teachers in directing learning and carrying out educational activities. Traditional educational practices often involve learners working individually, focusing on memorising facts or performing simple tasks. These activities are typically conducted without the use of books, computers, or social networks. The work is then shared solely with the teacher, who usually provides only minimal feedback. Moreover, learners are provided with few opportunities to make revisions. (Binkley et al., 2012) Assessing the learning process in PhBL requires a shift from these traditional assessment methods to more process-oriented and learner-centred ways of assessing learning. The assessment in PhBL emphasises the evaluation of learners' ability to apply knowledge, think critically, and solve problems within the context of real-world phenomena.

For a PhBL project, it is essential to base evaluation on learning goals and criteria rather than comparing learners' performance with one another. Learning goals and objectives are established in national or local curricula. These objectives serve as the basis for deriving the assessment criteria for a subject or learning task. These criteria explain what learners need to know and be able to do to achieve each grade level. The criteria can include, for example, how an "excellent" performance is distinguished from a "good" or "poor" one. Evaluation can be designed to cover aspects of learning, working and behaviour. It is helpful for learners to have



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learning goals and assessment criteria visually available. This can be achieved by creating rubrics that outline specific criteria for assessing the selected learning objectives, such as collaboration. These learning objectives and criteria can be visualised as a matrix or a tree on a classroom wall. (Luostarinen & Peltomaa, 2016)

You can search for assessment rubrics using search engines on the internet (Ovaska et al., 2014). Alternatively, if your organisation approves the use of AI in pedagogical planning, you can also utilise openly available AI tools, such as ChatGPT (OpenAI, 2025), and employ prompting tactics (see e.g. AI for Education, 2025) for drafting assessment rubrics.

Instead of providing feedback at the end of a learning process, the assessment of a PhBL project should be designed to support learning continuously throughout the project and encompass various assessment methods, with a focus on formative, self-assessment, and peer assessment. From a teacher's perspective, assessing 21st-century skills involves continuous observation, offering formative feedback that is encouraging and development-oriented, as well as goal-setting and scaffolding to facilitate learners' learning. This approach also involves arranging learners' opportunities for self- and peer-assessment (Luostarinen & Peltomaa, 2016). Instead of only providing feedback on past performance, assessment should “feed forward,” which means that learners receive needs-based support throughout the learning process and receive information on how to improve their skills in the future (Gonzalez, 2018). Continuous and simultaneous assessment is possible if learners are guided towards continuous self-assessment and peer-assessment practices. These, however, need to be taught and practised often before a project starts. (Lonka, 2018b)

Suggested key assessment methodologies for a PhBL project include diagnostic assessment, formative assessment, summative assessment, and self- and peer-assessment.

### **1. Diagnostic assessment**

Diagnostic assessment “examines the knowledge and skills that a pupil has already learnt”. (Jones, 2023) Diagnostic assessment serves several key purposes in the learning process. It helps identify gaps in learners' understanding, enabling educators to address these areas before introducing new concepts. It informs instructional planning by revealing learners' current knowledge and skills, allowing lessons to build on existing understanding while



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targeting areas for improvement. Additionally, it establishes a baseline for tracking progress and evaluating instructional strategies over time. By offering insights into learners' preferences and needs, diagnostic assessment supports differentiated instruction, ensuring each learner receives tailored educational support.

Diagnostic assessment methods offer diverse ways to evaluate learners' existing knowledge and skills. Pre-tests help gauge prior understanding before new instruction begins, while surveys and questionnaires capture detailed insights into misconceptions. Concept maps and mind maps enable learners to represent their learnings visually. This provides information on areas where there are gaps in understanding. Observations provide teachers with real-time perspectives on problem-solving approaches, and self-assessments (see e.g. Marchant (2023) for KWL charts) invite learners to reflect on their strengths and areas needing improvement. (Marchant, 2023)

## **2. Formative assessment**

Formative assessment involves evaluating learners continuously during the whole learning process. The aim is to support learning by providing constructive feedback and helping learners understand how they are progressing toward their goals and what objectives they should set next. Formative assessment serves as a tool to aid learning (assessment for learning) and contains a guiding and development-focused perspective (assessment as learning) (Luostarinen & Peltomaa, 2016). Formative assessment is particularly beneficial for learners with weaker skills when the purpose of the assessment is to support the implementation of the next steps in the learning process (scaffolding) (Binkley et al., 2012) .

In a PhBL project, formative assessment methods can be integrated into each phase of projects life cycle. At different phases of learning, it is important to provide learners opportunities to assess their own learning process as well as their own and others' actions. (Lonka et al., 2015)

Formative assessment methods include regular observations and discussions to monitor learners' participation, collaboration, and engagement during activities. Teachers can also utilise checkpoints, such as short quizzes, to evaluate understanding of key concepts at different points in the learning process. Reflective journals or learning logs allow students to





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document their thoughts, questions, and discoveries, fostering deeper engagement. Additionally, portfolios, which comprise a selection of a learner's work, provide a comprehensive view of learners' progress and achievements over time while also helping them track their development and understand their strengths and areas for improvement. (LuKiMat, 2025)

### **3. Summative assessment**

Traditionally, summative assessment has been used to assess overall learning at the end of a unit or project and give feedback on what has already been learned. It typically does not involve ideas on how to improve performance in the future. To support learning after the learning period, summative assessments should also include guidance and descriptions on how learners can improve their skills in the future. This type of assessment for learning includes a description of learners' strengths and areas of mastery, as well as identifying areas that need improvement. As a ratio for effective assessment feedback, it is often beneficial to mention 3 strengths and areas of mastery to one area of improvement (Luostarinen & Peltomaa, 2016).

At the end of a phenomenon-based project, summative assessment is based on final outputs. In their final outputs, learners showcase their understanding of the phenomenon and their findings. These can involve, for example, presentations, essays, portfolios or photo exhibitions.

### **4. Self-assessment and peer assessment**

Self- and peer-assessments can be included in a PhBL-based project. In self-assessment, learners use assessment criteria to reflect on their own work, pinpoint areas for improvement, and enhance the quality of their output accordingly. Peer assessment involves learners evaluating the work of their peers according to established criteria related to a specific learning objective and providing constructive feedback to help improve their peers' performance. The purpose of self-assessment is to develop one's skills in metacognitive awareness and the learner's ability to assess, orient, and regulate one's own learning experience. Usually, learners do not acquire this ability outside school, so it needs to be taught. To make self- and peer-assessment effective for learners, it is important to share encouraging feedback and foster an



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accepting, safe, open and trusting atmosphere in the group. (Luostarinen & Peltomaa, 2016)

Self-assessment can be taught through tasks that require self-reflection, guiding learners to reflect on their own learning and identify strengths and areas for improvement. In peer assessment, learners provide constructive feedback to one another based on the evaluation criteria. Methods for self- and peer-assessment include, for example, the Scrum method (Peltomaa, 2021) and learning journals (Rongas & Laaksonen, 2014) .



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## Transforming operating culture for phenomenon-based learning: myths, realities, and strategies

Integration of phenomenon-based learning poses certain challenges for the operational culture of educational institutions. The culture in many educational institutions does not support the general goals of PhBL, which include, for instance, increasing learners' agency, engagement, and participation, diversifying assessment methods, implementing 21<sup>st</sup>-century (transversal) skills, and enhancing cooperation between teachers.

In educational settings, certain cultural myths surround the implementation and effectiveness of PhBL. In education, a cultural myth is “a sociocultural structure and learned thought construct that either promotes or prevents change in an educational institution and intuitively guides everyday choices and actions”. Similarly, a pedagogical myth can be regarded as “a well-established conviction that contradicts current knowledge concerning pedagogical truths” (Heland-Kurzak, 2020). Awareness and conscious debunking of cultural and pedagogical myths can help to create a more PhBL-friendly environment for learning. (Peltomaa & Luostarinen, 2020)

Peltomaa and Luostarinen, (2020) list and describe four cultural myths in education that might influence the implementation of a PhBL project. These myths are 1) transfer of knowledge, 2) efficiency, 3) the immutability of education and 4) preparation for exams. (Peltomaa & Luostarinen, 2020)

### **Transfer of knowledge**

The notion that the teacher is the provider of knowledge while learners are mere recipients is a common myth in the educational world. It restricts learners' active participation and critical thinking, reducing their role to that of passive learners. To counteract this, teachers can encourage learners to ask questions, seek knowledge independently, and construct their own understanding. Additionally, it is beneficial to act as a guide or facilitator and provide support throughout the learning process. Leverage the knowledge of your collaboration with



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fellow teachers for co-teaching and continuously acquiring new knowledge. (Peltomaa & Luostarinen, 2020)

### **Efficiency**

The efficiency myth suggests that effective learning happens if teachers tightly control it. In traditional instruction, learning time is divided into short periods to cover content quickly rather than promote deep understanding. As a consequence, this myth prevents deep understanding and the meaningfulness of learning. To counter this myth, it is beneficial to support learners' ownership of their learning. Also, it is important to create an environment that is emotionally supportive, meaningful, experiential, and enjoyable. Additionally, diverse resources should be made available for acquiring knowledge that can be easily used to organise and apply information effectively. Allowing sufficient time to explore phenomena in-depth is crucial, as it fosters comprehensive and long-term learning. Emphasising the deep understanding and meaningfulness of learning further enhances the educational experience. (Peltomaa & Luostarinen, 2020)

### **The unchanging nature of education**

The belief that learning standards and levels remain unchanged despite changes in the world around us is a misconception. This myth overlooks the continuous evolution of society and the job market, which alters societal needs for learning. In the reality, many learning outcomes of traditional education are becoming outdated and irrelevant in today's world.

To counteract this myth, learners can be provided with opportunities to tailor their learning to their personal needs and interests and explore content that sparks their creativity and curiosity. In this process, teachers can still define common and essential goals for all learners, while allowing flexibility to differentiate instruction up or down without compromising required educational standards. By involving learners in the planning of content, methods, and the assessment of their own skill levels, education becomes more participatory and meaningful. Furthermore, creating an environment that encourages learners to delve into phenomena from multiple perspectives ensures that learning remains dynamic, flexible, and relevant to contemporary needs. (Peltomaa & Luostarinen, 2020).



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### Preparation for exams

The myth that the primary goal of learning is to succeed in exams limits the development of transversal skills such as critical thinking, problem-solving and teamwork skills. This can be counteracted by focusing more on developing 21<sup>st</sup>-century (transversal) skills and integrating diverse assessment methods that support the learning process holistically. It is advisable to use both formative and summative assessment methods. (Peltomaa & Luostarinen, 2020)

The four cultural myths in education and means to counteract their effect in phenomenon-based learning

| Myth                         | Description                                                                                                                            | Limitation                                                                                                                           | Tips for counteracting the myth                                                                                                                                                                                                                                                                                    |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Transfer of knowledge</b> | The teacher is the primary source of knowledge, and the role of the learner is to receive information.                                 | This myth limits learners' active participation and critical thinking, as they are often considered passive recipients of knowledge. | <ul style="list-style-type: none"> <li>• Encourage learners to ask questions, seek and construct knowledge themselves.</li> <li>• Act as a guide and facilitator, supporting learners in their learning process.</li> <li>• Collaborate with other teachers for co-teaching and acquiring new knowledge</li> </ul> |
| <b>Efficiency</b>            | Learning is efficient when the teacher controls the learning process and scheduling. For this, time is divided into short segments and | This myth prevents deep understanding and the meaningfulness of learning by focusing on quantitative                                 | <ul style="list-style-type: none"> <li>• Support learners' agency of their learning by providing <ul style="list-style-type: none"> <li>➤ emotional, meaningful, experiential and joyful learning environment</li> <li>➤ diverse resources for knowledge acquisition</li> </ul> </li> </ul>                        |



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|                                           |                                                                                         |                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                           | covering content is more important than understanding it                                | learning rather than qualitative.                                                                                                     | <p>➤ opportunities to organise and apply information</p> <ul style="list-style-type: none"> <li>• Give learners time to delve into phenomena and learn about them in a diverse, deep and long-term manner.</li> <li>• Emphasise deep understanding and the meaningfulness of learning.</li> </ul>                                                                                                                                                                                                                         |
| <b>The Unchanging Nature of Education</b> | Learning standards and levels remain unchanged even though the world around us changes. | This myth does not consider the constant changes in society and the job market, which make learning outcomes outdated and irrelevant. | <ul style="list-style-type: none"> <li>• Adapt learning to the needs and interests of learners</li> <li>• Leave space for learners' creativity and highlight learning content that interests them.</li> <li>• Include general and important goals and content for everyone, but also allow differentiation upward or downward when it serves your learners.</li> <li>• Involve your learners in the planning of educational content and methods as well as in defining and evaluating the level of competence.</li> </ul> |



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|                              |                                                      |                                                                                                                          |                                                                                                                                                                                                                                                             |
|------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                                                      |                                                                                                                          | <ul style="list-style-type: none"> <li>• Provide learners with the opportunity to explore and understand phenomena from different perspectives, making learning more flexible and up-to-date.</li> </ul>                                                    |
| <b>Preparation for exams</b> | The primary goal of learning is to succeed in exams. | This myth limits the development of future (transversal) skills, such as critical thinking, problem-solving and teamwork | <ul style="list-style-type: none"> <li>• Focus on developing 21<sup>st</sup>-century (transversal) skills and integrate diverse assessments that support the learning process</li> <li>• Utilise both formative and summative assessment methods</li> </ul> |

Table 4. Cultural myths (Peltomaa & Luostarinen, 2020)





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## Curriculum on climate change and environmental protection as a guiding document

To align everyday educational efforts with global and local sustainability issues, developing a curriculum on climate change and environmental protection is crucial for educating learners about the pressing issues facing our planet and empowering them to take an action. According to UNESCO's declaration on education for sustainable development (UNESCO, 2022), multidisciplinary environmental education and education for sustainable development (ESD) are crucial components that should be integrated into curricula worldwide. The European Union (EU) promotes the integration of sustainability education into national curricula (European Commission, 2025). For this, the EU has established a European sustainability competence framework called GreenComp (Joint Research Centre, 2022). According to a recent EU report (European Commission et al., 2024), these competences have already been addressed by the national curricula in most European countries.

For example, the Finnish national core curriculum for primary and lower secondary education (Finnish National Agency for Education, 2014) addresses various aspects of sustainability and eco-social education. Firstly, learning to practice a sustainable lifestyle is seen as one of the value-based guiding principles of education. Also, goals for environmental education have been integrated into subject-specific curricula. Also, a significant goal for comprehensive and secondary education in Finland is to develop 21<sup>st</sup>-century (transversal) skills. For more information, see Road to 21<sup>st</sup> Century Competence – Evaluation Framework for Transversal Competences in the Finnish Curriculum (Claned Group & ELE Finland, 2017). To support these educational goals, the Finnish curriculum incorporates integrative education, multidisciplinary learning, and phenomenon-based learning as pedagogical approaches.

National, local and grade-specific educational goals need to align with the goals of a PhBL project. By identifying these goals, the phenomenon-based project can be designed to involve the locally relevant goals, objectives, contents, pedagogical approaches and assessment methods, as well as the practices for collaboration, division of work between



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teachers and means for development and monitoring the project. (Peltomaa, 2021) For example, the Bloom's taxonomy (University of Arkansas, 2022) can be used as a tool for designing the learning objectives and assessment criteria for a PhBL project.

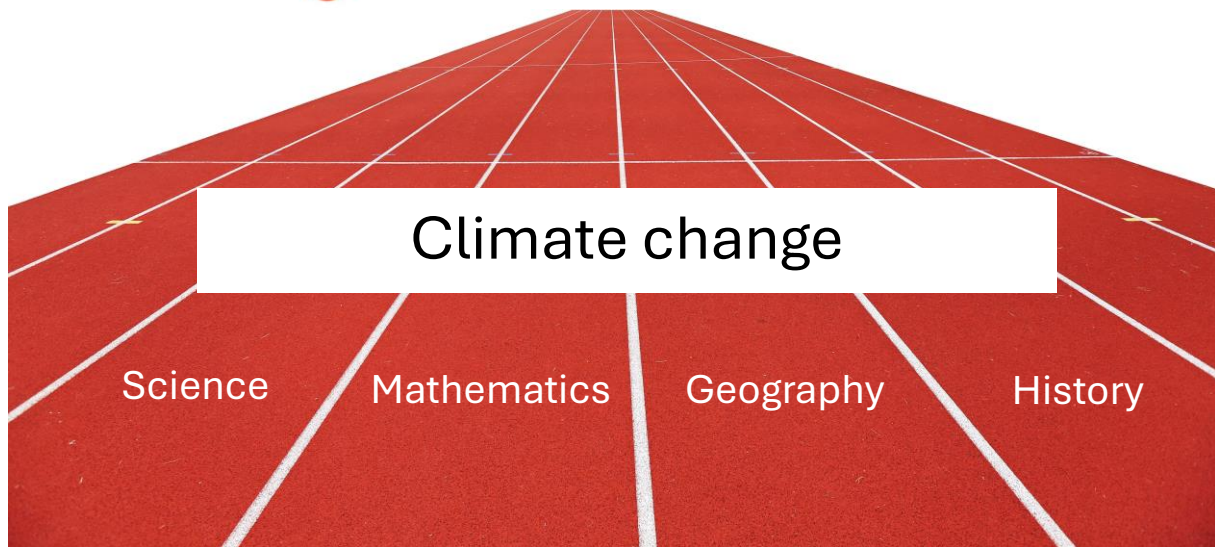
Consequently, subject-related core contents, learning goals, objectives and assessment methods as well as 21<sup>st</sup> century skills are key ingredients in constructing a PhBL-based project (Peltomaa & Luostarinen, 2020). A PhBL project on climate change can be designed to incorporate goals for various subjects. As examples, it can comprise goals in geography, such as the exploration of maps or the circulation of water, or in mathematics, such as calculating climate change-related tasks, e.g., temperatures. Learning objectives for history may include discussions on historical developments, such as the Industrial Revolution, that have contributed to climate change.

The subject-specific components do not need to be taught separately. Instead, they should be integrated into the project's structure. Whenever possible, learners should have opportunities to personalise their learning experience, choosing topics, methods, and tools that align with their interests. Providing autonomy fosters authentic engagement and encourages learners to take ownership of their learning. (Peltomaa & Luostarinen, 2020)

In addition to subject-specific goals, PhBL projects emphasise 21<sup>st</sup>-century skills (Lonka, 2018b). The national and local curricula can be utilised to determine the relevant skills for different grade levels. For 21st-century skills, the project may be designed to focus, for example, on collaboration, problem-solving, and metacognitive skills. To support the development of these skills, educators should carefully select and prioritise relevant skills based on learners' age and learning needs. Clear learning objectives help maintain focus, guide instructional choices, and ensure learners understand what they are expected to learn and practice. (Peltomaa & Luostarinen, 2020).



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*Figure 8. A phenomenon unites multiple disciplines into a holistic and authentic learning entity*

A well-designed PhBL project on climate change and environmental protection should aim to achieve a range of relevant content and skill-specific learning outcomes. By incorporating knowledge, skills, attitudes, and behaviours related to climate change and environmental protection into teaching, educators can empower learners to become informed, responsible, and engaged citizens who are equipped to address the various environmental challenges present in our time.



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## Case studies and examples

### Case examples – primary and lower secondary education (1<sup>st</sup>-9<sup>th</sup> grades )

To illustrate the applications of PhBL, this chapter includes case examples from different educational contexts. The grade levels presented in this chapter are based on those of Finland's education system (see e.g., Finnish National Agency for Education, 2025). The case examples demonstrate how PhBL can be applied in the thematic context of climate change, environmental protection, and sustainable development across various educational levels, from primary to higher education.

#### Primary Education Case Example 1: Explore – Root causes

**Grade Level:** 4.-9.

**Subject Areas:** adaptable to many subjects

**Phenomenon:** sustainable development

**Recommended duration:** adaptable

**Reference:** Translated and adapted from: Lauttamäki, E., Lehtinen, R., Rajala, A., Rentola, A., & Rauhankasvatusinstituutti ry. (2020). Opettajan Opas—Agenda 2030 teemapäivät. Rauhankasvatusinstituutti ry.

[https://cdn.accentuate.io/4483793092659/11692919193651/Agenda-2030-teemap%C3%A4iv%C3%A4opas\\_lz4yr5Z-v1585637871656.pdf](https://cdn.accentuate.io/4483793092659/11692919193651/Agenda-2030-teemap%C3%A4iv%C3%A4opas_lz4yr5Z-v1585637871656.pdf)

**Objective:**

In this exercise, students will investigate the root causes of a particular issue. By understanding the background of the phenomenon thoroughly, they can think in a more informed manner about solutions to change it. (Lauttamäki et al., 2020)



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### Instructions:

**Step 1: Introduction: Define necessary terminology (cause, consequence, sustainable development etc.)**

Start by watching the video [The largest lesson](#) (available in [Spanish](#)/Bulgarian) on the United Nation's Sustainable Development Goals.

Ask students to pay attention to the challenges associated with implementing sustainable development.

Together, list on the board the types of challenges mentioned in the video.

### Step 2: Group work

Divide students into small groups. Ask each group to choose one challenge from the board or think of another challenge or issue that everyone in the group recognises and wants to address.

### Step 3: Tree diagram

Each small group receives one A3 or A2-sized paper, markers, and sticky notes. On the paper, draw a large tree trunk with roots, trunk, and branches. The group writes their chosen issue on the tree trunk. This exercise can also be done using visualisation and collaboration tools, such as [Padlet](#), [Flinga](#), or [Prezi](#).

### Step 4: Roots and branches

The group discusses and writes the causes and consequences related to the issue on sticky notes, using different colours for causes and consequences. Attach the causes to the tree roots and the consequences to the branches. Encourage students to think about the underlying causes of the problems. For example, the lack of clean water may be due to drought, which is caused by climate change, in turn caused by human actions, and so on. These deeper causes can be traced further back to the roots to identify the ultimate root causes of



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the problems. Does any consequence loop back to the causes, creating a negative cycle?

### **Step 5: Presentation**

Small groups present their completed tree to other groups. Other groups comment and ask questions, and groups modify their tree based on the feedback.

### **Step 6: Information gathering**

Groups search for additional information from various sources to gain a deeper understanding of the phenomenon and its underlying causes. The group adds new ideas to the tree based on the information they find.

*Interviewing experts:* At this stage, information gathering can be supplemented by interviewing experts via phone, email, or face-to-face. Students discuss with the rest of the group and teachers who they can interview to get more information about the phenomenon. First, clarify who or what could be experts on the phenomenon and how to contact them.

When there is a lot of information about the phenomenon, the group presents ideas on the best ways to address the situation and resolve the problem. Experts can also be asked for advice on how to address the issue. Is anyone already doing something about it? How can young people influence the phenomenon or draw attention to it? What means of influence could be utilised?

The work can continue with exercises like *"Make a difference: Making dreams come true"* or *"Make a difference: If I could decide..."*.

### **Step 7: From idea to action**

Next, small groups create a plan on how to implement the idea.

### **EXTRA: Follow-up exercise: make a difference: making dreams come true**



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**Objective:** With this follow-up exercise, students can continue the "Root causes" exercise in groups. In this exercise, students brainstorm solutions to problems and practice civic engagement skills.

### **Step 1: Dream map**

Ask students to create a dream map where they envision what the world would look like if the issue from the "Root causes" exercise was resolved. Guiding questions: What good would come from resolving the issue? How would people, nature, and the economy benefit? List the good things that would lead to other good things.

Then, review the tree created in the "Root causes" exercise. What needs to change in the tree for the positive dream to be possible? List the change requirements.

### **Step 2: Brainstorming**

Next, students brainstorm various and diverse ways to bring about change and achieve a positive outcome. Encourage students to think boldly and creatively and have them list as many ideas as possible without censoring them at this stage.

### **Step 3: Filtering**

Once the ideas are listed, ask students to examine the ideas critically:

- Does the idea address the root causes of the problem?
- Would the idea cause problems elsewhere?
- Does the idea consider the people affected by the problem and its solution?
- Could the idea bring about the desired change?
- Could success be evaluated? How?
- Is the idea feasible? Why? Why not?
- Ask groups to then choose one strong solution from their list.





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#### Step 4: Planning

Guiding questions for creating the plan:

**Scope:** At what level do you want to implement your plan: individual level, local environment, your own country, Europe, the world?

**People:** Who needs to be involved as an expert, to implement, to support, to hear about the plan?

**How:** By what means will the plan be implemented?

**Finally,** ask students to consider whether the plan is realistic and impactful.

**Challenges:** What challenges might arise in implementing the plan? How could the challenges be resolved?

**Evaluation:** How can the implementation be evaluated?

#### Step 5: Getting Everyone Involved!

Ask learners to prepare a presentation of your action plan for the rest of the class. The goal of the presentation is to get everyone excited about their plan.

In the presentation, tell in your chosen way the following:

- What kind of world do you dream of: "If only we had a world where..."
- What problem have you come up with a solution for: "But unfortunately, the problem is..."
- What kind of action have you planned: "However, we can change the world like this..."
- How others can participate in the campaign and why they should participate: "And you can join too..."

The presentation can be in any form: a video presentation (e.g., vlog), spoken narration, mini-play, story, social advertisement, audio play, or wall comic, and it can include, for example, a participatory mini-quiz, challenge or guessing game, petition, or even a citizens' initiative.



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Finally, discuss together with the whole class:

- What means did you use to get others excited about your action plan?
- What kind of presentations did you get involved in?
- How can knowledge and understanding of the issue and increased empathy change the world?
- What increased the credibility of the action plan?

## Primary Education Case example 2: Spread the Good – Sustainable lifestyle

**Grade Level:** lower secondary education (7.-9. grades)

**Subject Areas:** adaptable to many subjects

**Phenomenon:** Spreading the Good - Sustainable Lifestyle

**Recommended duration:** 3 school days

**Reference:** Niemi, L.-M., Lehtovaara, K., & Hietikko, J. (2015). Monialaisia oppimiskokonaisuuksia yläkoulussa. In H. Cantell (Ed.), Näin rakennat monialaisia oppimiskokonaisuuksia. PS-kustannus.

During the years 2012-2013, Kasavuori Lower Secondary School implemented the "Spread the Good" project. The purpose of the project was to spread good and kind deeds in their local environment. The goal of the project was to promote students' engagement in future-oriented and sustainable ways of thinking and acting. The project aimed to provide a learning experience for learners in developing solutions that are ecologically, economically, socially, and culturally sustainable. In the project, students were guided to form groups of two or three people, comprising members from their own class or other classes. Each group created a plan on how to spread good in their local environment and implemented it. The plans were executed during project days during the autumn and spring semesters and documented. The resulting final products were presented to other students. (Niemi et al., 2015)



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The project consisted of initial planning and workshop days. The initial planning phase was conducted during the homeroom/form teacher's (in Finnish lower secondary education, this person is responsible for supervising a class) lesson. The learners were introduced to the general idea of the project, and ideas were gathered from the students on what "Spread the Good" means. In the following sessions, the groups' topics were elaborated, and learners were assigned to a group facilitated by a supervising teacher. At the end of the planning phase, groups and teachers also arranged the visits and other practical matters for the workshop days.

During the workshop days, students did not have regular lessons to attend but worked solely on their projects. Other teachers substituted for teachers supervising the groups during the workshop days. The supervising teacher team had divided the organising tasks amongst themselves. These tasks included ensuring that student groups were provided with relevant learning tools, such as computers, taking responsibility for room reservations, and informing the work community and parents about the workshop days.

### **Workshop days program**

#### **First Day**

Morning: Learners created a written plan for their project and started preparing the activities

Afternoon: Learners continued to prepare the activities, gathered key materials for their activities, and documented their learning process at a preferred location, e.g., school or outside school

#### **Second day**

Morning: Learners implemented their planned activities of spreading good outside the school. Moreover, groups conducted documentation on their work at school.

Afternoon: The groups continued documenting their activities and started creating the final product



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### **Third day**

Morning: Learners conducted documentation, completed the final product, and practised the upcoming presentations.

Afternoon: Group presentations were held first within the working group and then for the classes of the grade level.

In the implementation phase, learners spread good in various ways. Their activities included, for instance, shovelling snow from neighbours' yards, preparing recycling and waste sorting signs for the school, attending elementary school lessons as assistants and organising exercise sessions at an elderly people's home.

Students were encouraged to document their work in various ways. For this, many students preferred videos and slide presentations. For documentation, learners were allowed to use their own mobile devices to take videos and photos. Students had the opportunity to bring their own digital devices to school for editing purposes. Moreover, they were also assigned homework to edit and finalise their outputs.

### **Project evaluation**

Evaluation was discussed before the activities began. The evaluation of the work was conducted through the supervising teacher's evaluation of the overall work, the groups' self-assessments and teacher-instructed peer-assessments between the groups. After the project, the supervising teacher and the group participated in a discussion to evaluate their work. The evaluation examined various elements of the learning process, such as the overall quality of their work, final products, oral presentations, written plans, scheduling, division of labour within groups, and collaboration in online groups and during the implementation phase.

The project's final evaluation was considered in the evaluation of two subjects. For this, learners were allowed to select which two subjects they wanted to include in the project's evaluation. They could select one subject from art and physical education and one academic



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subject. The evaluation results for each subject were shared with the respective subject teachers. A summary of the evaluation was communicated to the learners' guardians.

## Case Examples – Secondary education

### Secondary Education Case Example: Climate change

**Grade Level:** upper secondary education and vocational education

**Subject Area:** e.g. biology and geography, visual arts, social studies, languages, music, and philosophy.

**Phenomenon:** Climate change

**References:** Translated and adapted from

- United Nations Association of Finland and Lindholm, M. (2022) Ilmastomuutos - ilmiöprojekti. <https://www.ykliitto.fi/kasvattajille/yk-osaksi-opetusta/tehtavat/ilmastonmuutos-ilmioprojekti>
- Organise a Climate and Environment-themed Collage Poetry Workshop: Miettinen, K. ja Happonen, K., 2022. Ilmasto- ja ympäristöaiheinen kollaasirunotyöpaja. <https://www.ykliitto.fi/kasvattajille/yk-osaksi-opetusta/tehtavat/ilmasto-ja-ymparistoaiheinen-kollaasirunotyopaja>
- Task for Biodiversity Day: Climate Refugees: United Nations Association of Finland. (2025). Luonnon monimuotoisuuden päivän tehtävä: Ilmastopakolaisuus (Task for Biodiversity Day: Climate Refugees). <https://www.ykliitto.fi/kasvattajille/yk-osaksi-opetusta/tehtavat/luonnon-monimuotoisuuden-paivan-tehtava>
- Explore: Climate Action: Lauttamäki, E., Lehtinen, R., Rajala, A., Rentola, A., & Rauhankasvatusinstituutti ry. (2020). Opettajan Opas—Agenda 2030



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teemapäivät. Rauhankasvatusinstituutti ry.

[https://cdn.accentuate.io/4483793092659/11692919193651/Agenda-2030-teemap%C3%A4iv%C3%A4opas\\_lz4yr5Z-v1585637871656.pdf](https://cdn.accentuate.io/4483793092659/11692919193651/Agenda-2030-teemap%C3%A4iv%C3%A4opas_lz4yr5Z-v1585637871656.pdf)

- Familiarize Yourself: Young Climate Influencers:

Lauttamäki, E., Lehtinen, R., Rajala, A., Rentola, A., &

Rauhankasvatusinstituutti ry. (2020). Opettajan Opas—Agenda 2030 teemapäivät. Rauhankasvatusinstituutti ry.

[https://cdn.accentuate.io/4483793092659/11692919193651/Agenda-2030-teemap%C3%A4iv%C3%A4opas\\_lz4yr5Z-v1585637871656.pdf](https://cdn.accentuate.io/4483793092659/11692919193651/Agenda-2030-teemap%C3%A4iv%C3%A4opas_lz4yr5Z-v1585637871656.pdf)

### What is learned?

The phenomenon-based project focuses on climate change and culminates in a collage poetry workshop and poetry art exhibition. Agenda 2030 Goal 13: Climate Action is closely related to the topic. The project offers a deep understanding of climate change and related topics, and provides tools for considering the subject and the climate actions we can take ourselves. (United Nations Association of Finland & Lindholm, 2022)

**Target group:** upper secondary (vocational education)

**Duration:** 5 ECTS / approximately 3-4 months, autumn or spring semester

**Materials and guests:** Climate action materials, Agenda 2030 goals, an expert guest speaker, suitable music, and websites of various related organizations

**Number of participants:** students and teachers from five different subjects (see further details below under Subjects)

### Description of the project

The project's goal is to learn about complex phenomena in a meaningful and experiential way, understanding the related contexts and connections to one's future profession. It is a multidisciplinary learning module, conducted in collaboration with teachers from various subjects.



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Learning is action-oriented, utilising multiple environments and methods, such as outdoor learning, individual, and group work. Learning is also participatory, with learners playing a key role in various stages of the project. The approach is learner centred.

Content of the phenomenon project:

1. Introduction and orientation to the topic (40-50 hours)
2. Project planning (1-2 hours)
3. In-depth exploration of the topic (30-40 hours)
4. Collage poetry workshop (2-3 hours)
5. Project conclusion: final exhibition (20-30 hours)
6. Optional: Song campaign (5-10 hours)

### **Subjects in vocational basic education**

The project can be tailored for the common units of vocational basic education as follows (common units include a total of 35 credits, 26 compulsory and 9 optional):

1. Communication and interaction skills; art and creative expression (1 credit for the project)
  2. Social and work-life skills: maintaining work ability and well-being (total 2 credits, 1 credit for the project)
  3. Acting in society and as a citizen (total 2 credits, 1 credit for the project)
  4. Promoting sustainable development (1 credit for the project).
  5. In addition: Communication and interaction in a foreign language (total 3 credits, 1 credit for the project)
- = 5-credit module (approx. 135 hours).

### **Subjects in upper secondary school**

In upper secondary school, an interdisciplinary project can be implemented according to the model above in subjects such as biology and geography, visual arts, social studies, languages, music, and philosophy.

### **Instructions for tasks**





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Each part of the project includes various tasks with detailed instructions and descriptions, as outlined below (individual and group tasks). Learning environments vary, and students can also influence the selection and implementation of certain tasks.

### **Implementation of the Phenomenon-based project**

The multidisciplinary phenomenon-based project focuses on climate change, which is examined from different perspectives. Throughout the project, students engage in diverse, functional, and participatory tasks related to the subject. As the final output, a collage poetry workshop and exhibition will be presented.

## **1. Introduction and orientation to the topic (40-50 hours)**

### **Preliminary assignment before the first classroom activity:**

- Read the detailed description of [Goal 13: Climate Action from the Agenda 2030](#) (The Global Goals, 2025). Material is also available in [Spanish](#).
- Questions to think about:
  - How does climate change manifest in our country and elsewhere?
  - What thoughts arise regarding your future field and profession?

### **Classroom activity:**

- In the class, discuss the thoughts and responses generated by the preliminary assignment with the group.
- Discussion of the questions given in the preliminary assignment:
  - How does climate change manifest in our country and elsewhere?
  - What thoughts arise regarding your future field and profession?
- This can also be conducted as a language immersion activity if a foreign language is involved. In this case, the goal is to read in the targeted foreign language, and the class discussion is conducted in the same language.

### **Homework:**

- Independently explore concepts/topics such as:



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- Global warming
- Climate refugees
- Climate anxiety and climate hope (provide examples of relevant websites in your own language. In Finnish, helpful information can be found on sites like ympäristö.fi, ilmatieteenlaitos.fi, and ilmasto-opas.fi).

- Familiarise yourself with signs of change via videos and visualisations.

Examples of websites:

- Climate guide's videos and IPCC infographics:
  - <https://www.climateguide.fi/videos-climate-change-as-a-phenomenon/>
  - <https://www.climateguide.fi/ipcc-infographics/>

**Class activity:**

- What prevents us from acting to mitigate climate change?
- Listen to an expert speech about the topic and read an article. An example of an article, "What prevents us from taking action to mitigate climate change?" in Finnish: <https://www.sitra.fi/en/articles/prevents-us-taking-action-mitigate-climate-change/>
- Have discussions with the group based on the expert speech and the article

**Class activity:**

- Create a collective idea map on solutions to mitigate climate change.
- Consider what solutions can be implemented in your future profession to mitigate climate change.

**Homework/Class activity:**

- Quiz on climate change. An example of a quiz can be found here (in Finnish): <https://openilmasto-opas.fi/faktat-kuntoon-ilmastosta-testi/>

**Pair activity:**

Explore: Climate action (Exercise 26 in Lauttamäki et al., 2020)



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- Investigate different phenomena, causes, and consequences of climate change. Create a mind map or other type of report on the topics in pairs or small groups. Divide the students into pairs or small groups. Assign each group one or two concepts from the list found in the online learning materials. Create a concept map on large paper about the group's concept(s):

- Causes: What causes the phenomenon [concept] in your group? What has caused it? What are the factors that exacerbate it?
- Consequences: What are the consequences of the phenomenon in your group? Who does it particularly affect?
- Influencing: How can the phenomenon be influenced and promote the fight against climate change? How can anyone influence it?
- Influencers: Who can impact the problem? How? Gather the concept maps together and present them to each other.

**Individual or pair activity:**

**Familiarize yourself: young climate influencers** (Exercise 21 in Lauttamäki et al., 2020)

- Familiarise yourself with young climate influencers. Create comics about their activism.
- For example, watch the video of climate activist Greta Thunberg's speech at the UN summit in September 2019.
- Investigate who typically attends the United Nations summit.
- Also, familiarise yourself with the following young climate influencers: Autumn Peltier, [14 yrs.] Isra Hirsi [16 yrs.], Xiuhtezcatl Martinez [18 yrs.]. You can find information about them by searching the internet, their own social media channels, and YouTube.
- Choose one of the four young influencers. Draw a short comic about the young climate influencer's life, describing how they decided to get involved in advocating for an important issue to advance the fight against climate change and how they influence it.



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### **Small group activity:**

#### **Positive environment or climate news in media** (Miettinen & Happonen, 2025b)

- Search for positive climate news in the press and on social media. A good news headline might relate to legislation or efforts to slow climate change.
- Consider which news stories pertain to your future field and profession.
- At the same time, reflect on what kinds of headlines attract attention and why the media tends to emphasise mostly provocative and negative news.
- We know that people often click on and share primarily troubling or anger-inducing news on social media. Why does this happen?
- After searching and discussing, cut out headlines from printed newspapers and paste them onto separate sheets of paper.
- "Clippings" from digital news channels can be made using screenshots. Screenshots can be compiled on the same page using image editing, layout, or word processing software.
- Everyone should aim to find 3-5 headlines.
- Spend 15-20 minutes searching for headlines.
- Finally, review the headlines together. Was it easy or difficult to find positive climate news? Why?

### **Next project session:**

- In a small group of students, select 2-3 news items and write them on large papers, which are then attached to the classroom wall.
- The group should familiarise itself with all the news, serving as a thought-provoking activity.
- Groups select a chairperson to present the selected news headlines to an expert later in the project.
- The chairperson can also briefly prepare a justification for why the news was chosen and why it was considered important by the group.



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## 2. Project planning (1-2 hours)

### Class activity:

- In small groups, familiarise yourself with the collage poetry workshop assignment instructions (see step 4) and list the necessary equipment.
- Plan the implementation of the workshop.
- You can set the mood for planning with music on the topic of climate change.

## 3. In-depth exploration of the topic (30-40 hours)

### Pair activity:

#### Consequences of climate change

- Familiarise yourself with the following materials and then discuss these questions with your partner:
  - First, look for resources on the environmental impact of food on the internet
  - How does increasing vegetarianism affect the climate and its temperature?
  - How does reducing the use of animal products affect nutrition?
  - Write your favourite vegetarian dishes on the board and challenge each other to eat/prepare each other's favourite vegetarian dishes.

### Class activity:

- Familiarise yourself with [Earth Hour Day](#) (e.g., from WWF's website).
- Plan a short information session on the topic and agree on how the day will be celebrated within your group (e.g., turning off lights at school or home for an hour, participating in an energy-saving week, hosting information sessions via the school radio, organising yard events, or demonstrations).



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**Class activity:**

- Watch the documentary "An Inconvenient Truth" (2006, USA), which addresses global warming. In the documentary, former US Vice President Al Gore presents climate change and its estimated impacts. The film won two Oscars in 2007 for Best Documentary Feature and Best Original Song. The film has also sparked typical controversy on the subject.
- After watching the film, complete the tasks "Melting Glaciers" and "Impacts of Climate Change" from the site: <https://www.koulukino.fi/oppimateriaalit/epamiellyttava-totuus/miten-voit-itse-vaikuttaa/>
- Write down observations or questions from the film and the tasks for the upcoming visitor.
- This can also be conducted as a language immersion activity if a foreign language is involved. In this case, the film's subtitles are chosen in the selected foreign language. If the target language is English, subtitles are not used. As a learning task, observations and questions are written in the selected foreign language.

**Climate change expert/organisation representative visit:**

- The visit is intended to be interactive and conversational (can be held outdoors depending on the weather, with questions brought along).
- After the expert's informal introduction, group chairpersons present selected questions and news headlines that were previously posted on the classroom wall and emerged in the previous step. For example: "The use of renewable energy has exploded (news) --> How can we influence global warming?"

**Pair activity:**

**Task for biodiversity day: climate refugees** (United Nations Association of Finland, 2025)

- To spark interest, watch a video that exemplifies the links between climate change, security, and refugees in your preferred language.



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- Divide into pairs. Conduct a pair discussion on three concepts. Initially, no prior knowledge is needed as the purpose of the discussion is to warm up to the task. Discuss the concepts in this order:

- Climate
- Refugees
- Climate refugees

- After the pair discussion, divide learners into groups of four. In your groups, start searching for information on climate refugees. Use the internet and social media channels to gather information. Write down your findings and observations. You can write your reflections either on paper or on a computer, for example, in the form of a PowerPoint presentation. Write at least:

- What does climate refugee mean?
- Who can become a climate refugee?
- How are climate refugees discussed on social media? Is the discussion different on different channels?
- Will the number of climate refugees increase in the future?

- Finally, present your reflections to the rest of the class.

#### **Class activity:**

- Play climate bingo.
- Climate bingo helps learn and review key concepts related to climate change and its consequences.

- An example of climate bingo in the [MAPPA.fi material bank](#) (includes forms and templates in Finnish. You can use e.g. browser-based translation tools to translate the instructions and templates into the preferred language).

- This exercise can also be conducted as a language immersion activity if a foreign language is involved. In this case, in addition to playing climate bingo, the concepts are translated into a foreign language.



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#### **4. Collage poetry workshop (2-3 hours)**

Organise a climate and environment-themed collage poetry workshop (Miettinen & Happonen, 2025a)

For the collage poetry workshop, you will need sufficient materials, such as magazines, newspapers, and other text materials for cutting, as well as scissors and glue sticks. Additionally, you will need paper or cardboard to which the finished poem will be glued. Another way to preserve the poems is to take a picture of them and save them, for example, in a shared folder. Pictures of the finished poems can also be shared on social media.

##### **Working process**

Begin by collecting suitable materials, i.e., cutting out topic-related words from magazines. It is often convenient to choose words from headlines or other sufficiently large, printed words. You can also use smaller printed text, but it is more difficult to handle and paste. Try to collect 15-20 words initially by making relatively quick selections. Words from all word classes (adjectives, verbs, nouns) are needed to build new sentences. Once you have a suitable number of words, start seeing how they fit together. Often, the poem begins to "write itself," meaning certain words seem to fit together and start forming sentences. At this stage, missing connecting words and sentence parts are often needed to make the sentences understandable. These can be found or asked for from a neighbour. Missing words can also be constructed letter by letter.

##### **Images**

Collage poetry can also use image material. Sometimes, a compelling full-page image can be found in a magazine, which can serve as the base for the poem, with words pasted on top. Images can also be combined by pasting them together.

##### **Content of the poem**

There are no specific rules regarding the content of the poem. You can also use ready-made sentences as part of the poem, but the most surprising and rewarding result is achieved when sentences are built word by word. Use news text, entertainment text, advertising slogans, and consider what the source text was written for. The purpose of the source material determines the type of vocabulary used. News vocabulary is very different from that used in,





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for example, a youth magazine or hobby magazine. Mix different language registers together. It helps to identify suitable opening and closing sentences to understand the overall structure. One way is to choose the beginning and end of the poem, paste them first, and then build the middle part. The poem can be short and aphoristic or longer, like prose poetry. It can be funny, sad, absurd, or straightforward. It can be list-like or more lyrical if it provokes thoughts. Allocate 20-30 minutes for cutting and pasting the poem.

### **Finishing up**

The poems are read aloud. This can be done by the teacher or volunteers participating in the workshop. Finished collage poems can be made into an "art exhibition." The works become more impactful when enlarged, for example, to A3 size. Finished poems can also be written cleanly, where the collage technique is lost, but the assembled poems become "real poetry." This way, you can consider different poetry techniques and the pros and cons of the collage technique. No one would likely come up with similar word combinations if faced with a blank page. Start cutting and pasting!

For the collage poetry workshop, you will need sufficient materials, such as magazines, newspapers, and other text materials for cutting, as well as scissors and glue sticks. Additionally, you will need paper or cardboard to which the finished poem will be glued. Another way to preserve the poems is to take a picture of them and save them, for example, in a shared folder. Pictures of the finished poems can also be shared on social media.

## **5. Project conclusion: final exhibition (20-30 hours)**

### **Organizing the final exhibition:**

- Visiting the exhibition of the poetry works: other classes, school staff, parents.
- Agree on responsibilities within the group (e.g., enlarging and displaying exhibition works, adding works to social media and websites, and invitations to the exhibition).



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- Comics created in step 1, as well as positive and negative climate news, are also displayed in the exhibition, and images of them (as well as poetry works) are added to the school's website and social media pages.
- Background music for the exhibition can be compiled from songs related to or about climate change (see song campaign).

#### **6. Optional: song campaign (5-10 hours)**

##### **Organise a song campaign:**

- Compile a list of songs related to or about climate change.
- Use the songs as background music during exercises, in the final exhibition, or as part of the campaign to raise awareness about climate change.



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## Adapting Phenomenon-Based learning for inclusivity and technological integration

This chapter outlines the key information for planning and instructing a PhBL project tailored to support learners with mild learning disabilities and special needs. From this perspective, it provides strategies for enhancing inclusivity, accessibility and technology integration of a PhBL project.

### Adapting Phenomenon-based learning for learners with special needs

Adapting Phenomenon-Based Learning to your specific context involving learners with special needs requires knowledge of your learners' special needs and the methodology to address those needs. As we know, learners with special educational needs and disabilities (SEND) are individuals who have learning difficulties or disabilities. These difficulties can create physical, cognitive, emotional, or sensory challenges in learning and limit learners' ability to make progress in education (Herwegen, 2024). Learning difficulties can be caused by, for example, developmental disabilities, neurological diseases, injuries, or mental health issues (Oppimisvaikeus.fi, 2025).

Learning difficulties and disabilities are relatively common worldwide, and it has been assessed that up to 20 per cent of the population experiences some kind of difficulties with learning. These challenges can be narrow and affect only one area of learning. Often, they also co-occur. They may also occur at varying degrees of severity. (Hämäläinen et al., 2015)

According to Hämäläinen et al. (2015), the common types of learning difficulties and disabilities include, e.g.:

#### **Dyslexia**

Dyslexia is a set of processing difficulties that affect the acquisition of reading and spelling. Signs of dyslexia include difficulties with reading and reading comprehension, writing, learning foreign languages, and mathematics. Linguistic challenges in reading may appear as



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difficulties in perceiving lines and letters in text or having a slow pace in reading. In writing, learners may struggle with producing coherent text and maintaining accurate spelling. Dyslexia may also cause problems with learning foreign languages. These problems may manifest as difficulties in learning spelling, vocabulary or sentence structures. Dyslexia commonly co-occurs with mathematical difficulties. This may be evident, for example, in difficulties of understanding word problems or learning multiplication tables aloud. (Hämäläinen et al., 2015) Dyslexia may also limit the capacity of a person's short-term memory. This may show up as difficulties in remembering oral instructions or complex thought structures, as well as executing complex problem-solving (Oppimisvaikeus.fi, 2025). Frequently reported strengths of dyslexic learners include visual perception, holistic thinking, ingenuity and artistic talent. (Hämäläinen et al., 2015)

### **Mathematical learning difficulties and Dyscalculia**

Mathematical learning difficulties manifest as challenges in learning mathematics as a subject and limited mathematical information processing in everyday life. Mathematical learning difficulties can be classified into two categories: dyscalculia and poor proficiency in mathematics. In dyscalculia, difficulties in mathematics affect learning significantly and may be evident in learning, for example, basic arithmetic skills, number sequence skills, understanding mathematical symbols or measurement units. In everyday life, handling money may be challenging. (Hämäläinen et al., 2015)

### **Attention Deficit Hyperactivity Disorder (ADHD)**

Symptoms of ADHD may involve trouble focusing or staying organized, short attention span, carelessness in school assignments, poor time management, problems with remembering the location of personal belongings, forgetting meetings, impulsivity, talkativeness or getting stuck with things that interest them. However, persons with ADHD often have many strengths and they may be ingenious, imaginative, curious, quick-witted, energetic, creative and enthusiastic. (Hämäläinen et al., 2015)



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### **Perceptual difficulties**

These are issues with correctly interpreting stimuli from the environment or the body. Difficulties can show in interpreting visual or auditory information. Problems with visual interpretation can involve differentiating visually between similarly looking letters or recognizing the direction of letters or numbers. Challenges with auditive perception may cause difficulties with distinguishing similarly sounding words from each other. Perception difficulties may also manifest as difficulties in understanding and interpreting time or the surrounding space, such as problems with reading schedules and maps, and assessing directions, distances, or locations of objects. (Hämäläinen et al., 2015)

To help learners overcome various obstacles in their learning, it is essential to enhance the accessibility of education and integrate inclusive, strengths-based approaches into teaching (Herwegen, 2024). Strength-based approaches often emphasise the following dimensions in planning education: 1) identification of strengths, 2) agency and self-determination, and 3) growth mindset (Hodges & Clifton, 2004). As an example of a strength-based educational approach, Universal Design for Learning (CAST, 2025) can be utilised to plan teaching and assessment that aims to support learners with their difficulties and highlight their strengths throughout the learning process.

## **Technology integration in Phenomenon-based learning projects**

In phenomenon-based learning, teachers are encouraged to create engaging learning environments and explore new tools to foster learning. To support this, various technological tools can be integrated to enhance the learning experience in a phenomenon-based learning project. Examples of these include blogs that showcase the outputs of phenomenon projects and virtual learning environments. (Lonka et al., 2015). According to research, phenomenon-based learning can also be effectively implemented online (see e.g., Özevin, 2023; Somy Project, 2013)

With respect to 21<sup>st</sup>-century skills, PhBL is regarded as an effective method of teaching information and communications technology (ICT) skills (Wakil et al., 2019). Acknowledging



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ICT as both a societal phenomenon and a critical 21<sup>st</sup>-century skillset highlights its significance and supports its integration into the curriculum. (Finnish National Agency for Education, 2014).

In Finland, ICT skills are developed in schools in four main areas:

1. Learners are guided in understanding the main principles and central concepts, as well as developing their ICT skills while doing their own learning tasks.
2. Learners are informed about the responsible, secure and ethical use of ICT technology tools.
3. Learners are taught to use ICT technology tools for managing data, conducting research, and engaging in creative projects.
4. Learners gain experience and they practise using ICT tools for collaboration and networking.

According to Aarnio (2016), digital tools can be used in a PhBL learning process to support:

- **Expanding the scope of exploration beyond the limits of classroom:** digital tools can be taken out of the classroom to enhance learning in real environments. For example, learners can explore a real-world environment, such as a forest, with their digital devices to search for more knowledge or to document the phenomenon.
- **Information acquisition and processing:** digital tools can be used to acquire information and process it in various ways. To be able to find reliable information, it is crucial for learners to have skills in media literacy. Teachers can integrate the learning of these skills into their PhBL project.
- **Interaction and collaboration:** although face-to-face learning is regarded as the most effective way of learning in PhBL, digital tools can be used to facilitate learning by supporting communication during different phases of the process when learners are physically apart from their group. For instance, during the phases of



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self-study, learners can reach out to others working in the same group to ask for help via digital devices.

- **Documentation and reporting:** digital devices can be used to guide learners to document the phases of the learning process and deepen their skills in reflecting on learning. Digital tools also provide a means for reporting the output of the learning process through text, sound or video.

When teachers utilise technology in the learning environments, it is important to design it to be flexible and adaptable, and to support learners' agency and feelings of security and familiarity (Lonka et al., 2015). For example, grouping learners based on their ability levels allows the use of adaptive digital tools that provide tasks tailored to individual learning needs. This enables learners to progress through their work at their own pace. (Tynnenen, 2024) To enhance motivation and interest in learning among digital natives (born after 1981), it is advisable to pay attention to the choice of digital knowledge practices, which encompass personal, institutional, or social ways of using and creating knowledge. Thus, it is beneficial to adopt various methods of acquiring and producing information that already interest your learners as tools supporting the PhBL process. (Lonka, 2015)

Vaara (in Lonka, 2018b) gives some examples of the use of educational technology in a phenomenon-based learning process. In the activation phase, digital tools can help show real-life situations, for example, by using Mixed Reality (see e.g. Microsoft, 2023) or interesting videos. After that, mind mapping tools can help collect what learners already know and think about the topic. During the learning process, a digital platform could be beneficial for instructions, visualisation and collaboration. In the sharing and presenting stage, learners can use various digital tools to create presentations, produce videos, or write blog posts, which can then be shared with a broader audience.

Regarding the inclusivity of education, research indicates that technology facilitates the integration of Universal Design for Learning (UDL) principles in various ways, making teaching and learning more inclusive for all learners (Bray et al., 2023). Learners' diverse backgrounds and life situations typically require flexible learning options that support individual learning



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styles and time management. Thus, pre-class materials, the possibility to prepare and a sense of community also contribute to learning. Technology offers opportunities for greater diversity, but its effective use requires careful consideration of the learning environment, learner group, learning objectives and accessibility. (Kärpänen et al., 2023)

The integration of technology into teaching and learning depends largely on the availability of digital infrastructure and tools within each school, such as internet access, Wi-Fi networks, servers, and a reliable power supply. However, certain limitations must be considered, including the cost of digital tools and the common age restriction of 13 years for many online services that require user registration. Therefore, it is advisable to select applications that do not require learners to register in order to participate.

In the table below, there examples of digital tools and suggestions on how they can be used at different phases of inquiry-based learning in a phenomenon-based learning project (Luostarinen & Peltomaa, 2016; Venho, 2016).

| Phase of Inquiry-based Learning | Digital tool examples                                                               | Purpose                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 1. Orientation                  | Mindmaps, Google search/docs, <a href="#">Kahoot</a> , Wordwall, Quizlet, Socrative | brainstorming, planning, Introducing a phenomenon, concepts etc         |
|                                 | wordclouds: <a href="#">Answergarden</a> , <a href="#">Wordart</a>                  | tuning-in, mapping out phenomena                                        |
| 2. Conceptualisation            | Google search/docs/slides                                                           | common understanding,                                                   |
|                                 | <a href="#">Padlet</a> / <a href="#">Flinga board</a>                               | gathering and evaluation of ideas                                       |
| 3. Investigation                | Internet search, ChatGPT, Copilot, Gemini, Whatsapp                                 | research, experimenting, Understanding, critical thinking collaboration |
|                                 | Google forms                                                                        | surveys, interviews                                                     |





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|                      |                                                                                               |                                                                                   |
|----------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                      | <a href="#">DeepL</a>                                                                         | AI translation                                                                    |
|                      | <a href="#">Read Aloud</a>                                                                    | converting text into spoken audio                                                 |
| <b>4. Conclusion</b> | Google slides                                                                                 | presenting and sharing the results                                                |
|                      | <a href="#">Canva</a> , <a href="#">Prezi</a> , social media tools (Instagram, Facebook etc.) | presentation, picture collage                                                     |
|                      | Moodle's editor recording tool (audio/video), smartphone                                      | audio/video material                                                              |
|                      | <a href="#">Blogger</a>                                                                       | creating blog texts that describe and illustrate the learning process and results |
|                      | <a href="#">Grammarly</a>                                                                     | proofreading                                                                      |

Table 5 Tools

AI tools have, undoubtedly, revolutionized teaching and learning, and schools are seeking effective ways to guide learners in the responsible and critical use of artificial intelligence. This includes using AI to support deeper understanding, encourage creative thinking, and assist with language development. It is important to be aware of the guidelines of your school and country.

AI-powered tools provide versatile and invaluable support to learners with challenges such as dyslexia or ADHD. For example, text-to-speech and speech-to-text features aid those who struggle with reading or writing. Beyond that, AI can provide customised feedback and assistance tailored to various individual needs. Additionally, such tools with gamifying feature can make learning more interactive and motivating for learners who otherwise would disengage from learning in more traditional learning settings.

AI tools provide support for many pedagogical purposes. For structuring presentations and lessons, tools like Microsoft Copilot in PowerPoint are beneficial. The AI assistants ChatGPT and Microsoft Copilot are efficient tools for creating clear instructions. Proofreading and simplifying texts can be done with applications, such as Grammarly and ChatGPT. Tools like Microsoft Copilot and ChatGPT are helpful in summarising texts. For mathematical tasks,



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learners can utilise MathGPT and Math Solver. Finally, AI translation (see e.g. DeepL, 2025) and speech tools can be used to support language learning and communication in multilingual environments. (Annie Advisor, 2025).



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## Design of a plan for Phenomenon-based learning

This chapter incorporates practical instructions for planning an inclusive and accessible PhBL project, incorporating the principles of Universal Design for Learning, and provides a template for this planning process. Lonka (2018b) emphasises that, for a PhBL project, a pedagogical plan is essential for teachers to navigate the complex learning process of PhBL and for learners to understand their tasks and navigate their own learning.

The pedagogical planning process integrating UDL can be structured based on the Learning Design Wheel (Kärpänen et al., 2023). It includes the following six steps to execute the planning process:

1. Align your teaching objectives with the overarching goals of the organisation and ensure they are consistent with the national curriculum.
2. Identify the required skills and content knowledge and simplify the learning objectives while recognising potential barriers to learning.
3. Design assessments that allow learners to demonstrate their understanding in multiple ways. Communicate the expectations to your learners and use tools like rubrics to outline the skills and content knowledge required.
4. Select teaching methods that accommodate diverse learning needs. To maintain learner engagement, integrate flexibility and opportunities that allow learners to make choices. Offer continuous, consistent and well-timed support throughout the project.
5. Develop accessible and varied learning content and materials. Ensure that resources meet accessibility standards, such as providing captions for videos.
6. Evaluate the project critically, gather feedback from other teachers and learners and implement improvements where appropriate.

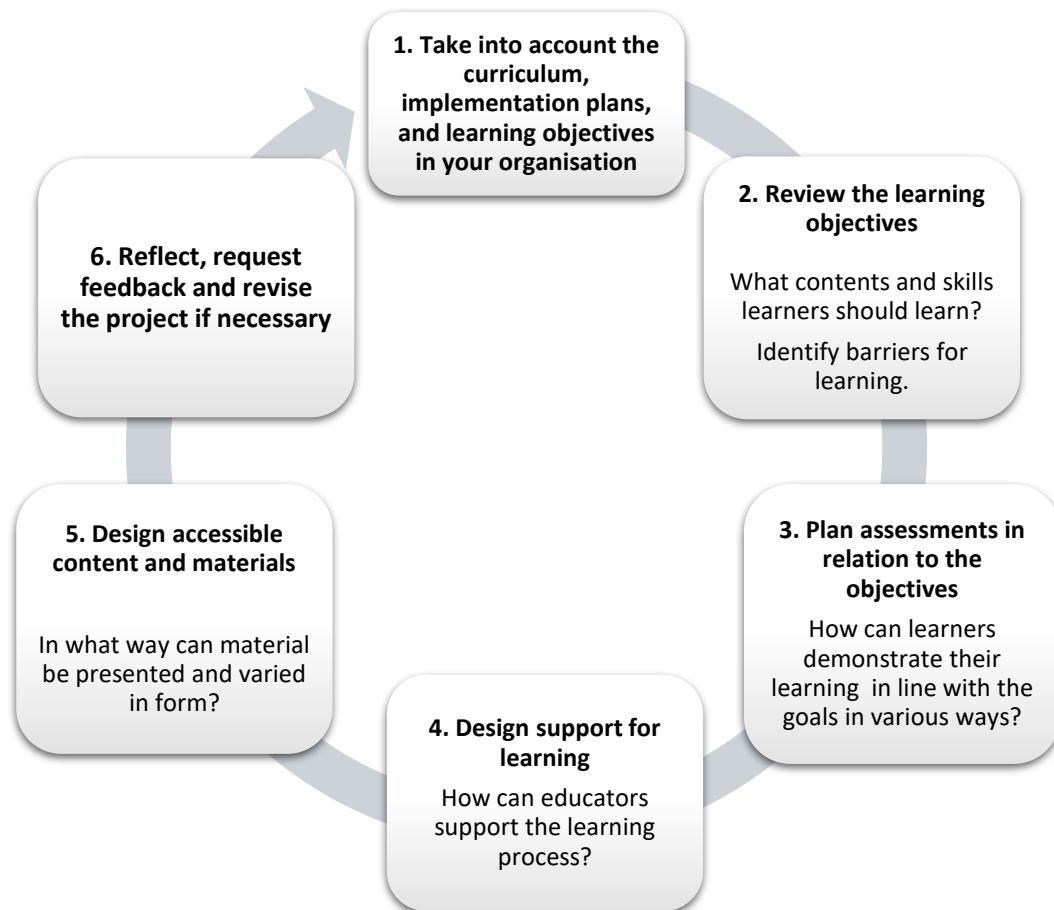


Figure 9. Learning Design Wheel model as a support for designing a PhBL project (translated and adapted from Kärpänen et al., 2023)

The following section provides a template for planning a UDL-based phenomenon-based project. The template incorporates perspectives from the learning design wheel, phenomenon-based learning, integrative and multidisciplinary learning, and universal design for learning. Each section of the template includes instructions for filling in the template.



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## An Example of a Phenomenon-Based Project Plan

| GENERAL INFORMATION                                                                                           |                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project's name</b>                                                                                         | Sustainable ICT services                                                                                                                                                                                                                                                                                     |
| <b>Phenomenon</b><br><i>Define the phenomenon(a) that is examined in the project</i>                          | Sustainability in ICT services                                                                                                                                                                                                                                                                               |
| <b>Duration</b><br><i>Specify the project's hours</i>                                                         | Three hours (90 min + 90 min)                                                                                                                                                                                                                                                                                |
| <b>Dates of implementation</b>                                                                                | Weeks 44 & 45                                                                                                                                                                                                                                                                                                |
| <b>Learner target group</b><br><i>Specify the learner group that the project is designed for</i>              | <ul style="list-style-type: none"> <li>• Third year Business Information Technology students specialised in Digital Business, Software Development and Game Development (35 persons in two groups) at Karelia University of Applied Sciences</li> <li>• Students study the complete degree online</li> </ul> |
| <b>Teacher(s)</b><br><i>Write here the names of teachers responsible for the project</i>                      |                                                                                                                                                                                                                                                                                                              |
| <b>Learner Engagement</b><br><i>Describe the ways you engage learners in the planning, implementation and</i> | <ul style="list-style-type: none"> <li>• Discussing the objectives, outcomes and assessment criteria with students</li> <li>• Encouraging questions and problem solving in challenging situations</li> <li>• Self and peer assessment</li> </ul>                                                             |



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|                                                                                                                                                        |                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>assessment of the project</i>                                                                                                                       |                                                                                                                                                                                                                   |
| <b>External stakeholders</b><br><i>List the stakeholders involved and their role, e.g. guardians/parents, guest speakers, organisations, companies</i> | <ul style="list-style-type: none"> <li>Consulting an expert in green coding</li> <li>Students consult alums (former students) working in ICT companies</li> </ul>                                                 |
| <b>Learning environments</b><br><i>Describe the spaces/locations where the learning happens</i>                                                        | Online implementation on the following platforms: <ul style="list-style-type: none"> <li>Moodle/Zoom for instructions and assignments</li> <li>Collaborative learning platform Howspace for group work</li> </ul> |
| <b>Learning tools</b><br><i>List and describe the tools needed for the project e.g. digital devices/programs</i>                                       | Outside group sessions, teams can decide their own communication channels that they prefer, e.g., Discord                                                                                                         |

| SUBJECTS, GOALS, OBJECTIVES AND ASSESSMENT METHODS                                                                                                   |                                                      |                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------|
| <i>List the included subjects and the selected curriculum-based learning goals and objectives here. Define the assessment methods for each goal.</i> |                                                      |                                                        |
| Subjects                                                                                                                                             | Goals and Objectives                                 | Assessment Methods                                     |
| Professional English                                                                                                                                 | professional communication and interaction, teamwork | self and peer assessment, feedback from teacher/expert |



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|                 |                                                                         |                                                        |
|-----------------|-------------------------------------------------------------------------|--------------------------------------------------------|
| Sustainable ICT | key challenges and solutions of sustainable development in ICT industry | self and peer assessment, feedback from teacher/expert |
|-----------------|-------------------------------------------------------------------------|--------------------------------------------------------|

## 21ST-CENTURY SKILLS: GOALS, OBJECTIVES AND ASSESSMENT

List the included curriculum-based 21<sup>st</sup>-century skills and their respective learning goals and objectives here. Define the assessment methods for each goal.

| 21 <sup>st</sup> -century/<br>Transversal Skill | Specific Learning Goals and Objectives           | Assessment Methods                                           |
|-------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------|
| Learning to learn                               | research: finding relevant information           | self assessment, guidance and feedback from teacher          |
| Teamwork                                        | discussing, analysing and evaluating information | self and peer assessment, guidance and feedback from teacher |
| Communication                                   | presenting the results/outcomes                  | assessment discussion on the basis of assessment criteria    |

## PROJECT PHASES AND SCHEDULE

Plan the pedagogical implementation for your project. For planning the phases for your project, you can utilise inquiry-based learning (see the handbook pp. 20-22) as a basis. These phases are provided in this form in brackets, but you can also apply any other pedagogic model suitable for phenomenon-based learning here.

| Phase                    | Date and Time<br>(and teacher)          | Description of Activities and Learning tasks                                               |
|--------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------|
| Phase 1<br>(Orientation) | Preassignment before the group sessions | Students familiarise themselves with the topic through teacher-provided learning materials |
|                          | 1 <sup>st</sup> session in week 44      | Discussing the learning objectives and assessment criteria                                 |



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|                                        |                                                                    |                                                                                                          |
|----------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
|                                        | 1 <sup>st</sup> session in week 44                                 | Initial knowledge of the phenomenon, poll                                                                |
| <b>Phase 2<br/>(Conceptualisation)</b> | 1 <sup>st</sup> session in week 44                                 | Common understanding and interest of the phenomenon, post-it notes                                       |
|                                        | 1 <sup>st</sup> session in week 44                                 | The phenomenon: organising the post-it notes into categories                                             |
|                                        | 1 <sup>st</sup> session in week 44                                 | Forming groups based on specialisations                                                                  |
| <b>Phase 3<br/>(Investigation)</b>     | 1 <sup>st</sup> session in week 44                                 | Background materials provided by the teacher: videos, articles                                           |
|                                        | 1 <sup>st</sup> session in week 44                                 | Teams choose their topics and research questions and allocate tasks and roles                            |
|                                        | 1 <sup>st</sup> and 2 <sup>nd</sup> session in weeks 44-45         | Teams research their chosen topics                                                                       |
|                                        | 1 <sup>st</sup> session in week 44                                 | Teams discuss their findings and document the main points                                                |
|                                        | 1 <sup>st</sup> session in week 44                                 | Teams present the initial findings to the teacher(s) and get feedback                                    |
|                                        | 1 <sup>st</sup> session in week 44 / For homework between sessions | A poll about teams' collaboration and progress                                                           |
| <b>Phase 4<br/>(Conclusion)</b>        | For homework between sessions                                      | Students deepen their knowledge on initial results based on teacher-provided and self-acquired materials |
|                                        | 2 <sup>nd</sup> session in week 45                                 | Teams give their final presentation and get feedback from teacher                                        |
|                                        | 2 <sup>nd</sup> session in week 45                                 | Students reflect on their learning outcomes individually and do peer assessment                          |

#### UNIVERSAL DESIGN FOR LEARNING

##### Special needs and barriers to learning in the group

*Based on the knowledge of your learners, list the learning difficulties/special needs or other learning barriers in the target group that need to be addressed.*





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- Social and performance anxiety
- Learning difficulties (challenges in concentration, staying focused and language processing)

### Design the UDL-based support and accessible learning materials for your learners

*Based on the knowledge of your learners, design the PhBL project to include multiple means for engagement, representation and action and expression. You can select, for example, 1 or 2 design options for each category.*

*For reference, this handbook offers ideas for UDL (pp. 55-58). Further resources on UDL are available in many different languages e.g. on this website:*

<https://udlguidelines.cast.org/more/downloads/>

| Engagement                                                                                                                                                                                                                                                                                                                       | Representation                                                                                                                                                                                                                                                                                                                                                                                        | Action and Expression                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Collaborative Goal Setting:</b> <ul style="list-style-type: none"> <li>• Involve students in discussing learning objectives and assessment criteria to foster agency, engagement and reducing anxiety.</li> <li>• Let students to decide their research topics and objectives collaboratively with others in teams</li> </ul> | <b>Accessible Learning Content:</b> <ul style="list-style-type: none"> <li>• Use both text and audiovisual resources, with captions and transcripts for videos.</li> <li>• Offer possibility to use AI tools for clarifying concepts, organising information and modifying learning contents into more accessible formats</li> <li>• External experts may be consulted to explain concepts</li> </ul> | <b>Flexible Assessment:</b><br>Let students choose how to present their work visually                                    |
| <b>Choice and Autonomy:</b><br>Allow students to choose their teams, topics, roles, and communication channels that support their motivation and comfort.                                                                                                                                                                        | <b>Visual Supports:</b><br>Provide infographics, mind maps, and chunked content to clarify complex ideas and vocabulary.                                                                                                                                                                                                                                                                              | <b>Role Choice:</b><br>Allow learners to select team roles that suit their strengths and comfort level.                  |
| <b>Varied Participation:</b><br>Offer options for anonymous polls, written or verbal contributions flexible group sizes to reduce social anxiety.                                                                                                                                                                                | <b>Language Support:</b><br>Offer glossaries, simplified summaries, and translation tools for key terms and concepts.                                                                                                                                                                                                                                                                                 | <b>Practice Opportunities:</b><br>Give formative feedback prior to the final presentation to help students improve their |



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|                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                         | work and ease performance anxiety                                                                                                                |
| <b>Regular Feedback and Check-ins:</b><br>Use (Howspace) polls and mood meters for ongoing feedback, helping students self-regulate and stay engaged.                                         | <b>Read-Aloud &amp; Text-to-Speech Tools:</b> <ul style="list-style-type: none"> <li>• Provide digital tools that read materials aloud for students who benefit from auditory input</li> <li>• Encourage the use of digital reading practice tools, such as Microsoft Reading Coach, to practice reading presentations aloud</li> </ul> | <b>Assistive Technology:</b><br>Encourage use of mind mapping software, speech-to-text tools, presentation practicing tools and grammar checkers |
| <b>Authentic Context:</b><br>Connect learning to meaningful real-world experiences (job interview) that make learning motivating and meaningful by tapping into personal goals and identities |                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                  |



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## Annex I - Template for planning a Phenomenon-based project

| GENERAL INFORMATION                                                                              |  |
|--------------------------------------------------------------------------------------------------|--|
| <b>Project's name</b>                                                                            |  |
| <b>Phenomenon</b><br><i>Define the phenomenon(a) that is examined in the project</i>             |  |
| <b>Duration</b><br><i>Specify the project's hours</i>                                            |  |
| <b>Dates of implementation</b>                                                                   |  |
| <b>Learner target group</b><br><i>Specify the learner group that the project is designed for</i> |  |
| <b>Teacher(s)</b><br><i>Write here the names of teachers responsible for the project</i>         |  |
| <b>Learner Engagement</b><br><i>Describe the ways you</i>                                        |  |



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|                                                                                                                                                        |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| engage learners in<br>the planning,<br>implementation and<br>assessment of the<br>project                                                              |  |
| <b>External stakeholders</b><br><i>List the stakeholders involved and their role, e.g. guardians/parents, guest speakers, organisations, companies</i> |  |
| <b>Learning environments</b><br><i>Describe the spaces/locations where the learning happens</i>                                                        |  |
| <b>Learning tools</b><br><i>List and describe the tools needed for the project e.g. digital devices/programs</i>                                       |  |



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| <b>SUBJECTS, GOALS, OBJECTIVES AND ASSESSMENT METHODS</b>                                                                                            |                             |                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------|
| <i>List the included subjects and the selected curriculum-based learning goals and objectives here. Define the assessment methods for each goal.</i> |                             |                           |
| <b>Subjects</b>                                                                                                                                      | <b>Goals and Objectives</b> | <b>Assessment Methods</b> |
|                                                                                                                                                      |                             |                           |
|                                                                                                                                                      |                             |                           |
|                                                                                                                                                      |                             |                           |
|                                                                                                                                                      |                             |                           |
|                                                                                                                                                      |                             |                           |
|                                                                                                                                                      |                             |                           |
|                                                                                                                                                      |                             |                           |

| <b>21ST-CENTURY SKILLS: GOALS, OBJECTIVES AND ASSESSMENT</b>                                                                                                                   |                                               |                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------|
| <i>List the included curriculum-based 21<sup>st</sup>-century skills and their respective learning goals and objectives here. Define the assessment methods for each goal.</i> |                                               |                           |
| <b>21<sup>st</sup>-century/<br/>Transversal Skill</b>                                                                                                                          | <b>Specific Learning Goals and Objectives</b> | <b>Assessment Methods</b> |
|                                                                                                                                                                                |                                               |                           |
|                                                                                                                                                                                |                                               |                           |
|                                                                                                                                                                                |                                               |                           |
|                                                                                                                                                                                |                                               |                           |
|                                                                                                                                                                                |                                               |                           |



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## PROJECT PHASES AND SCHEDULE

*Plan the pedagogical implementation for your project. For planning the phases for your project, you can utilise inquiry-based learning (see the handbook pp. 20-22) as a basis. These phases are provided in this form in brackets, but you can also apply any other pedagogic model suitable for phenomenon-based learning here.*

| Phase                          | Date and time (and teacher) | Description of activities and learning tasks |
|--------------------------------|-----------------------------|----------------------------------------------|
| Phase 1<br>(orientation)       |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
| Phase 2<br>(conceptualisation) |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
| Phase 3<br>(investigation)     |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
| Phase 4<br>(conclusion)        |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |
|                                |                             |                                              |



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## UNIVERSAL DESIGN FOR LEARNING

### Special needs and barriers to learning in the group

*Based on the knowledge of your learners, list the learning difficulties/special needs or other learning barriers in the target group that need to be addressed.*

### Design the UDL-based support and accessible learning materials for your learners

*Based on the knowledge of your learners, design the PhBL project to include multiple means for engagement, representation and action and expression. You can select, for example, 1 or 2 design options for each category.*

*For reference, this handbook offers ideas for UDL (pp. 55-58). Further resources on UDL are available in many different languages e.g. on this website:*

<https://udlguidelines.cast.org/more/downloads/>

| Engagement | Representation | Action and Expression |
|------------|----------------|-----------------------|
|            |                |                       |
|            |                |                       |
|            |                |                       |
|            |                |                       |



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## References

- Aarnio, M. (2016, February 9). *Digitaalisen oppimisen webinaarisarja: Ilmiöpohjainen oppiminen – mitä, miksi, miten?*  
<https://www.youtube.com/watch?v=trpHiGsfXQo>
- AI for Education. (2025). *Create Rubrics with an AI Chatbot*.  
<https://www.aiforeducation.io/prompts/rubrics>
- Almeqdad, Q. I., Alodat ,Ali M., Alquraan ,Mahmoud F., Mohaidat ,Mohammad A., & and Al-Makhzoomy, A. K. (2023). The effectiveness of universal design for learning: A systematic review of the literature and meta-analysis. *Cogent Education*, 10(1), 2218191. <https://doi.org/10.1080/2331186X.2023.2218191>
- Annie Advisor. (2025). *Tekoäly opettajien ja erityisopetuksen opiskelijoiden tukena*. Annie Advisor. <https://annieadvisor.com/fi/blogi/tekoaly-opettajien-ja-erityisopetuksen-opiskelijoiden-tuena>
- Ariza, J. Á., & Hernández Hernández, C. (2025). A Systematic Literature Review of Research-based Interventions and Strategies for Students with Disabilities in STEM and STEAM Education. *International Journal of Science and Mathematics Education*. <https://doi.org/10.1007/s10763-025-10544-z>
- Auno, P., Heikkinen, E., Itkonen, H., Karhu, A., Karjalainen, R.-L., Korkealehto, K., Määttä, A., Oikarinen, A., Rajander, T., Ravelin, T., Ruotsalainen, M., & Takala, K. (2016). Pedagoginen malli 2016 – älyllä ja ilolla osaajaksi. *Kajaanin Ammattikorkeakoulun Julkaisusarja B 54 / 2016*.  
<https://www.theseus.fi/handle/10024/107179>
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining Twenty-First Century Skills. In P. Griffin, B. McGaw, & E. Care (Eds.), *Assessment and Teaching of 21st Century Skills* (pp. 17–66). Springer Netherlands. [https://doi.org/10.1007/978-94-007-2324-5\\_2](https://doi.org/10.1007/978-94-007-2324-5_2)
- Bray, A., Devitt, A., Banks, J., Sanchez Fuentes, S., Sandoval, M., Riviou, K., Byrne, D., Flood, M., Reale, J., & Terrenzio, S. (2023). What next for Universal Design for Learning? A systematic literature review of technology in UDL implementations at second level. *British Journal of Educational Technology*, 55(1), 113–138.  
<https://doi.org/10.1111/bjet.13328>
- Claned Group, & ELE Finland. (2017). *Road to 21st century competence: Evaluation Framework for transversal competences in the Finnish curriculum*. Microsoft. [https://kirstilonka.fi/wp-content/uploads/2018/08/evaluation\\_framework\\_microsoft\\_final.pdf](https://kirstilonka.fi/wp-content/uploads/2018/08/evaluation_framework_microsoft_final.pdf)
- Climateguide. (2025). *What is climate change? | Climateguide*.  
<https://www.climateguide.fi/climate-change-as-a-phenomenon/>
- Code, J. (2020). Agency for Learning: Intention, Motivation, Self-Efficacy and Self-Regulation. *Frontiers in Education*, 5. <https://doi.org/10.3389/feduc.2020.00019>
- DeepL. (2025). *DeepL Translate: The world's most accurate translator*.  
<https://www.deepl.com/translator>





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Ehlers, U.-D., Lindner, M., Sommer, S., & Rauch, E. (2023). AICOMP - Future Skills in a World Increasingly Shaped By AI. *Ubiquity Proceedings*.  
<https://doi.org/10.5334/uproc.91>

European Commission. (2025, February 18). *Learning for the green transition and sustainable development*. <https://education.ec.europa.eu/focus-topics/green-education/learning-for-the-green-transition>

European Commission, Parveva, T., Birch, P., Horváth, A., Piedrafita Tremosa, S., & Sigalas, E. (2024). *Learning for sustainability in Europe: Building competences and supporting teachers and schools : Eurydice report*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2797/81397>

Finnish National Agency for Education. (2014). *Perusopetuksen opetussuunnitelman perusteet | Opetushallitus*. <https://www.oph.fi/fi/koulutus-jatutkinnot/perusopetuksen-opetussuunnitelman-perusteet>

Finnish National Agency for Education. (2025). *Finnish Education System*. The Finnish Education System.  
<https://www.oph.fi/sites/default/files/documents/Finnish%20education%20system%202023.pdf>

Gonzalez, J. (2018). *Moving from Feedback to Feedforward | Cult of Pedagogy*.  
<https://www.cultofpedagogy.com/feedforward/>

Griffiths, A. J., Brady, J., Riley, N., Alsip, J., Trine, V., & Gomez, L. (2021). STEM for Everyone: A Mixed Methods Approach to the Conception and Implementation of an Evaluation Process for STEM Education Programs for Students With Disabilities. *Frontiers in Education*, 5. <https://doi.org/10.3389/educ.2020.545701>

Halinen, I., & Jääskeläinen, L. (2015). Opetussuunnitelmauudistus 2016. In H. Cantell (Ed.), *Näin rakennat monialaisia oppimiskokonaisuuksia*. PS-kustannus.

Hämäläinen, R., Oksanen, S., & Valkama, I. (Eds.). (2015). *Minullako oppimisvaikeuksia?* Erilaisten oppijoiden liitto.

Heland-Kurzak, K. (2020). Bad Practice Affecting and Limiting the Education of Students: A Study of Pedagogical Myths in Pedagogy Students. *Educational Sciences: Theory and Practice*, 20, 36–50. <https://doi.org/10.12738/jestp.2020.4.003>

Herwegen, J. V. (2024). *Shifting Perspectives: Embracing Strengths in Supporting Students with Special Educational Needs and Disabilities*. IBE — Science of Learning Portal. <https://solportal.ibe-unesco.org/articles/shifting-perspectives-embracing-strengths-in-supporting-students-with-special-educational-needs-and-disabilities/>

Hodges, T. D., & Clifton, D. O. (2004). Strengths-Based Development in Practice. In *Positive psychology in practice* (pp. 256–268). John Wiley & Sons, Inc.  
<https://doi.org/10.1002/9780470939338.ch16>

Honkonen, S., & Lehmuskoski, J. (2015, October 30). *Systeemiajattelun keinoista apua ilmiöpohjaiseen oppimiseen*. Sitra.  
<https://www.sitra.fi/blogit/systeemiajattelun-keinoista-apua-ilmiopohjaiseen-oppimiseen/>



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- Joint Research Centre. (2022). *GreenComp: The European sustainability competence framework*. Publications Office of the European Union.  
<https://data.europa.eu/doi/10.2760/13286>
- Jones, E. (2023, June 30). *What is diagnostic assessment?* [National Foundation for Educational Research (NFER)]. <https://www.nfer.ac.uk/assessment-hub/what-is-diagnostic-assessment/>
- Kärpänen, T., Loikkanen, O., & Puttonen, K. (2023). *Oppiminen kuuluu kaikille: Universal Design for Learning -viitekehys käytännössä*.  
<https://www.theseus.fi/bitstream/handle/10024/812737/Laurea%20julkaisut%20217.pdf?sequence=5>
- Kauppila, R. A. (2007). *Ihmisen tapa oppia: Johdatus sosiokonstruktiviseen oppimiskäsitykseen*. PS-kustannus.
- Lauttamäki, E., Lehtinen, R., Rajala, A., Rentola, A., & Rauhankasvatusinstituutti ry. (2020). *Opettajan Opas—Agenda 2030 teemapäivät*. Rauhankasvatusinstituutti ry.  
[https://cdn.accentuate.io/4483793092659/11692919193651/Agenda-2030-teemap%C3%A4iv%C3%A4opas\\_lz4yr5Z-v1585637871656.pdf](https://cdn.accentuate.io/4483793092659/11692919193651/Agenda-2030-teemap%C3%A4iv%C3%A4opas_lz4yr5Z-v1585637871656.pdf)
- Levterova-Gadjalova, D., Lazarov, A. et al (2020), "Training of teachers as inclusive education ambassadors", Plovdiv university "P. Hilendarski" edition.
- Lonka, K. (2015). *Oivaltava oppiminen*. Otava.  
<http://www.otava.fi/oppimateriaalit/luokat7-9/oivaltava-oppiminen/>
- Lonka, K. (2018a). *Phenomenal Learning from Finland*. Edita.
- Lonka, K. (2018b). *Phenomenal Learning from Finland*. Edita.
- Lonka, K., Hietajärvi, L., Hohti, R., Nuorteva, M., Rainio, A. P., Sandström, N., Vaara, L., & Westling, S. K. (2015). Ilmiölähtöisesti kohti innostavaa oppimista. In H. Cantell (Ed.), *Näin rakennat monialaisia oppimiskokonaisuuksia* (pp. 49–76). PS-kustannus.
- LuKiMat. (2025). *Arviointimenetelmät*. LukiMat.  
<https://www.lukimat.fi/lukimat-oppimisen-arviointi/tietopalvelu/arviointi-kaytannossa/arvioinnin-menetelmat-ja-valineet/arviointimenetelmat/arviointimenetelmat.html>
- Luostarinen, A., & Peltomaa, I.-M. (2016). *Reseptit OPSin käyttöön*.
- Marchant, R. (2023, April 3). Diagnostic assessments—Teacher's guide & examples. *ICAS Assessments*. <https://www.icasassessments.com/blog/diagnostic-assessments-teachers-guide-examples/>
- Microsoft. (2023). *What is mixed reality? - Mixed Reality*. Microsoft Learn.  
<https://learn.microsoft.com/en-us/windows/mixed-reality/discover/mixed-reality>
- Miettinen, K., & Happonen, K. (2025a). *Ilmasto- ja ympäristöaiheinen kollaasirunotyöpaja*. United Nations Association of Finland.  
<https://www.ykliitto.fi/kasvattajille/yk-osaksi-opetusta/tehtavat/ilmasto-ja-ymparistoaiheinen-kollaasirunotyopaja>
- Miettinen, K., & Happonen, K. (2025b). *Positiivinen ympäristö- tai ilmastouutinen mediassa*. <https://www.ykliitto.fi/kasvattajille/yk-osaksi-opetusta/tehtavat/positiivinen-ymparisto-tai-ilmastouutinen-mediassa>



Co-funded by  
the European Union

- Morozov, I. (2025). *Balabolka* [Computer software]. <https://www.cross-plus-a.com/balabolka.htm>
- Niemi, L.-M., Lehtovaara, K., & Hietikko, J. (2015). Monialaisia oppimiskokonaisuuksia yläkoulussa. In H. Cantell (Ed.), *Näin rakennat monialaisia oppimiskokonaisuuksia*. PS-kustannus.
- OECD. (2023, January 30). *Equity and Inclusion in Education*. [https://www.oecd.org/en/publications/equity-and-inclusion-in-education\\_e9072e21-en.html](https://www.oecd.org/en/publications/equity-and-inclusion-in-education_e9072e21-en.html)
- OpenAI. (2025). *ChatGPT (May 5 version) [Large language model]*. <https://chatgpt.com>
- Oppimisvaikeus.fi. (2025). *Oppimisvaikeudet – Oppimisvaikeus.fi*. <https://www.oppimisvaikeus.fi/tietoa/oppimisvaikeudet>
- Ovaska, J., Rongas, A., Luostarinen, A., & Kekkonen, T. (2014). *Ilmiöoppi—Opas ilmiöpohjaisen opetuksen suunnittelijalle*. Otavalan opisto. <https://peda.net/p/Turunan/vo/ilmi%C3%B6pohjaisuus/ilmioppi/ilmiopas-pdf2:file/download/07e350a3529e70d31fa81298ef26508aceef86cd/Ilmiopas.pdf>
- Özevin, B. (2023). Proposal of A Pedagogic Approach in Online Education: Phenomenon Based Learning. *International Journal of Social Policy and Education*, 5(2), Article 2. <https://www.ijspe.com/vol-5-no-2-february-2023-3.pdf>
- Pedaste, M., Mäeots, M., Siiman, L. A., de Jong, T., van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015a). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review*, 14, 47–61. <https://doi.org/10.1016/j.edurev.2015.02.003>
- Pedaste, M., Mäeots, M., Siiman, L. A., de Jong, T., van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015b). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review*, 14, 47–61. <https://doi.org/10.1016/j.edurev.2015.02.003>
- Peltomaa, I.-M. (2021). *Mokista oppii! Ohjekirja onnistuneisiin monialaisiin oppimiskokonaisuuksiin*. PS-kustannus.
- Peltomaa, I.-M., & Luostarinen, A. (2020). Ilmiölähtöistä oppimista tukevan toiminta kulttuurin haasteet ja mahdollisuudet. In E. Kostainen & M. Tarnanen (Eds.), *Ilmiömäistä! : Ilmiölähtöinen lähestymistapa uudistamassa opettajuutta ja oppimista* (Ilmiömäistä! : ilmiölähtöinen lähestymistapa uudistamassa opettajuutta ja oppimista). Jyväskylän yliopisto. <https://jyx.jyu.fi/handle/123456789/68029>
- Read Aloud. (2025). *Read Aloud: A Text-to-Speech Voice Reader*. <https://readaloud.app/>
- Rongas, A., & Laaksonen, R. (Eds.). (2014). *Ilmiöopas: Kokemuksia ilmiöopettamisesta - opettajilta toisille*. Hämeenlinnan kaupunki.
- Sanomapro. (2025). *Ilmiöoppiminen selittää monimutkaista maailmaa ja yhdistää oppiaineita*. <https://www.sanomapro.fi/ilmiooppiminen-selittaa-monimutkaista-maailmaa-ja-yhdistaa-oppiaineita/>
- Schaffar, B., & Wolff, L.-A. (2024). Phenomenon-based learning in Finland: A critical overview of its historical and philosophical roots. *Cogent Education*, 11(1), 2309733. <https://doi.org/10.1080/2331186X.2024.2309733>



Co-funded by  
the European Union

- Sillander, P. (2015). *Phenomenon Based Learning Rubric*.  
<https://nebula.wsimg.com/c58399e5d05e6a656d6e74f40b9e0c09?AccessKeyId=3209BE92A5393B603C75&disposition=0&alloworigin=1>
- Sitra. (2025). *Definition of Phenomenon*. Sitra.  
<https://www.sitra.fi/en/dictionary/phenomenon/>
- Somy Project (Director). (2013, September 26). *Ilmiöpohjainen opetus verkossa* [Video recording]. <https://www.youtube.com/watch?v=8S9ngu2RbjA>
- Taimela, I. (2017, April 4). *Ilmiöpohjainen oppiminen koulussa*.  
<https://www.youtube.com/watch?v=XQ4Ojorods8>
- The Global Goals. (2025). Goal 13: Climate action. *The Global Goals*.  
<https://globalgoals.org/goals/13-climate-action/>
- Tynninen, P.-S. (2024, December 20). Integrating Chemistry, Biology, and Physics Through Phenomenon-Based Learning in Comprehensive Schools. *HAMK Unlimited*. <https://unlimited.hamk.fi/amatillinen-osaaminen-ja-opetus/integrating-chemistry-biology-and-physics-through-phenomenon-based-learning-in-comprehensive-schools/>
- UNESCO. (2022). *Berlin Declaration on Education for Sustainable Development; Learn for our planet: Act for sustainability—UNESCO Bibliothèque Numérique*. <https://unesdoc.unesco.org/ark:/48223/pf0000381228>
- United Nations. (2025). *Goal 4 | Department of Economic and Social Affairs*.  
<https://sdgs.un.org/goals/goal4>
- United Nations Association of Finland. (2025). *Luonnon monimuotoisuuden päivän tehtävä: Ilmastopakolaisuus (Task for Biodiversity Day: Climate Refugees)*.  
<https://www.ykliitto.fi/kasvattajille/yk-osaksi-opetusta/tehtavat/luonnon-monimuotoisuuden-paivan-tehtava>
- United Nations Association of Finland, & Lindholm, M. (2022). *Ilmastonmuutos -ilmiöprojekti*. <https://www.ykliitto.fi/kasvattajille/yk-osaksi-opetusta/tehtavat/ilmastonmuutos-ilmioprojekti>
- University of Arkansas. (2022). *Using Bloom's Taxonomy to Write Effective Learning Objectives*. <https://tips.uark.edu/using-blooms-taxonomy/>
- Vaknin-Nusbaum, V., & Rachevski, I. (2024). Perpetuating the Gaps: 21st-Century Skills in Students With Learning Disabilities and Their Typically Developing Peers. *Journal of Learning Disabilities*, 57(6), 371–383.  
<https://doi.org/10.1177/00222194231211947>
- Venho, P. (2016, October 26). *Digitaalisia vinkkejä ilmiöoppimiseen*. SlideShare. <https://www.slideshare.net/slideshow/digitaalisia-vinkkejä-ilmiooppimiseen/67683488>
- Wakil, K., RAHMAN, R., HASAN, D., MAHMOOD, P., & JALAL, T. (2019). Phenomenon-Based Learning for Teaching ICT Subject through other Subjects in Primary Schools. *Journal of Computer and Education Research*, 7, 205–212.  
<https://doi.org/10.18009/jcer.553507>
- Wolff, L.-A. (2022). Phenomenon-based learning. In S. Idowu, R. Schmidpeter, N. Capaldi, L. Zu, M. Del Baldo, & R. Abreu (Eds.), *Encyclopedia of sustainable management*. Springer. [https://doi.org/10.1007/978-3-030-02006-4\\_1137-1](https://doi.org/10.1007/978-3-030-02006-4_1137-1)



Co-funded by  
the European Union

Yli-Panula, E., Jeronen, E., & Lemmetty, P. (2020). Teaching and Learning Methods in Geography Promoting Sustainability. *Education Sciences*, 10(1), Article 1. <https://doi.org/10.3390/educsci10010005>

Yue, S. (2024). The Evolution of Pedagogical Theory: From Traditional to Modern Approaches and Their Impact on Student Engagement and Success. *Journal of Education and Educational Research*, 7, 226–230. <https://doi.org/10.54097/j4agx439>