



# STEAM Stars

2019-1-UK01-KA201-061537

Intellectual Output 1:

## European Framework of Competences in Teaching STEAM Education for Gifted Students



This Project has been funded with the support of the European Commission. The information reflects the views of the authors, and Commission cannot be held responsible for any use which may be made of the information contained therein.





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## 1. Introduction

This European Framework of Competences is the first formal output of the STEAM Stars project. It provides a reference of competences in teaching STEAM education to gifted students, using a common language to describe these competences that can be understood across Europe, following European standards and frameworks of reference such as the European Qualifications Framework (EQF).

This document provides an outline of the STEAM Stars project and its partner organisations, followed by details of the key competences which form the Framework.

The Framework forms the basis for the future actions in the STEAM Stars project, and provides the structure within which the Open Campus and mobile assessment app will be created (see Section 2 below).



## 2. About the STEAM Stars project

Evidence suggests that highly gifted learners represent as much as 15% of the EU school-age population (European Economic and Social Committee, 2013, p.3), although at present there is a marked scarcity of targeted teacher training in this area. As a result, most gifted students spend the majority of their time in regular classrooms without access to challenging work or teachers knowledgeable about the specific needs of high-ability learners.

STEM (Science, Technology, Engineering and Mathematics) education has been an increasing focus in schools and universities over the past two decades and is recognised as being essential to “national development and productivity, economic competitiveness and societal wellbeing” (Freeman, Marginson & Tytler, 2019, p. 350). The integration of Arts into STEM to create STEAM education has enormous potential to provide challenging and motivating schooling for gifted students, who may be under-served in the classroom. Rather than spending less time on STEM subjects and more time on artistic topics, STEAM education applies creative thinking to STEM projects, sparking students’ imagination and creativity through the arts. While studies (see Section 7 of this document) show that a quality STEAM education programme is engaging, motivating, student-centred, innovative, collaborative, and has real-world applications, teachers often find it challenging to integrate into their existing teaching practice.

In recognition of this need, and to better support teachers’ understanding and use of STEAM education, the STEAM Stars project has produced this **European Framework of Competences in Teaching STEAM Education for Gifted Students**, defining for the first time the competences, knowledge and skills required to teach STEAM to high-ability learners. To further support school teachers, trainers and non-formal and informal educators in refining these competences, the project will also produce:

- The **STEAM Stars Open Campus**, comprising of:
  - an Online Instructional Guide on Digital Competences for Virtual Learning;
  - a set of structured Training Modules; and
  - a collection of Massive Open Online Courses (MOOC).
- The **STEAM Stars Mobile Assessment App**, a practical and innovative ICT-based tool designed to evaluate competences against this European Framework of Competences.
- Accessible guidelines to promote transparency and recognition of teaching STEAM education for gifted students.



### 3. STEAM Stars partner organisations

The seven members of the STEAM Stars consortium comprise universities, educational authorities, and educational experts from five countries (United Kingdom, Spain, Ireland, the Netherlands, and Turkey). These partners work together to define common strategies and to design and carry out the outputs outlined above.

#### **Coventry University, United Kingdom (COVUNI)**

Coventry University is the lead partner in the project. With a proud tradition as a provider of high-quality education and a focus on multidisciplinary research, the university has established a robust academic presence regionally, nationally and across the world. Coventry University has an extensive track record in engagement with Europe and European research and development. It has widely recognised experience in the delivery of Framework Programme activity, with extensive European collaborative management experience from lead and partner roles in a variety of projects.

The COVUNI project team is based in the Centre for Postdigital Cultures (CPC). The CPC builds on previous successes and reputation for new technology (augmented reality, virtual reality and serious games). With a wealth of experience and project success the Centre contains gifted and talented researchers working on this immersive technology for 21st Century knowledge exchange.

#### **Instituto Para el Fomento del Desarrollo y la Formación, Spain (INFODEF)**

INFODEF, the Institute for the Promotion of Development and Training, is a private and independent centre for research, development and innovation. INFODEF's mission is to design and carry out projects that contribute to achieving sustainable and inclusive development through education, culture and innovation. INFODEF supports the modernisation of educational systems and the pedagogical innovativeness of public and private educational institutions, at national and European levels, by designing and developing innovative tools, methodologies, products and services that respond to current social and economic challenges and enable us to anticipate and drive the changes needed to achieve future goals and objectives in society.

#### **Rotterdam University of Applied Sciences, The Netherlands (RUAS)**

The Dutch STEAM Stars project team works in the School of Education, which is a part of the Rotterdam University of Applied Sciences (RUAS). RUAS offers a range of study programmes at undergraduate (Bachelor) and postgraduate (Master's) levels. The School of Education also offers special preparation programmes for Bachelor and



Master's Programmes, as well as accelerated programmes, exchange programmes for students from partner universities, summer courses and tailor-made business courses.

All courses provide preparation for the profession of a teacher in Primary, Secondary, Vocational and Adult Education. The design of the various teacher training programmes is quite similar but, naturally, they differ in knowledge areas, training schools (internships), instructional methods, and educational theories. Students will acquire competences and knowledge that contribute to teaching in primary or secondary education and will gain the ability to become a highly competent teacher.

The work in the School relates closely to the STEAM Stars project as gifted students can be RUAS students; additionally the students, who will become teachers, are trained to teach a variety of pupils, including those who are gifted and those with special educational needs.

### **Dokuz Eylul University of Izmir, Turkey (DEU)**

The Turkish STEAM Stars project team works at Dokuz Eylül University, in the Buca Faculty of Education. The Buca Education Faculty provides undergraduate, graduate and doctoral education in many different fields, and has eight departments for the training of teachers at primary, secondary and high school levels. The faculty has been engaged in many different projects at national and international level, scientific publications, congresses, symposia and courses, and is making a significant contribution to education in Turkey.

The Turkish project team is based in the Department of Gifted Education within the Buca Faculty of Education. The team works in the fields of interdisciplinary interaction, developing activities and training programmes for the education of gifted students at national and international level, and each member contributes to the STEAM Stars project according to their expertise.

### **Zabala Innovation Consulting, Spain (ZABALA)**

ZABALA is a Spanish SME (Small and Medium Enterprise) with more than 200 employees that has been working for more than 30 years promoting innovation as a key competence to organisations, including SMEs, big companies, Research & Technology Centres, universities and public organisations. As part of its services, ZABALA specialises in providing project management services for projects funded under transnational collaborative programmes, including exploitation and innovation management in multi-beneficiary grant agreements. Its Social Innovation department has extensive experience in social innovation, social awareness and stakeholder engagement, with more than 16 years working for social development, international cooperation, project





management, and human rights all around the world. In the field of education and inclusion, ZABALA has participated in the preparation of several Erasmus+ project proposals and participated as a partner in other Erasmus+ projects related to the design and development of innovative and inclusive EQF-based curricula in educational organisations.

### **General Directorate of Special Education and Guidance Services within the Ministry of Education, Turkey (ORGM)**

This institution is the most authoritative institution and policymaker in Turkey in terms of special education, specifically vocational education and guidance services in special needs. The General Directorate for Special Education and Guidance Services carries out its activities in two main fields as special education services and guidance services, and the basis of their work is:

- to provide education access for individuals who need special education, and
- to increase the quality of special education services; providing educational, personal and vocational guidance services to students, parents and teachers.

The fundamental aim of the General Directorate for Special Education and Guidance Services is to ensure that every individual in society can exist in every field of life and improve themselves. To this end, it provides guidance services that all students in the education system need, along with education services for individuals with special needs and gifted individuals in Turkey.

### **Innoquality Systems Limited, Republic of Ireland (INQS)**

Innoquality Systems (INQS), STEAM Stars' Irish partner, is a social innovation company based in Dublin, Ireland. INQS provides programme and policy services to enable positive student and teacher outcomes. The scope of their work covers early childcare, school, college and workforce training. They are expert in crafting innovative approaches, methodologies and digital designs which address critical educational gaps to improve the quality of educational programmes, both in the classroom and the digital realm.

STEAM Stars is strongly aligned with INQS's activities. It addresses two critical educational gaps: a deficiency in the educational programming of STEAM for gifted students in standardised education, and a lack of clarity around the translation of the innovative quality of artistic practice into tiered STEAM educational planning, projects, programmes and systems.





## 4. EQF Methodology

The European Qualifications Framework (EQF), which came into force in April 2008, has the purpose of making qualifications comprehensible and transferable across the 39 European countries which currently implement the EQF (Cedefop, 2021). The EQF aims to promote transparency, quality assurance, and mobility (Bohlinger, 2008), and works as a “bridge between national qualifications systems” (Cedefop, 2021). In order to implement the EQF, individual countries develop their own National Qualification Frameworks (NQFs).

The EQF is divided into eight levels based on learning outcomes, each of which is described in terms of knowledge, skills, and autonomy and responsibility; national qualification levels are then linked to these EQF levels. The learning outcomes indicate what an individual should know, understand, and be able to do at the end of a learning process (Cedefop, 2021).

The table on the following pages summarises the eight levels of the EQF. Within the context of the Framework, **Knowledge** is described as theoretical or practical, **Skills** are described as cognitive (involving thinking) and practical (involving dexterity and the use of tools), and **Responsibility and Autonomy** is described as the ability to apply the knowledge and skills appropriately and independently.



### Level 1 – learning outcomes

Knowledge	Skills	Responsibility and autonomy
Basic general knowledge	Basic skills required to carry out simple tasks	Work or study under direct supervision in a structured context

### Level 2 – learning outcomes

Knowledge	Skills	Responsibility and autonomy
Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules	Work or study under supervision with some autonomy

### Level 3 – learning outcomes

Knowledge	Skills	Responsibility and autonomy
Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems

### Level 4 – learning outcomes

Knowledge	Skills	Responsibility and autonomy
Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities

### Level 5 – learning outcomes

Knowledge	Skills	Responsibility and autonomy
Comprehensive factual and theoretical knowledge within a field and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others



### Level 6 – learning outcomes

Knowledge	Skills	Responsibility and autonomy
Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups

### Level 7 – learning outcomes

Knowledge	Skills	Responsibility and autonomy
Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
Critical awareness of knowledge issues in a field and at the interface between different fields		

### Level 8 – learning outcomes

Knowledge	Skills	Responsibility and autonomy
Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research

(taken from Europass, 2021)



## 5. STEAM Stars Framework of Competences : Outline

This innovative European Framework of Competences in teaching STEAM education for gifted students defines, for the first time, the competences, knowledge and skills required to teach STEAM (Science, Technology, Engineering, Art and Mathematics) in a way that directly benefits the target group.

The Framework consists of seven units designed to train educators in providing STEAM education for gifted students. These are detailed below, and include the foundations of gifted education, the educational needs of gifted children, and the implementation of STEAM education for gifted students. Each unit provides an overview of the topics which will be covered within the STEAM Stars Open Campus, the competence which will result from the unit, and the anticipated learning outcomes which the educator will gain from completing the unit. These learning outcomes are structured using the EQF categories of knowledge, skills, and responsibility and autonomy.

The Framework will allow school managers, course designers, teachers, trainers, and examining bodies to define and develop new training paths and courses designed for school teachers, trainers and non-formal and informal educators. The framework has been designed at level 6 of the EQF.

The competences arising from the STEAM Stars Framework are summarised on the next page.



### **Foundations of Gifted Education**

Improved understanding of the ways in which some gifted children may present and behave in the classroom, and awareness of some identifying characteristics of gifted students

### **Educational Needs of Gifted Students**

Increased knowledge of the various manifestations of giftedness and how to recognise the educational, social and emotional needs of gifted students, including 'twice-exceptional' students

### **Curriculum Planning for Gifted Students**

Knowledge of the types of curriculum models for teaching gifted students, and how to develop a curriculum that meets their individual needs

### **Learning Environments for Gifted Instruction**

Increased awareness of the ways in which the learning environment can impact and support gifted students

### **Teaching Key Competences for Success in STEAM to Gifted Students**

Understanding of why and how STEAM education has included the Arts, and the ability to apply soft skills and digital literacy practices to provide enriched teaching for gifted students

### **Instructional Design of STEAM for Gifted Students**

Understanding of the importance of interdisciplinary teaching in educating gifted students, and how to apply STEAM within instructional design

### **Implementation of STEAM Education for Gifted Students**

Awareness of the barriers to implementing STEAM education, and the ability to design strategies to successfully implement a curriculum which supports gifted students towards successful performance both in and out of the classroom



## 6. STEAM Stars Framework of Competences : Detailed

### Unit 1 : Foundations of Gifted Education

Gifted students (also known as gifted and talented, high-achieving, or high-ability students) have been a specific focus of education for thousands of years. The provision of specialised education for young people exhibiting high levels of intellect or creativity was argued by Plato, and has continued to exist throughout the world.

Gifted education seeks to meet the various requirements of students who have been identified as gifted, usually by providing additional learning materials which allow them to go deeper into the subject or to move ahead of their classmates. However, most gifted children spend the majority of their time in regular classrooms without access to challenging coursework or to teachers who are knowledgeable about the special learning needs of our most highly able learners. That is the reality in countries such as the United Kingdom, Ireland, Spain, the Netherlands and Turkey.

#### Competence

Upon completion of this unit, the educator will understand the ways in which some gifted students may present and behave within the classroom, and will be aware of some identifying characteristics of gifted students.





<b>Unit 1 Learning Outcomes</b>		
<b>Knowledge</b>	<b>Skills</b>	<b>Responsibility and autonomy</b>
<p>The ways in which gifted students may present in the classroom</p> <p>Different methods for engaging gifted students in the classroom</p> <p>How to recognise some characteristics of giftedness in students</p> <p>The reasons why some gifted children do not perform at the highest level</p>	<p>The ability to communicate with gifted children</p> <p>The ability to engage gifted students in the classroom</p> <p>The ability to support gifted students in their learning</p> <p>The ability to identify types of lesser-known or previously-unrecognised gifted students</p> <p>The ability to recognise educational malnourishment in students</p>	<p>The development of learning designs which engage and challenge gifted students</p> <p>An awareness of the various ways in which gifted students engage with and relate to their world</p> <p>The understanding that gifted students may underachieve in the classroom, and that underachieving students may in fact be gifted</p> <p>The understanding that certain traits in gifted students may lead to unsuccessful and/or damaging educational experiences</p>



## Unit 2 : Educational Needs of Gifted Students

This unit provides an overview of gifted students' learning characteristics and personality traits, and their educational needs.

Knowledge of the educational, social and emotional needs, the common characteristics, and the common misconceptions about gifted people is necessary in order to optimally coach and guide gifted students in their personal, cognitive, social, psychological and emotional development. Providing educators with knowledge of their characteristics and behaviour will help them to distinguish typical behaviour of gifted students from behaviour linked to certain mental disorders.

In this unit you will learn in which ways poor self-image and self-insight play a role in the learning outcomes of the gifted underachievers. Since the solutions for underachievement are multivariable, teachers have to know where to pay attention, in particular because the professional has the responsibility to support the student.

When giftedness is accompanied with a learning or developmental disorder (for example ADD, ADHD, dyscalculia, dyslexia or ASS), this is called 'twice-exceptional' and needs special attention from the teacher. When teachers are able to recognise the above-mentioned in educational practice, they will become better coaches and bring the gifted students to their full potential.

### Competence

Upon completion of this unit, the educator will have increased knowledge of the various manifestations of giftedness, and how to recognise the educational needs of gifted students, including 'twice-exceptional' students.



## Unit 2 Learning Outcomes

Knowledge	Skills	Responsibility and autonomy
<p>Understand the educational needs of gifted students</p> <p>Understand the social and emotional needs of gifted children</p> <p>Know which common characteristics gifted individuals display, and common misconceptions</p> <p>Understand that, as a group, gifted students are heterogeneous and are easily stereotyped in an incorrect way</p> <p>Knowledge of how poor self-image and dysfunctional self-management are the main causes of underachievement</p> <p>Know the characteristics of underachievement and twice-exceptional gifted students</p> <p>Awareness of the huge impact of the educator on the wellbeing of gifted students in general</p>	<p>Recognise the educational needs of the different types of gifted students</p> <p>The ability to recognise the need to balance the cognitive, social and emotional needs of gifted students</p> <p>Ability to recognise the need to balance the cognitive, social and emotional needs of gifted students</p> <p>Ability to identify common stereotypes applied to gifted students, and avoid the harm that can be caused through their use</p> <p>Recognise the characteristics of underachievement and underachievers</p> <p>The ability to analyse to what extent the child, the parents, or the school have led to a deficient self-image and underachieving behaviour</p> <p>The ability to recognise and guide twice-exceptional gifted students</p>	<p>Applying acquired skills and knowledge related to the variety of personal and learning characteristics properties to meet the educational needs of gifted students</p> <p>Working with validated and correct diagnoses (by recognising their behaviour, needs, feelings and attitudes) in order to meet the social, emotional and educational needs of gifted students</p> <p>Creating a learning environment to stimulate the personal, cognitive, psychological and emotional development of gifted students while avoiding stereotypes and misconceptions</p> <p>Meeting the educational needs of underachievers by working with validated and correct identification</p> <p>Developing a helpful coaching process which includes, at least, the student, the parent(s) and educator</p> <p>Constructing educational adjustments for gifted pupils who are underachieving or twice-exceptional</p>



### **Unit 3 : Curriculum Planning for Gifted Students**

A curriculum is a set of objectives, basic competences, content, pedagogical methods, activities, teaching resources and evaluation criteria of each of the courses of an educational system.

Curriculum planning for gifted students aims to develop students' talent, enhance their learning, provide them with knowledge and skills to become independent and self-aware learners, and give them the tools to contribute to a multicultural and diverse society.

Curriculum planning for gifted students is a complex process in which educators apply the theory and research-based curriculum and instruction models related to gifted students, and respond to their needs by planning, selecting, adapting and creating relevant content to ensure specific student outcomes. In this process, educators must emphasise advanced, conceptually challenging, in-depth, distinctive, and complex content within cognitive, affective, aesthetic, social, and leadership domains.

#### **Competence**

Upon completion of this unit, the educator will be able to develop a curriculum that meets the unique needs of gifted students.



Unit 3 Learning Outcomes		
Knowledge	Skills	Responsibility and autonomy
<p>Understand the different types of curriculum models</p> <p>Understand evidence-based best practices on curriculum development for gifted students</p>	<p>Adapt, modify, or replace the standard curriculum to meet the interest, strengths, and needs of gifted students</p> <p>Develop tiered lesson plans, being able to adapt and complexify an already existing lesson plan, following tiered measurable learning outcomes</p> <p>Integrate a variety of technologies for students to construct knowledge, solve problems, communicate and express themselves creatively, and collaborate with others in teams locally and globally</p> <p>Use pre-assessments, formative assessments, and summative assessments to identify students' strengths and needs, develop differentiated content, and adjust instructional plans based on progress monitoring</p>	<p>Contribute to professional knowledge and practice regarding curriculum development for gifted students</p>



## Unit 4 : Learning Environments for Gifted Instruction

Learning environments contribute significantly to ensuring specific student outcomes. They “promote personal and social responsibility, multicultural competence, and interpersonal and technical communication skills” for 21st-century leadership (NAGC, n.d.).

Learning environments are like aquariums. Just as the temperature, cleaning and feeding of an aquarium is vital to the creatures that live within it, so the physical and psychological arrangement of a learning environment is vital for the students who study there. It is important to be aware of the functions of an effective learning environment and its possible impact on gifted students; it is a setting in which they can realise their personal characteristics and development (Akdeniz, 2020).

This unit addresses some ways of creating a positive classroom environment that might be appropriate for gifted students. Gifted students have many traits mentioned in previous units and one of them is creativity; a learning environment should be designed in a way that will advance their creativity and help them to reach their potential.

Gifted students can differ significantly from their peers, and using the same teaching programme, strategies, and materials during the class potentially provides insufficient challenge and could result in boredom. This unit concludes with the setting of appropriate expectations that will advance not only their skills and academic success, but also their social and emotional well-being.

### Competence

Upon completion of this unit, the educator will have increased awareness of how the learning environment can impact and support gifted students.



Unit 4 Learning Outcomes		
Knowledge	Skills	Responsibility and autonomy
<p>A conceptual and theoretical framework of learning environments for gifted students</p> <p>Functions of the learning environment and their associated impact on gifted students</p> <p>The STEAM learning environment for gifted instruction, from theory to practice</p>	<p>Describe a conceptual framework of learning environments for gifted instruction</p> <p>Describe effective formal and informal learning environments for gifted students</p> <p>Describe an effective physical learning environment for STEAM education</p> <p>Set advanced expectations based on gifted students' traits to cultivate soft skills and creativity and develop 21st-century skills</p>	<p>Describe, design and maintain an effective learning environment for gifted students</p> <p>Awareness of the importance of the theoretical and practical implications in STEAM education of an effective learning environment</p> <p>Design STEAM education for gifted students in order to develop 21st-century skills such as collaboration, communication, creativity, problem solving, and critical thinking.</p> <p>Capable of setting advanced expectations that support the emotional wellbeing and soft skills of gifted students</p>



## Unit 5 : Teaching Basic Skills to Gifted Students through STEAM Education

This unit will provide the teacher with the key competences and knowledge required for success when programming STEAM education lessons, projects and programmes of studies which consider enrichment for gifted students in tandem with class groups. Upon completing this unit, the teacher will be able to discuss the theoretical basis behind STEM education and the type of mindset that STEM activities cultivate. They will also be able to define and discuss the rationale and theoretical ideas behind the expansion of STEM to include Art and become STEAM, specifically focusing on the benefits which an art education and an artistic mindset can provide.

Teachers will become familiar with soft skills and digital literacy practices that can be cultivated to support the STEAM education processes.

At the end of this unit, the teacher will have the knowledge and skills to create and plan STEAM lessons, projects, and programmes of studies that consider enrichment for gifted students. They will be able to incorporate practices within these lessons, projects, and programmes of studies which cultivate soft and digital literacy skills.

### Competence

Upon completion of this unit, the educator will be able to define STEAM and apply complimentary soft skills and digital literacy practices to provide enrichment for gifted students.





Unit 5 Learning Outcomes		
Knowledge	Skills	Responsibility and autonomy
<p>The theory and mindset behind STEM education</p> <p>The theoretical rationale behind the expansion of STEM education to include art and the artistic mindset: STEAM</p> <p>The soft skills which support STEAM education for gifted students</p> <p>Digital literacy practices which support STEAM education for gifted students</p>	<p>The ability to define and discuss STEM education</p> <p>The ability to define and discuss the theoretical rationale behind the expansion of STEM education to include art and the artistic mindset: STEAM</p> <p>The ability to define and discuss the application of soft skills in STEAM education for gifted students</p> <p>The ability to define and discuss complementary digital literacy practices in STEAM education for gifted students</p>	<p>The creation of STEAM lessons with enrichment for gifted students</p> <p>The creation of STEAM lessons with enrichment for gifted students which activate complementary soft skills</p> <p>The creation of STEAM lessons with enrichment for gifted students, including complementary digital literacy practices</p>



## Unit 6 : Instructional Design of STEAM for Gifted Students

Instructional designs created for gifted students include elements of enrichment and acceleration, as well as the integration of different disciplines. Teaching with STEAM is important for the integration of different disciplines and for gifted students to examine the relationship between the different disciplines from a broader perspective.

STEAM teaching design for gifted students can be placed in a disciplinary, multidisciplinary, interdisciplinary and transdisciplinary setting. This unit will focus on the basics of STEAM instructional design by explaining how the integration of different disciplines, questioning, and inquiry should function with examples.

### Competence

Upon completion of this unit, the educator will be able to define disciplinary, multidisciplinary, interdisciplinary, and transdisciplinary approaches, and apply the basic features of STEAM instructional designs.



<b>Unit 6 Learning Outcomes</b>		
<b>Knowledge</b>	<b>Skills</b>	<b>Responsibility and autonomy</b>
<p>Disciplinary, multidisciplinary, interdisciplinary and transdisciplinary teaching approaches</p> <p>Higher order skills, questioning, inquiry, and investigation, and their application to instructional design for STEAM</p>	<p>The ability to use different disciplinary integration methods for instructional design within STEAM</p> <p>The ability to use questions and inquiry methods, and to understand higher order skills for instructional design for STEAM</p> <p>The ability to evaluate STEAM activities and lessons for gifted students from different perspectives and disciplines</p>	<p>The creation and evaluation of instructional design of STEAM for gifted students</p>



## **Unit 7 : Implementation of STEAM Education for Gifted Students**

Curriculum implementation includes the provision of organised assistance to teachers in order to ensure that the newly developed curriculum and the most powerful instructional strategies are actually delivered at the classroom level.

### **Competence**

Upon completion of this unit, the educator will be able to put the curriculum into practice in such a way that the eventual outcome is evidenced through the learners' performance in and outside the classroom.



### Unit 7 Learning Outcomes

Knowledge	Skills	Responsibility and autonomy
<p>Knowledge of accessibility barriers to education for gifted students, and strategies to create accessible learning environments</p> <p>Knowledge of local learning contexts linked with different social-cultural elements such as language, skills, and ethno-methods/practices, and the importance of contextualizing knowledge to make learning effective</p> <p>Knowledge of different methodologies, tools and materials of continuing professional development to enhance teachers' competence-oriented education, training and learning</p> <p>How to assess the effectiveness of teaching approaches in contributing to student learning and that students are meeting their learning goals</p>	<p>The ability to adapt/create accessible learning environments for gifted students by understanding their accessibility needs and setting accessible learning environments that support students' skills and well-being</p> <p>The ability to adapt the STEAM curriculum to the specific local context</p> <p>The ability to update or develop additional competences through continuing professional development</p> <p>The ability to assess effectiveness of teaching through evaluation tools addressed to colleagues or to students</p>	<p>The creation of accessible learning environments for gifted students based on their accessibility needs</p> <p>The adaptation of STEAM curriculum and teaching methods to the different and culturally diverse contexts of gifted students</p> <p>Access to a wide range of learning materials to acquire continuing professional development</p> <p>Development and use of assessment methodologies to evaluate teaching effectiveness</p>



## 7. Lists of References

### Section 1 About the STEAM Stars project

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