



Learn STEM
Innovative Model of learning STEM
in secondary schools



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ERASMUS+ KA220
Cooperation partnerships in school education

**LEARN STEM Teacher
Training Programme**

Date:
September, 2024

Reference Number:
2022-1-TR01-KA220-SCH-000087583



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1 Introduction

Creating a curriculum for training teachers to implement STEM education involves a detailed plan that encompasses understanding STEM teachers needs, and keeping these needs in mind, evolving the programme around STEM principles, integrating them into the curriculum, and employing innovative teaching methods. In this document, the needs and experiences of STEM teachers working in partner schools are also described (Annex 1). After the presentation of needs analysis, below is a structured curriculum designed to equip teachers with the necessary skills and knowledge to effectively implement STEM education in their schools. This curriculum is divided into several modules, each with a specific focus area within STEM education.

This curriculum provides a comprehensive framework for training teachers in implementing STEM education. Each module is designed to build on the previous one, ensuring that participants not only understand the theoretical underpinnings of STEM education but also acquire practical skills and strategies for effective implementation.



2 Teacher Training Curriculum

MODULE 1: INTRODUCTION TO STEM EDUCATION

Lesson Title: Understanding STEM and Its Importance

Subject: Introduction to STEM

Duration: 2 hours

Learning Objectives:

- Define STEM and explain its significance in education.
- Understand the interdisciplinary approach of STEM.
- Identify the benefits of integrating STEM into the curriculum.

Materials and Resources:

- PowerPoint presentations
- Case studies of successful STEM programs
- Access to online resources and journals

Instructional Steps:

- Begin with a presentation on what STEM stands for, highlighting the integration of Science, Technology, Engineering, and Mathematics.
- Discuss the importance of STEM education in fostering innovation, critical thinking, and problem-solving skills.
- Show examples of successful STEM programs in schools through case studies.
- Engage participants in a discussion on the potential challenges and benefits of implementing STEM in their classrooms.

Closure:

- Recap the key points of the lesson.
- Assign participants to find and share examples of STEM activities.



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MODULE 2: CURRICULUM INTEGRATION

Lesson Title: Designing a STEM-Integrated Curriculum

Subject: Curriculum Planning

Duration: 4 hours

Learning Objectives:

- Learn how to integrate STEM concepts into existing curricula.
- Understand how to design interdisciplinary STEM lessons.
- Explore strategies for aligning STEM activities with educational standards.

Materials and Resources:

- Curriculum standards
- Sample STEM lesson plans
- Templates for lesson planning

Instructional Steps:

- Introduction to curriculum integration concepts and benefits.
- Workshop on analyzing current curriculum and identifying opportunities for STEM integration.
- Group activity to design a sample STEM lesson plan using templates, aligned with curriculum standards.
- Peer review of designed lesson plans with constructive feedback.

1. Closure:

- Highlight key strategies for successful curriculum integration.
- Encourage sharing of created lesson plans for collaborative improvement.



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MODULE 3: INNOVATIVE TEACHING METHODS IN STEM

Lesson Title: Adopting Innovative Teaching Strategies for STEM

Subject: Teaching Strategies

Duration: 3 hours

Learning Objectives:

- Identify and apply various innovative teaching methods suitable for STEM education.
- Explore the use of technology and digital tools in enhancing STEM learning.
- Develop skills in fostering a collaborative, inquiry-based learning environment.

Materials and Resources:

- List of digital tools and resources for STEM education
- Videos demonstrating innovative STEM teaching methods
- Guide on collaborative and inquiry-based learning strategies

Instructional Steps:

- Overview of innovative teaching methods in STEM, including flipped classrooms, project-based learning, and problem-based learning.
- Demonstration of digital tools and resources that support STEM education.
- Small group activity to plan a mini-lesson incorporating an innovative teaching strategy and a digital tool.
- Presentations of mini-lessons with group feedback.

Closure:

- Discuss how to overcome challenges in implementing new teaching strategies.
- Encourage experimentation with different methods to find what works best for their students.



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MODULE 4: ASSESSMENT AND EVALUATION IN STEM

Lesson Title: Effective Assessment Strategies for STEM Education

Subject: Assessment Strategies

Duration: 3 hours

Learning Objectives:

- Understand different assessment methods suitable for STEM education.
- Learn how to design assessments that accurately measure student understanding and skills in STEM.
- Explore the use of formative and summative assessments to support and evaluate student learning.

Materials and Resources:

- Examples of STEM assessments
- Rubrics and evaluation criteria for STEM projects
- Articles on best practices in STEM assessment

Instructional Steps:

- Introduction to assessment types and their roles in STEM education.
- Discussion on designing assessments that align with learning objectives and STEM competencies.
- Group work to create a rubric for evaluating a STEM project.
- Share and critique rubrics in small groups for feedback.

Closure:

- Summarize key points on effective STEM assessment.
- Encourage sharing of assessment strategies among colleagues for continuous improvement.



MODULE 5: PROFESSIONAL DEVELOPMENT AND CONTINUOUS LEARNING

Lesson Title: Fostering a Culture of Continuous Professional Development

Subject: Professional Development

Duration: 2 hours

Learning Objectives:

- Recognize the importance of continuous professional development (CPD) in keeping up with STEM education trends.
- Identify resources and opportunities for CPD in STEM education.
- Develop a personal action plan for ongoing learning and improvement in STEM teaching.

Materials and Resources:

- List of CPD resources for STEM educators
- Template for a personal development plan
- Case studies of successful professional growth in STEM teaching

Instructional Steps:

- Discuss the evolving nature of STEM fields and the need for teachers to stay informed.
- Explore various CPD resources, including online courses, workshops, and professional networks.
- Guide participants in creating a personal action plan for their professional development.
- Share and discuss action plans in small groups for feedback and encouragement.

Closure:

- Highlight the benefits of a community of practice for ongoing support and learning.
- Motivate participants to commit to their personal development plans and to seek out opportunities for growth.



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3 ANNEXES

ANNEX 1: Needs Analysis Reports from Partner Schools

ANNEX 2: Lesson Plans Developed to Train STEM Teachers



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WP3: LearnSTEM: Needs Assessment for Teachers
Survey results in Greece

Kalliopi Ntolou
IEK Kavalas, Kavala, Greece

Date:

11.04.2024

Reference Number:

2022-1-TR01-KA220-SCH-000087583



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Learn STEM: Needs Assessment for Teachers Survey results in Greece

Questionnaire:

<https://docs.google.com/forms/d/e/1FAIpQLSdddbKSrLWwsXFuzzU5mi6GZjyn7K00K3HAcWYzgvrGqgggrjQ/viewform>



Results

https://docs.google.com/forms/d/1qPSnO_1L9CGN-ehaGOnu6J80pohRQT3-4ktx332_RuE/viewanalytics

The form was completed by 36 teachers from IEK Kavallas, Greece.

Based on their answers, we present the data collected:

Gender

Female 58.3%

Male 41.7%



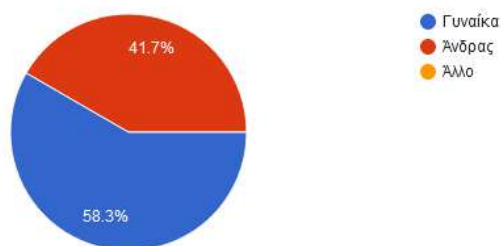
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Φύλο

36 responses



Branch - Specialty

ICT

Tourism Business Management

Cooking-pastry

ELECTRICAL ENGINEER T.E. / ELECTRICAL

ART

physical education

Mechanical Engineer

PE04.01 Physicists

PE82-MECHANOLOGIST

PE80 ADMINISTRATION OF TOURIST BUSINESSES

Information technology

BIOLOGIST - NURSE

Cooking art

AGRICULTURE

Culinary Technician French

ICT

PE 07 GERMAN LANGUAGE

TE01.19 - HAIRDRESSER

TOURISM

PHYSICS

Technician beautician of Podiatry Nail Beautification and Onychoplasty

PE 83 ELECTRICIAN

PE28 Physiotherapy

AESTHETIC

PE86 Informatics



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TECHNICIAN OF PODIATRY-HAIRDRESSING

PE ELECTRICITY

French

Early childhood educator

Physical therapy assistant

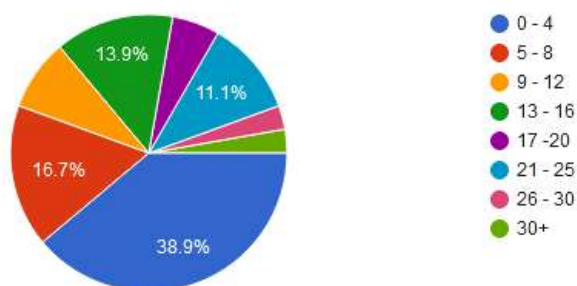
Hospitality Unit Executive

TOURISM

Seniority

Έτη που διδάσκετε:

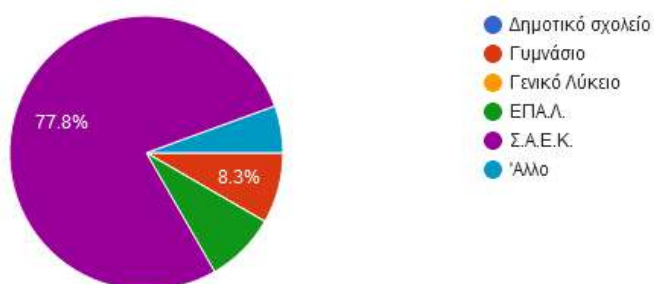
36 responses



Type of school you work in

Τύπος σχολείου που διδάσκετε:

36 responses



STEM Awareness

I know what the letters in the STEM acronym stand for *

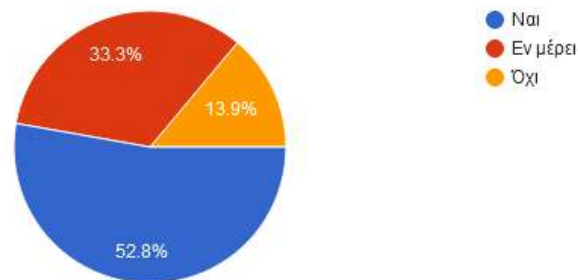
- ☐ Yes
- ☐ Partially
- ☐ No

I know what the letters in the STEM acronym stand for

Ενημερότητα για STEM

Ξέρω τι σημαίνουν τα γράμματα στο ακρωνύμιο STEM

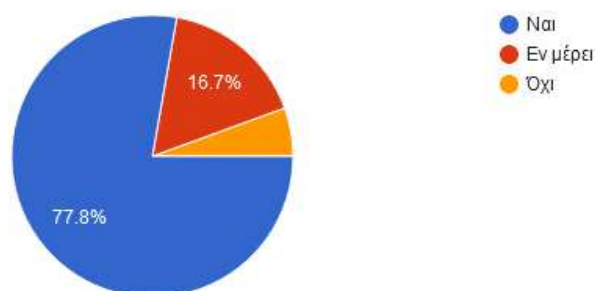
36 responses



Science in STEM is defined as "the endeavor to understand and describe the natural world"

Η Επιστήμη (Science) στο STEM ορίζεται ως "η προσπάθεια κατανόησης και περιγραφής του φυσικού κόσμου"

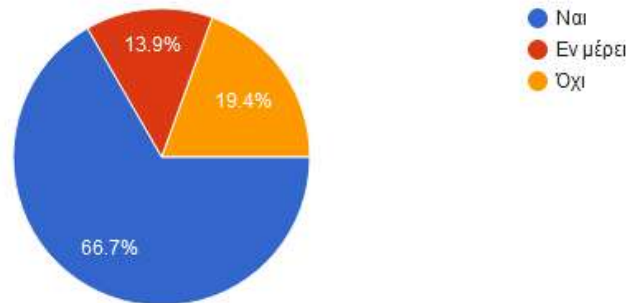
36 responses



Technology in STEM is defined as "the study, products and process of the man-made world"

Η Τεχνολογία (Technology) στο STEM ορίζεται ως "η μελέτη, τα προϊόντα και η διαδικασία του ανθρωπογενούς κόσμου"

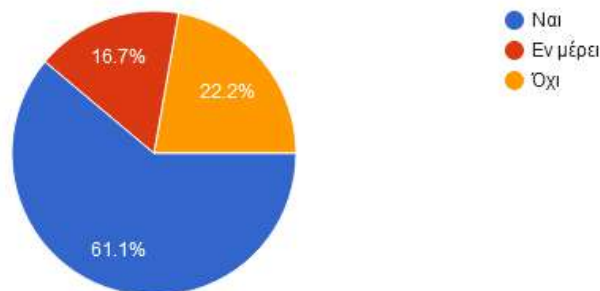
36 responses



Engineering in STEM is defined as "creating the man-made world-products and processes that have never existed before"

Η Μηχανική (Engineering) στο STEM ορίζεται ως «η δημιουργία των ανθρωπογενών παγκόσμιων προϊόντων και διαδικασιών που δεν έχουν υπάρξει ποτέ πριν»

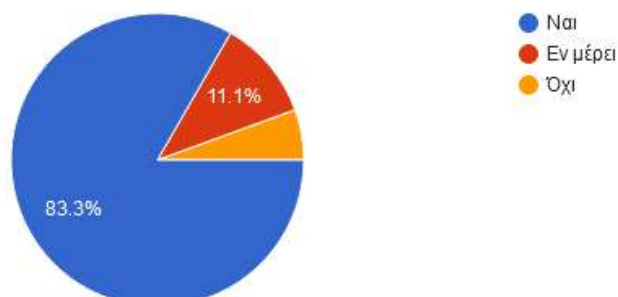
36 responses



Math in STEM is defined as "the study of patterns and relationships between quantities, numbers and shapes"

Τα Μαθηματικά (Maths) στο STEM ορίζονται ως "η μελέτη των μοτίβων και των σχέσεων μεταξύ μεγεθών, αριθμών και σχημάτων"

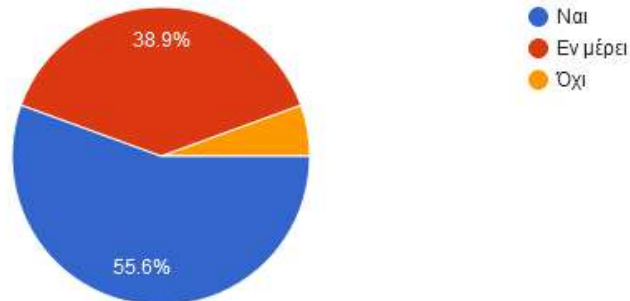
36 responses



I have knowledge about educational Technologies

Έχω γνώσεις για Εκπαιδευτικές Τεχνολογίες

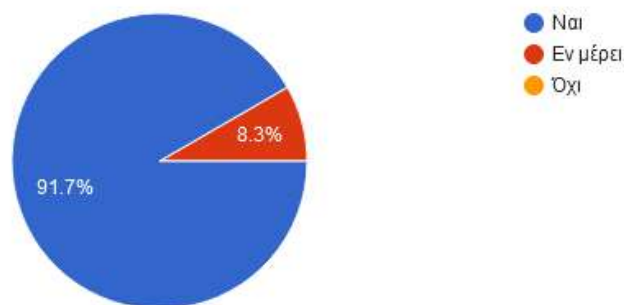
36 responses



I have basic knowledge about fields related to my field

Έχω βασικές γνώσεις για τομείς που σχετίζονται με τον κλάδο μου

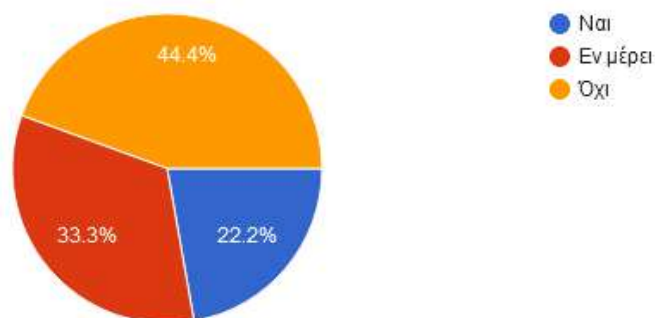
36 responses



I have design (engineering) knowledge in the concretization of issues related to my field

Έχω γνώσεις σχεδιασμού (μηχανικής) στη συγκεκριμενοποίηση θεμάτων που σχετίζονται με τον κλάδο μου

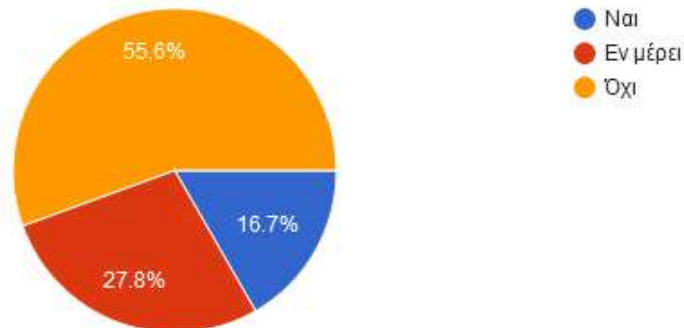
36 responses



I have knowledge about the Problem Based Learning method used in STEM

Έχω γνώσεις σχετικά με τη μέθοδο μάθησης βάσει προβλημάτων που χρησιμοποιείται στο STEM.

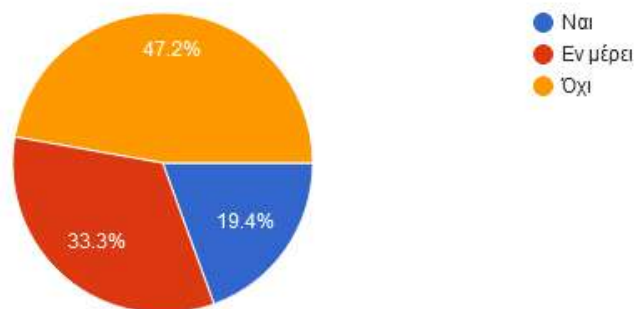
36 responses



I know about the inquiry learning method used in STEM

Ξέρω για τη μέθοδο μάθησης διερεύνησης που χρησιμοποιείται στο STEM.

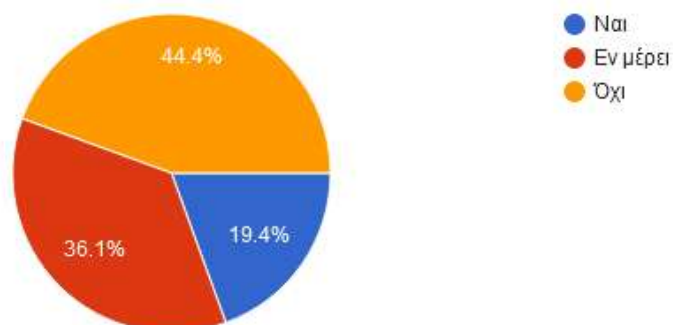
36 responses



I know about the design-based learning method used in STEM

Ξέρω για τη μέθοδο μάθησης βάσει σχεδίασης που χρησιμοποιείται στο STEM

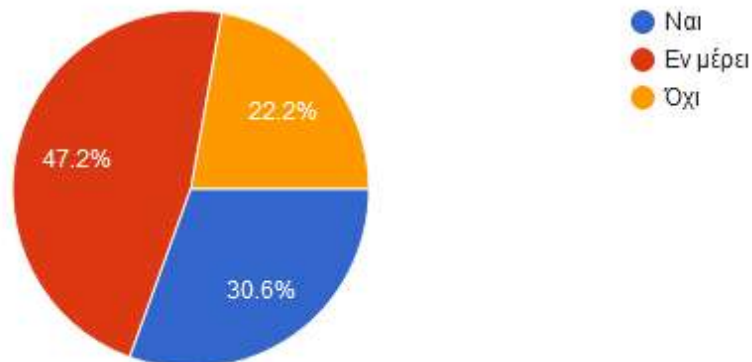
36 responses



I can establish interdisciplinary relationship

Μπορώ να δημιουργήσω διεπιστημονικό εκπαιδευτικό σενάριο

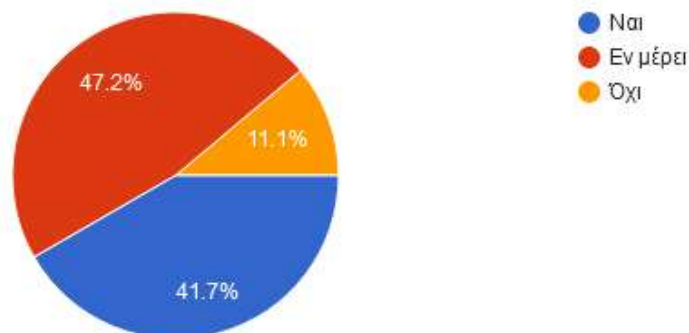
36 responses



I can collaborate across disciplines

Μπορώ να συνεργαστώ με διάφορους κλάδους στο STEM

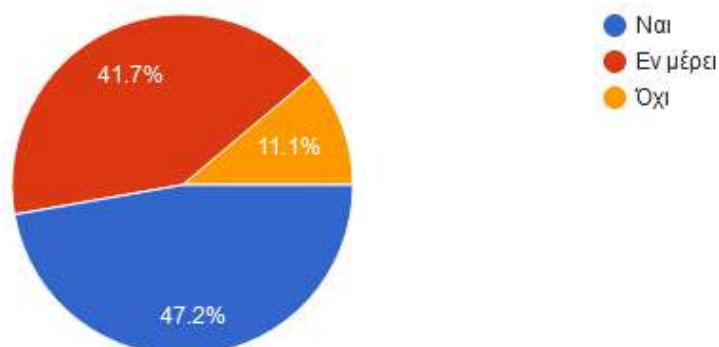
36 responses



I know the process of problem-based learning

Γνωρίζω τη διαδικασία της μάθησης βάσει προβλημάτων.

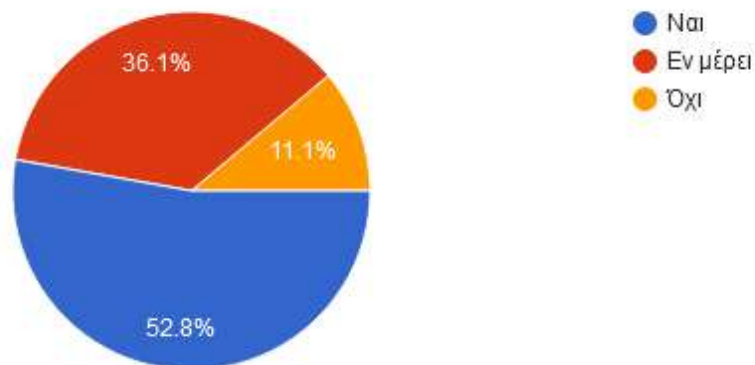
36 responses



I can apply the problem-based learning method in the classroom

Μπορώ να εφαρμόσω τη μέθοδο μάθησης βάσει προβλημάτων στην τάξη

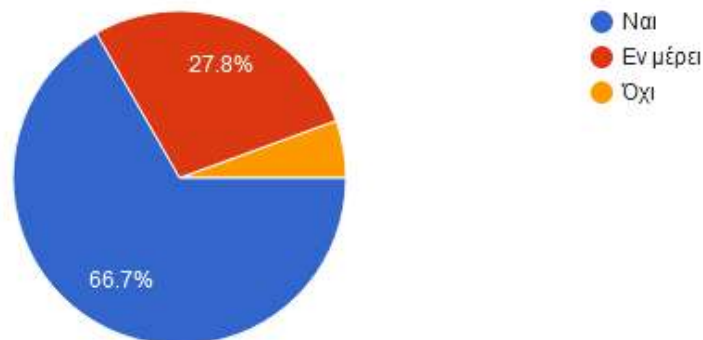
36 responses



I know the process of inquiry learning

Γνωρίζω τη διαδικασία της διερευνητικής μάθησης

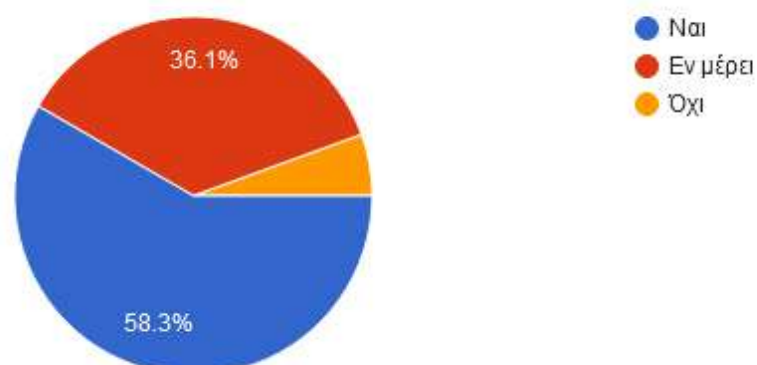
36 responses



I can apply the inquiry learning method in the classroom

Μπορώ να εφαρμόσω τη μέθοδο διερευνητικής μάθησης στην τάξη.

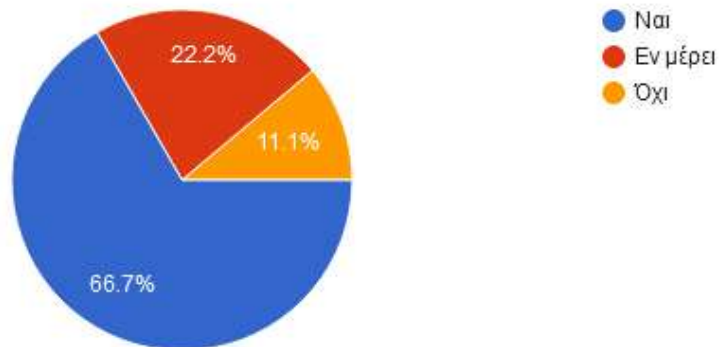
36 responses



I know the design-based learning process

Γνωρίζω τη διαδικασία μάθησης βάσει σχεδιασμού.

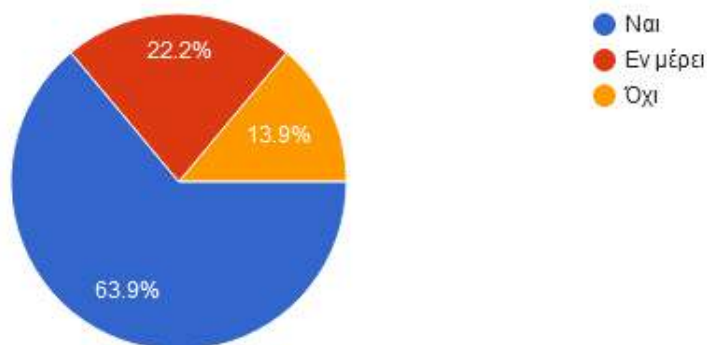
36 responses



I can apply design-based learning in the classroom

Μπορώ να εφαρμόσω τη μάθηση βάσει σχεδιασμού στην τάξη

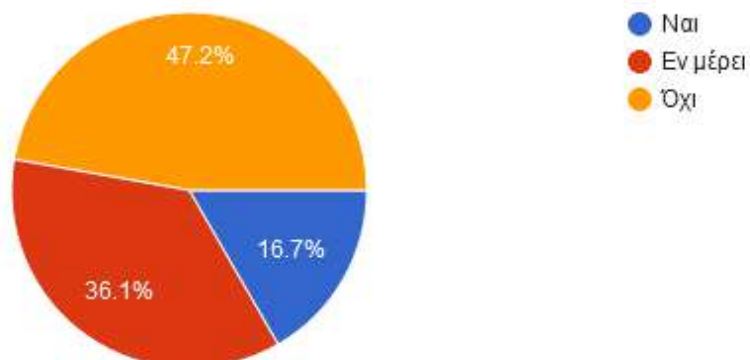
36 responses



I know coding

Γνωρίζω κωδικοποίηση

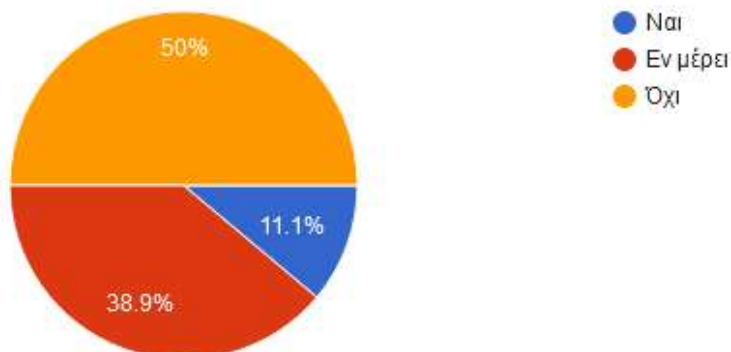
36 responses



I can prepare instructional content associated with coding

Μπορώ να προετοιμάσω εκπαιδευτικό περιεχόμενο που σχετίζεται με κωδικοποίηση

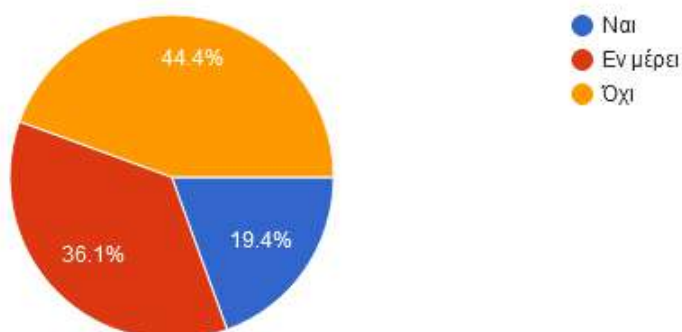
36 responses



I can implement instructional content associated with coding

Μπορώ να εφαρμόσω εκπαιδευτικό περιεχόμενο που σχετίζεται με κωδικοποίηση

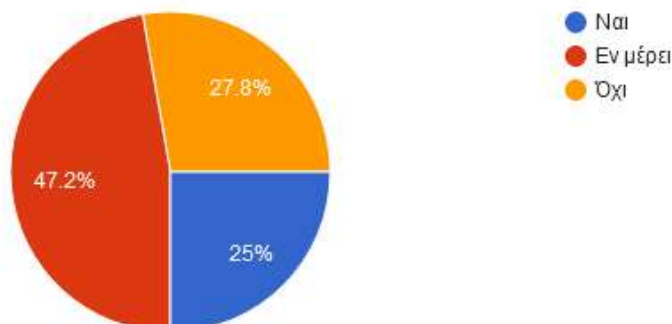
36 responses



I can prepare a lesson plan suitable for STEM-related to my field

Μπορώ να ετοιμάσω ένα σχέδιο μαθήματος κατάλληλο για STEM - σχετιζόμενο με τον τομέα μου.

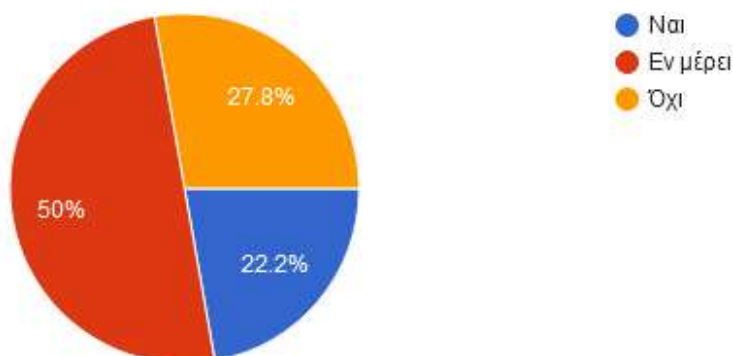
36 responses



I can implement a STEM-appropriate lesson plan related to my field

Μπορώ να εφαρμόσω σε τάξη ένα σχέδιο μαθήματος κατάλληλο για STEM - σχετιζόμενο με τον τομέα μου.

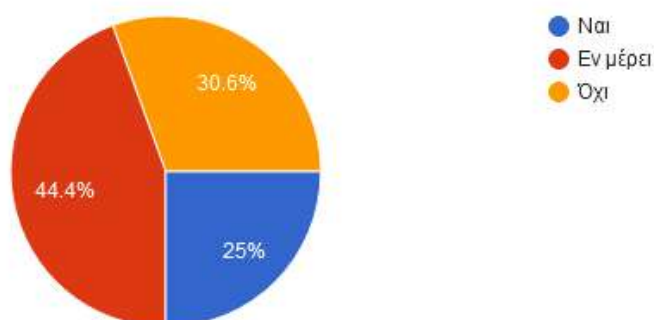
36 responses



I can prepare STEM-appropriate activities related to my field

Μπορώ να προετοιμάσω δραστηριότητες κατάλληλες για το STEM που σχετίζονται με τον τομέα μου

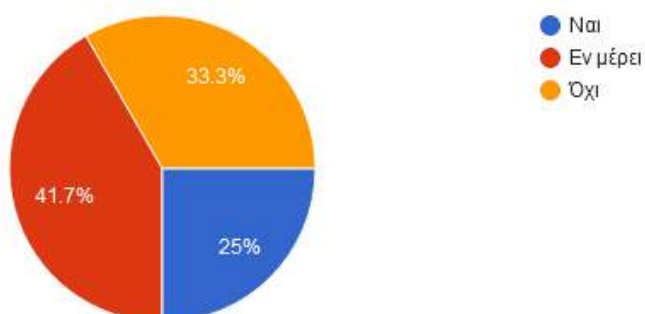
36 responses



I can apply STEM-appropriate activities related to my field

Μπορώ να εφαρμόσω δραστηριότητες κατάλληλες για το STEM που σχετίζονται με τον τομέα μου

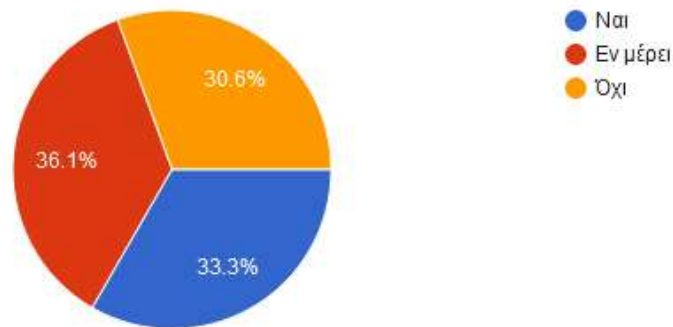
36 responses



I know the types of outcome-oriented assessment and evaluation

Γνωρίζω τους τύπους εκτίμησης και αξιολόγησης με γνώμονα τα αποτελέσματα.

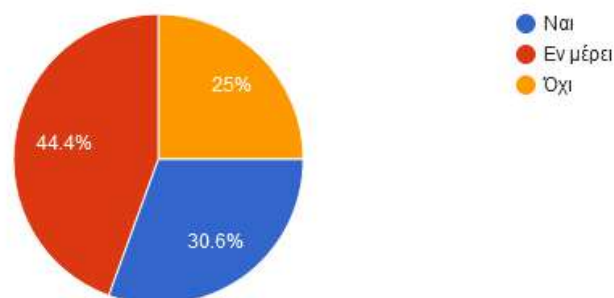
36 responses



I can apply the types of outcome-oriented assessment and evaluation

Μπορώ να εφαρμόσω τους τύπους εκτίμησης και αξιολόγησης με γνώμονα τα αποτελέσματα.

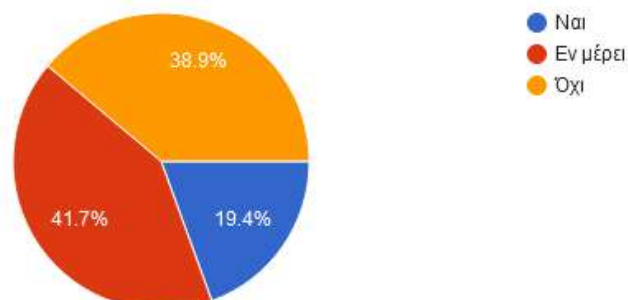
36 responses



I know the types of process-oriented measurement and evaluation

Γνωρίζω τους τύπους μέτρησης και αξιολόγησης με γνώμονα τη διαδικασία

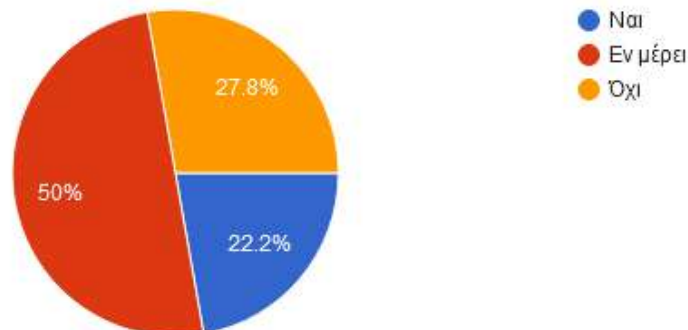
36 responses



I can apply the types of process-oriented measurement and evaluation

Μπορώ να εφαρμόσω τους τύπους μέτρησης και αξιολόγησης με γνώμονα τη διαδικασία.

36 responses



Conclusions and Comments

1. STEM Awareness and Understanding:

The majority of teachers are aware of and understand the STEM acronym and its components, which is crucial for integrating STEM education effectively.

2. Educational Technologies and Related Knowledge:

Teachers possess a good level of knowledge in educational technologies and related fields, indicating readiness to incorporate diverse technological tools in teaching.

3. Design and Engineering Knowledge:

There is a solid understanding of design and engineering principles among teachers, which is beneficial for fostering innovation and practical problem-solving skills in students.

4. Teaching Methods:

Teachers are knowledgeable about problem-based and inquiry learning methods and are capable of applying them in the classroom. However, there is room for improvement in fully integrating these methods into daily teaching practices.

5. Interdisciplinary and Collaborative Skills:

Strong interdisciplinary and collaborative skills are evident, which are essential for a holistic STEM education approach.

6. Coding Proficiency:

Coding skills are relatively weak, both in knowledge and application. This area needs focused professional development to enhance teachers' abilities to teach coding effectively.

7. STEM Lesson and Activity Planning:



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Teachers are fairly confident in preparing and implementing STEM lesson plans and activities. Additional support and resources could further improve their proficiency in this area.

8. Assessment Skills:

There is a good understanding and application of both outcome-oriented and process-oriented assessment methods. Continued emphasis on assessment training will help maintain and enhance these skills.

Recommendations

1. Professional Development:

Offer targeted training programs to improve coding skills and the practical application of problem-based, inquiry, and design-based learning methods.

2. Resource Allocation:

Provide additional resources and support for STEM lesson and activity planning to help teachers feel more confident and capable in their roles.

3. Assessment Training:

Continue offering workshops on both outcome-oriented and process-oriented assessment methods to ensure teachers are well-equipped to evaluate student learning comprehensively.

4. Encourage Interdisciplinary Collaboration:

Maintain and further promote opportunities for interdisciplinary and collaborative teaching practices to enrich the STEM learning experience for students.

By addressing these areas, the effectiveness of STEM education in Greece can be significantly enhanced, fostering a more comprehensive and engaging learning environment for students.



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Cooperation Partnerships in school education

WP3: LearnSTEM: Needs Assessment for Teachers

Survey results in Türkiye

Ali ERDEM, Ahi Evran Anadolu Lisesi

Fatih YAVUZ, Ahi Evran Anadolu Lisesi

Date:

11.04.2024

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Learn STEM: Needs Assessment for Teachers Survey results in Türkiye

STEM education is an interdisciplinary approach to teaching from preschool to higher education, providing integration by establishing a link between science, mathematics, engineering and technology disciplines. The aim of this study is to discuss the opinions of Secondary school teachers on STEM education. **The research data were obtained from 12 STEM-trained volunteer teachers with using a structured interview form.** The collected data were analyzed by content analysis method. The interviews showed that most of the teachers who received STEM education did not find it sufficient. All of the teachers consider that STEM education is necessary, and they think that engineering design skills will be integrated into the science course teaching process, but they state that they have difficulty in implementation and integration problems because of curriculum density, lack of knowledge and experience.

The project aims at strengthening secondary schools capacity to develop skills in subjects such as science, technology, engineering and mathematics through innovative and interactive pedagogical methods and approaches. The project will provide schools with a pedagogical Model and educational tools to support pupils to connect with the 'real-life' applications of STEM. Our target groups are upper and lower secondary schools, VET institutes, teachers, researchers, school staff, training organizations and providers, companies, HEIs, research institutes, Scientific Parks, public authorities, policymakers, trade unions, NGOs.

This Project will improve students' attitudes and performance in the STEM areas of interest. It wants to find ways to attract students and capture their interest in real subjects: science, technology, engineering, mathematics, are integral parts of the present and future, that we encounter everywhere. For this reason, the project wants to encourage students to devote more time to these subjects because they can help them to create their future.

WORKING GROUP

The sample group of the study was selected by selected sampling methods by maximum diversity sampling method. **In this study, 12 teachers were interviewed.** All of our teachers aged 40 and over. None of our teachers participating in the interview received STEM training at the university, but they participated to STEM training with in-service trainings.

Data Collection Tools

In this study, the interview technique and the structured interview form developed by the researcher were used.

The structured interview form consisting of 30 questions (ANNEX1) was created. The interview form was prepared by the researcher by applying expert opinions and thus the validity of the scope was provided. Form was applied to 12 teachers.



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Data Analysis

In the study, the data were analyzed from qualitative research methods using content analysis.

Findings

In this study, 12 teachers were interviewed. The study group of the study consists of 12 Erkek teachers working in Kırşehir Ahi Evran Anatolian High School. 1 computer, 4 mathematics, 3 physics, 2 chemistry and 2 biology teachers participated in the survey.

Kırşehir Ahi Evran Anadolu Lisesi

Your field of study:

Maths : 4 Physics :3 Chemistry :2 Biology :2 ICT:1

Years of teaching experience:

0-10 Years : 0 11-20 years: 1 21-30 years : 11

QUESTIONS	YES	NO	PARTIALLY
I know what the letters in the STEM acronym stand for.	8	3	1
Technology in STEM is defined as "the study, products and process of the man-made world".	7	1	4
Science in STEM is defined as "the endeavor to understand and describe the natural world".	9	-	3
Engineering in STEM is defined as "creating the man-made world-products and processes that have never existed before"	6	1	5
Math in STEM is defined as "the study of patterns and relationships between quantities, numbers and shapes".	6	-	6
I have knowledge about educational Technologies.	5	-	7
I have basic knowledge about fields related to my field.	12	-	-
I have design (engineering) knowledge in the concretization of issues related to my field.	5	2	5
I have knowledge about the Problem Based Learning method used in STEM.	3	2	7
I know about the inquiry learning method used in STEM.	6	1	5
I know about the design-based learning method used in STEM.	2	1	9
I can establish interdisciplinary relationships.	9	-	3
I can collaborate across disciplines.	10	-	2
I know the process of problem-based learning.	8	-	4
I can apply the problem-based learning method in the classroom.	6	-	6
I know the process of inquiry learning.	9	1	2
I can apply the inquiry learning method in the classroom.	6	-	6
I know the design-based learning process.	3	-	9
I can apply design-based learning in the classroom.	3	-	9



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I know coding.	3	8	1
I can prepare instructional content associated with coding.	3	8	1
I can implement instructional content associated with coding.	3	7	2
I can prepare a lesson plan suitable for STEM-related to my field.	4	1	7
I can implement a STEM-appropriate lesson plan related to my field	5	2	5
I can prepare STEM-appropriate activities related to my field.	6	2	4
I know the types of outcome-oriented assessment and evaluation.	5	3	4
I can apply the types of outcome-oriented assessment and evaluation.	7	1	4
I know the types of process-oriented measurement and evaluation.	6	1	5
I can apply the types of process-oriented measurement and evaluation.	7	1	4

1.Many of the teachers who participated in the study know the word STEM. Our other teachers state that they are aware of this word during in -service training. Teachers stated that after Stem training, their awareness increased and that they have better comprehend the concept of STEM.

2.All teachers participating in the study expressed that they intend to include STEM practices in their lessons.

3.All the teachers who participated in the study expressed their thoughts about the concept of engineering and stated that most of the teachers' general concept of engineering was technical knowledge. The most common answers of teachers as jointly; Design, production, and development, it is seen that there are concepts of technology and coding.

4.It is seen that most of the teachers participating in the study could not include STEM practices in the course plans.

5.It was stated that the biggest obstacle encountered by teachers is the shortage of time.

6.The opinions of the teachers are also expressed by the teachers that it is not easy to prepare and implement the STEM plan and that the number of examples for applications are limited.

7.All the teachers who participated in the study stated that STEM applications have a positive advantage of the education used.

8.The teachers who participated in the research stated that engineering skills give life skills (creativity, critical thinking communication) to the educational process.

9.The teachers who participated in the research stated that engineering skills give engineering skills (product -formation invention and innovation) to the educational process.



10. It was stated that the largest limitations in the implementation of STEM training were time economic inadequacy and lack of materials.

CONCLUSION AND DISCUSSION

In the study, STEM training teachers' opinions about STEM training practices were given. It is very important for teachers to actively use STEM training and applications for the development of students and the education system. For this reason, it is thought that the opinions and recommendations of the practitioners who are practitioners in this period when the need for STEM training and practices increases will provide reference to the best regulation of existing programs.

According to the findings obtained in the study, most teachers deem insufficient STEM education in universities; They stated that there was no sufficient implementation during the training and that they were trying to learn in a limited time.

All teachers think that STEM education is advantageous, necessary, and different from other applications. Teachers stated that STEM education contributes to daily life, develops problem solving skills, provides permanent learning, and develops students' critical thinking and creativity skills.

Teachers think that engineering design skills can be integrated into the teaching process of the Science course, and most of them express their time limitation as a disadvantage. In addition to time restriction, lack of materials and crowded classes are the disadvantages expressed by teachers.

The recommendations of teachers to limitation and disadvantages; STEM training should start in preschool period; the necessary arrangements should be made by providing sufficient opportunities and quotas should be reduced. Many of the teachers stated that they could not establish a relationship between the concepts of engineering and teaching before STEM education and defined the concept of engineering as "technical knowledge. However, after STEM training, they stated that they could connect between the concepts of engineering and teaching.

Teacher's views on teaching processes of the development of engineering skills enhances entrepreneurship skills, enables the learning of multi -faceted and critical thinking and enables them to produce creative solutions to the problems encountered.

Considering all the findings, it is seen that teachers are willing to open to innovations and will be willing to Stem applications.

Teachers stated that they had difficulty involving STEM training in their lesson plans.

Teachers want to integrate STEM training into the course process, but they state that they face time problem due to the intensity of the curriculum. For this reason, it is seen that they do not have theoretical concepts to use the concepts they know theoretically, causing what they cannot adapt to STEM training to the course processes. It was seen that most teachers comprehend the importance of STEM education and have positive opinions on STEM education, but the theoretical and practical knowledge is not sufficient.

It is seen that teachers need a better education and more practices in order to achieve the purpose of STEM education and to provide the benefits of STEM education to their students.



LearnSTEM
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in secondary schools*

ERASMUS+ KA220
Cooperation Partnerships in school education

WP3: Needs Assessment for STEM Teachers

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Learn STEM
Innovative Model of learning STEM in secondary schools



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The form was completed by 30 teachers from Colegiul Tehnic „Haralamb Vasiliu” Podu Iloaiei, Romania. Based on their answers, we present the data collected:

Gender:

Male	Female
8	22

Your field of study:

No.	Subject	No. teachers	Total number of teachers
1	Economic disciplines	5	30
2	Technical disciplines	6	
3	Mathematics	3	
4	Physics	2	
5	Agriculture/Zootechnics	4	
6	Language and communication	4	
7	History	1	
8	ICT	1	
9	Biology	1	
10	Religion	1	
11	Psychology	1	
12	Physical Education	1	

Years of teaching experience:

No.	Teaching experience	No. teachers
1	Less than a year	2
2	1-5 years	3
3	5-10 years	2
4	10-15 years	3
5	15-20 years	7
6	20-25 years	6
7	25-30 years	4
9	30-35 years	1
10	35-40 years	2

Type of school you work in:

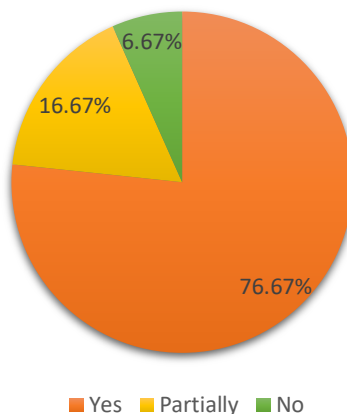
Upper secondary education - Colegiul Tehnic „Haralamb Vasiliu”



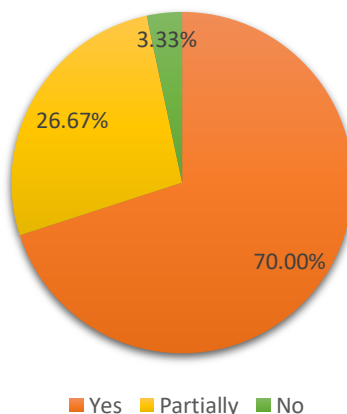
Questions and answers

No.	Question	Answer		
		Yes	Partially	No
1	I know what the letters in the STEM acronym stand for	23	5	2
2	Science in STEM is defined as "the endeavor to understand and describe the natural world".	21	8	1
3	Technology in STEM is defined as "the study, products and process of the man-made world"	20	8	2
4	Engineering in STEM is defined as "creating the man-made world-products and processes that have never existed before"	20	9	1
5	Math in STEM is defined as "the study of patterns and relationships between quantities, numbers and shapes"	20	10	0
6	I have knowledge about educational Technologies	18	10	2
7	I have basic knowledge about fields related to my field	27	3	0
8	I have design (engineering) knowledge in the concretization of issues related to my field	15	10	5
9	I have knowledge about the Problem Based Learning method used in STEM	10	14	6
10	I know about the inquiry learning method used in STEM	10	12	8
11	I know about the design-based learning method used in STEM	9	11	10
12	I can establish interdisciplinary relationship	23	6	1
13	I can collaborate across disciplines	22	6	2
14	I know the process of problem-based learning	20	8	2
15	I can apply the problem-based learning method in the classroom	22	7	1
16	I know the process of inquiry learning	23	7	0
17	I can apply the inquiry learning method in the classroom	20	9	1
18	I know the design-based learning process	22	5	3
19	I can apply design-based learning in the classroom	23	4	3
20	I know coding	6	4	20
21	I can prepare instructional content associated with coding	8	6	16
22	I can implement instructional content associated with coding	8	9	13
23	I can prepare a lesson plan suitable for STEM-related to my field	16	8	6
24	I can implement a STEM-appropriate lesson plan related to my field	15	8	7
25	I can prepare STEM-appropriate activities related to my field	16	8	6
26	I can apply STEM-appropriate activities related to my field	17	6	7
27	I know the types of outcome-oriented assessment and evaluation	21	6	3
28	I can apply the types of outcome-oriented assessment and evaluation	18	10	2
29	I know the types of process-oriented measurement and evaluation	18	5	7
30	I can apply the types of process-oriented measurement and evaluation	18	5	7

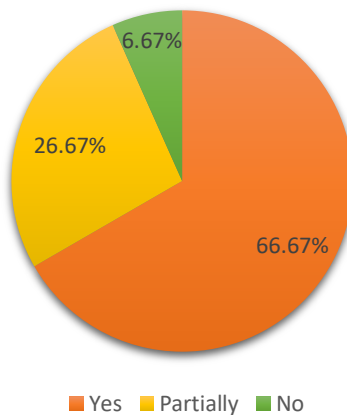
1. I know what the letters in the STEM acronym stand for



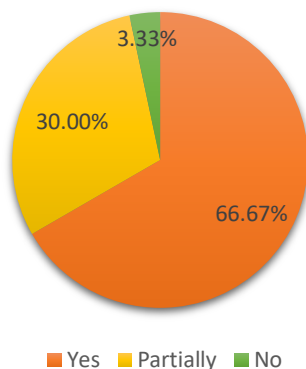
2. Science in STEM is defined as "the endeavor to understand and describe the natural world".



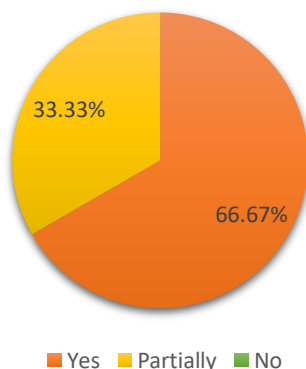
3. Technology in STEM is defined as "the study, products and process of the man-made world"



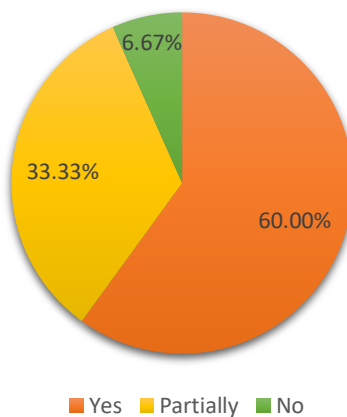
4. Engineering in STEM is defined as "creating the man-made world-products and processes that have never existed before"



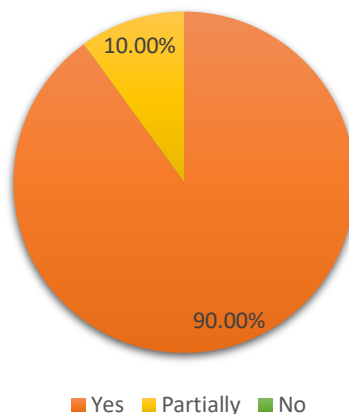
5. Math in STEM is defined as "the study of patterns and relationships between quantities, numbers and shapes"



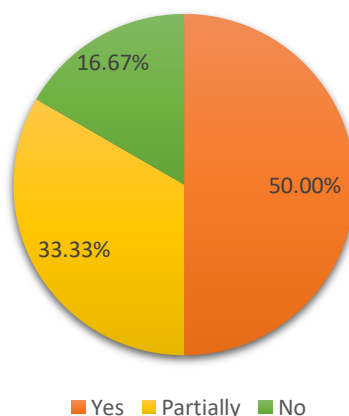
6. I have knowledge about educational Technologies



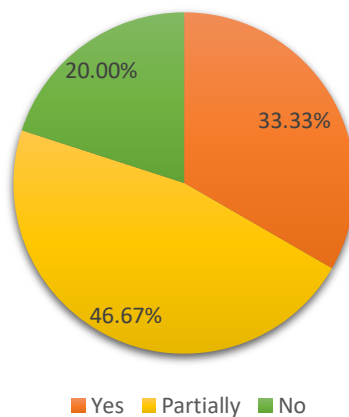
7. I have basic knowledge about fields related to my field



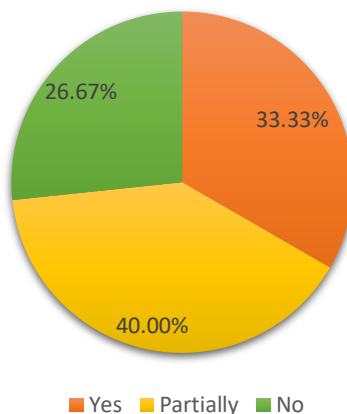
8. I have design (engineering) knowledge in the concretization of issues related to my field



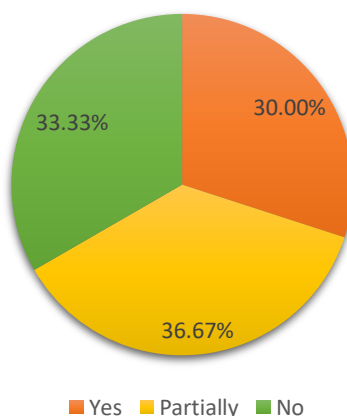
9. I have knowledge about the Problem Based Learning method used in STEM



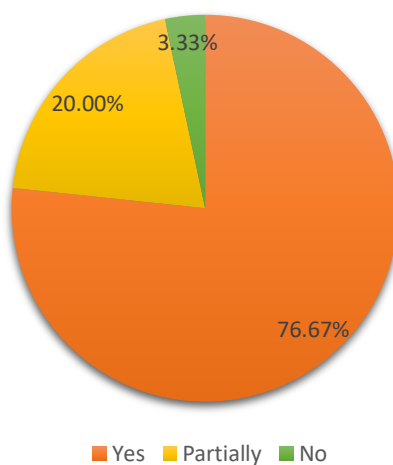
10. I know about the inquiry learning method used in STEM



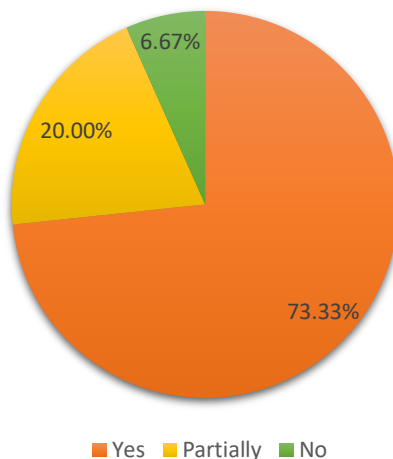
11. I know about the design-based learning method used in STEM



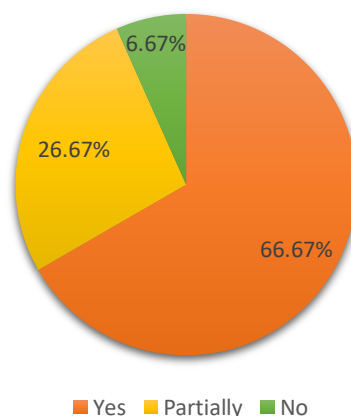
12. I can establish interdisciplinary relationship



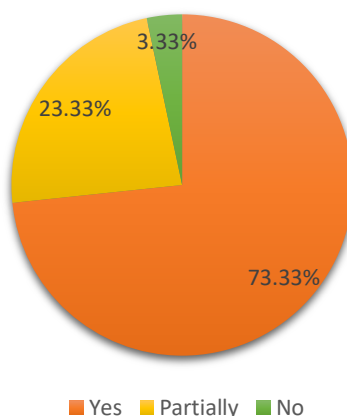
13. I can collaborate across disciplines



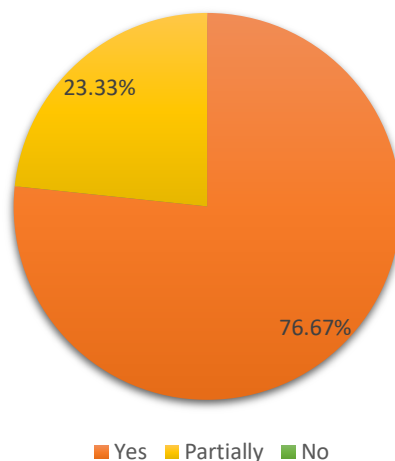
14. I know the process of problem-based learning



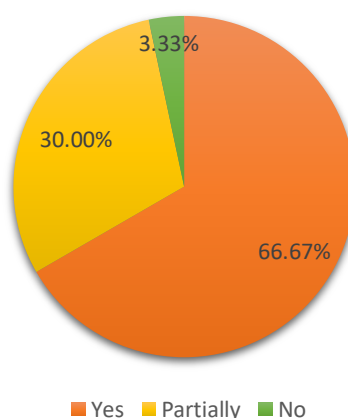
15. I can apply the problem-based learning method in the classroom



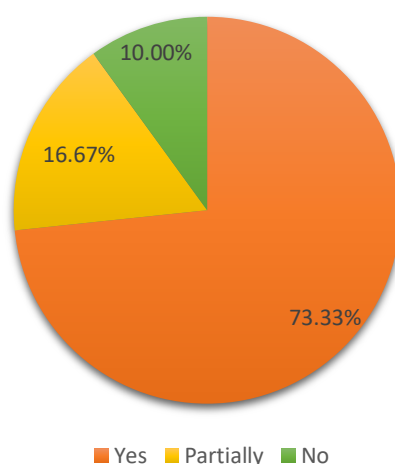
16. I know the process of inquiry learning



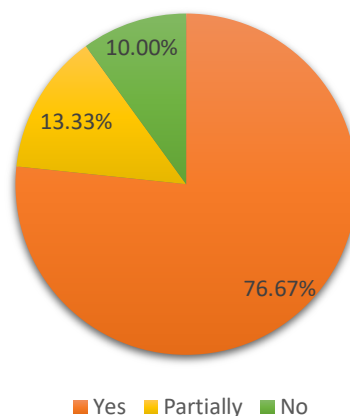
17. I can apply the inquiry learning method in the classroom



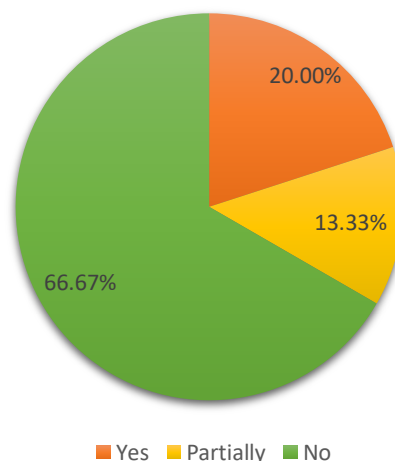
18. I know the design-based learning process



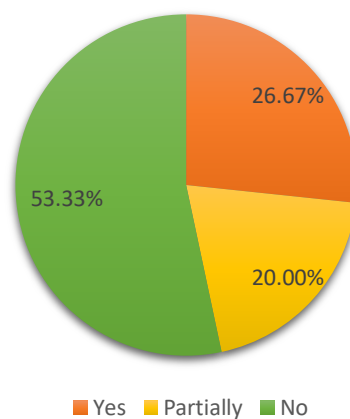
19. I can apply design-based learning in the classroom



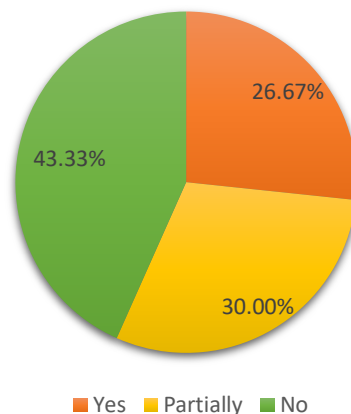
20. I know coding



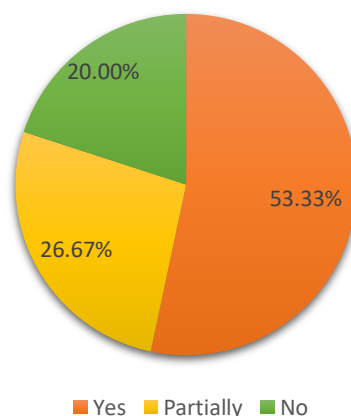
21. I can prepare instructional content associated with coding



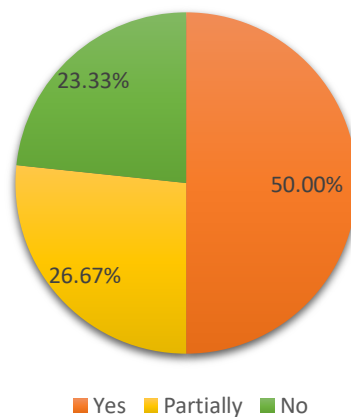
22. I can implement instructional content associated with coding



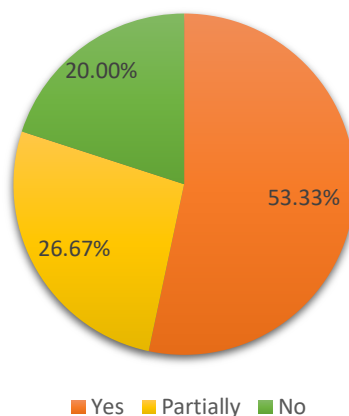
23. I can prepare a lesson plan suitable for STEM-related to my field



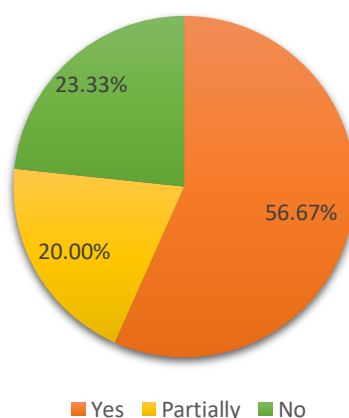
24. I can implement a STEM-appropriate lesson plan related to my field



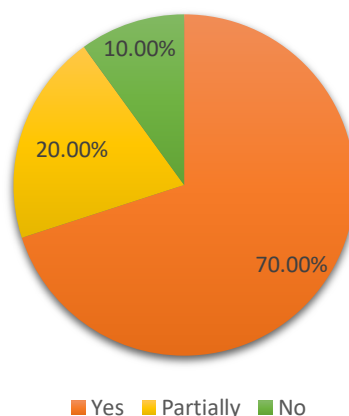
25. I can prepare STEM-appropriate activities related to my field



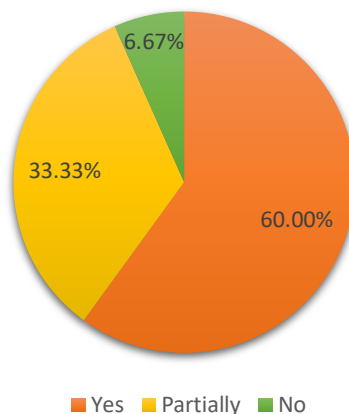
26. I can apply STEM-appropriate activities related to my field



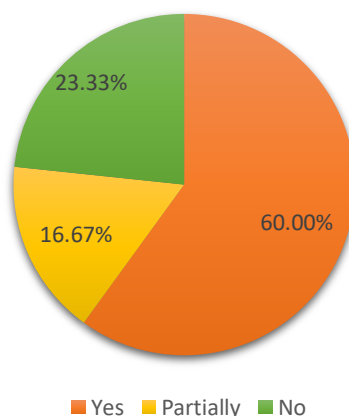
27. I know the types of outcome-oriented assessment and evaluation



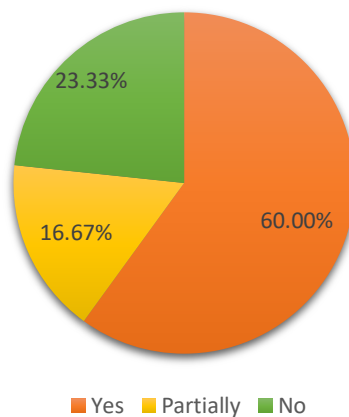
28. I can apply the types of outcome-oriented assessment and evaluation



29. I know the types of process-oriented measurement and evaluation



30. I can apply the types of process-oriented measurement and evaluation





Conclusions and Comments

1. STEM Awareness:

A significant majority of teachers are familiar with the STEM acronym and its components. This indicates a solid foundational knowledge.

2. Educational Technology:

While a good number of teachers have knowledge about educational technologies, a noticeable proportion still needs further training.

3. Interdisciplinary and Collaborative Skills:

Teachers exhibit strong capabilities in establishing interdisciplinary relationships and collaborating across disciplines, which is crucial for effective STEM education.

4. Teaching Methods:

There's a decent understanding and application of problem-based and inquiry learning methods, but knowledge and application of design-based learning methods need improvement.

5. Coding Proficiency:

Coding skills are notably lacking among teachers, both in knowledge and application. This is an area that requires significant attention and professional development.

6. STEM Lesson and Activity Planning:

A moderate number of teachers are confident in preparing and implementing STEM-appropriate lesson plans and activities. More support and resources might be necessary to enhance these skills.



7. Assessment Skills:

Teachers show better knowledge and application of outcome-oriented assessment than process-oriented assessment. Emphasis on process-oriented assessment training can help balance their evaluation skills.

Recommendations

1. Professional Development:

Enhance training programs focusing on educational technologies, design-based learning methods, and coding to address existing gaps.

2. Resource Allocation:

Provide more resources and support for STEM lessons and activity planning to boost teachers' confidence and skills.

3. Continuous Assessment Training:

Offer workshops on process-oriented assessment to ensure teachers are well-equipped to evaluate both outcomes and processes effectively.

4. Encourage Collaboration:

Continue to promote and facilitate interdisciplinary and collaborative teaching practices, which are already strong points among the teachers.

By addressing these areas, the effectiveness of STEM education at Colegiul Tehnic "Haralamb Vasiliu" can be significantly enhanced, fostering a more comprehensive and robust learning environment for students.