

QUALIFIED GENERATIONS WITH STEAM EDUCATION

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RESEARCH ON STEAM EDUCATION

RESEARCH ON EDUCATORS OBSERVATION KEY

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MAIN ASPECTS

- The research provides a detailed framework for evaluating teacher performance across multiple dimensions.
- It covers key areas such as subject matter knowledge, instructional planning, learning environment, and assessment strategies.
- In STEM education, teachers need a deep understanding of scientific and mathematical concepts and the ability to connect theory with real-world applications.
- Effective STEM teachers inspire inquiry, foster problem-solving skills, and adapt to diverse student needs.
- Rigorous evaluation of these competencies offers insights for professional development and enhanced pedagogical approaches, ensuring STEM education remains dynamic, inclusive, and impactful

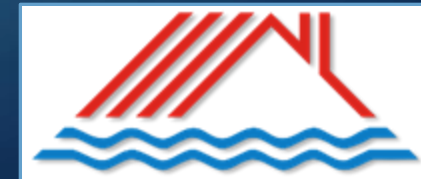


METHODOLOGY

- Questionnaires in Likert scale (5 scales)
- Systematic Analysis of the qualitative data (open questions, e.t.c)
- Content Analysis Method

Bibliography:

- Krippendorff, K. (2013). *Content Analysis: An Introduction to Its Methodology*. Sage Publications.
- Mayring, P. (2014). *Qualitative Content Analysis: Theoretical Foundation, Basic Procedures and Software Solution*. Beltz.
- Neuendorf, K. A. (2017). *The Content Analysis Guidebook*. Sage Publications.
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107-115.



SUBJECT MATTER KNOWLEDGE

Slovenia: 7 teachers



Turkey: 6 teachers



Finland: 4 teachers



Portugal: 4 teachers



	FIN	PO	SL	TU	FIN	PO	SL	TU	FI	PO	SL	TU	FI	PO	SL	TU	FI	PO	SL	TU	
Subject Matter Knowledge	1 (NOT AT ALL)				2 (SLIGHTLY)				3 (MODERATELY)				4 (SIGNIFICANTLY)				5 (TREMENDOUSLY)				NO ANSWER
Was the content linked with past and future learning experiences?		1	2	1				1	2	2	2		2		3	3		1			
Was the content taught through a variety of teaching skills?						1			1	2	1	2	3		1	3		1	5	1	
Was the content linked to practical life?										1		2	2	3		2			7	2	

Instructional Planning and Strategies

Instructional Planning and Strategies	FIN	PO	SL	TU		FIN	PO	SL	TU		FI	PO	SL	TU		FI	PO	SL	TU		FI	PO	SL	TU				
	1 (NOT AT ALL)					2 (SLIGHTLY)					3 (MODERATELY)					4 (SIGNIFICANTLY)					5 (TREMENDOUSLY)					NO ANSWER		
Were the objectives met within the teaching time?									2		1		1	2		2	3	4	1		1	1		1			2 SL	
Were the students taught according to their individual differences?									2		2			3		2		3	1			4		4				
To what extent did the teacher manage to mobilize all the students?														2		4		1	3			4		6	1			
Did the teacher engage, motivate, and maintain students' attention to the lesson?												1		2		4	3	5	2				2	2				
Did the teacher engage, motivate, and maintain students' attention to the lesson?												1		2		4	3	5	2				2	2				
Did the teacher use different teaching strategies to enhance students' understanding?							1				3		1	2		1	3	4	3				2	1				
Did the methods and means serve the objectives set?											2			3		2	2	2	2			1	5			1PO		

Learning Environment

	FIN	PO	SL	TU		FIN	PO	SL	TU		FI	PO	SL	TU		FI	PO	SL	TU		FI	PO	SL	TU		
Learning Environment	1 (NOT AT ALL)					2 (SLIGHTLY)					3 (MODERATELY)					4 (SIGNIFICANTLY)					5 (TREMENDOUSLY)					NO ANSWER
Was the teacher adequately helpful?														2		2	3	1	1		2	1	6	3		
Were these assignments directly related to the previous knowledge?			2								2		2	3		2	4	3	1							
Was the use of technology and tools seamlessly integrated into the process?												2	1	2		2		6	3		2	2		1		
Was the management of the classroom effective?												1		2		2	1	3	1			1	4	1		1PO, 2FI, 2TR
Was students' participation ensured in the learning process?											2	1	1	3		2	3		2				6	1		
Did lower-achievement students have opportunities to be successful?											2			2		2	4		3				7	1		



Assessment

	FIN	PO	SL	TU	FIN	PO	SL	TU	FI	PO	SL	TU	FI	PO	SL	TU	FI	PO	SL	TU	
<u>Assessment</u>	1 (NOT AT ALL)				2 (SLIGHTLY)				3 (MODERATELY)				4 (SIGNIFICANTLY)				5 (TREMENDOUSLY)				NO ANSWER
Were exercises, questions, knowledge expansion activities given at the end of the lesson to evaluate the students?				3				1		3	1		4	1	2	2			3		1SL
Were multiple assessment strategies incorporated?						1		4		1	1		2	2	3	1			3		1SL, 1FI, 1TR
Did the teacher provide feedback on the students' performance?								2				1	4	3	2	2		1	3		2 SL, 1TR



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MAIN AXES OF THE ANALYSIS

1. Subject Matter Knowledge
2. Instructional Planning and Strategies
3. Learning Environment
4. Assessment



1. Subject Matter Knowledge

Some teachers found the content well-linked to past and future learning, but there was inconsistency in responses.

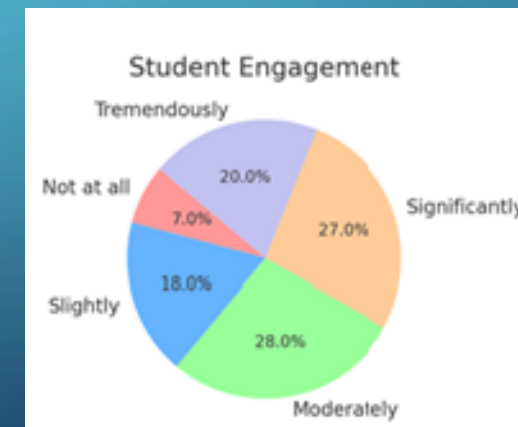
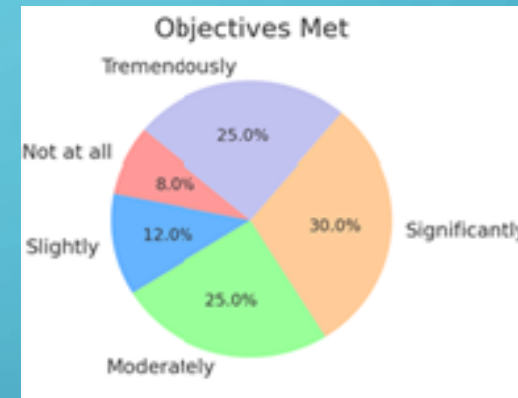
A variety of teaching skills were used, though the effectiveness varied.

Practical applications of content were moderate, with some teachers indicating a lack of real-world connections.



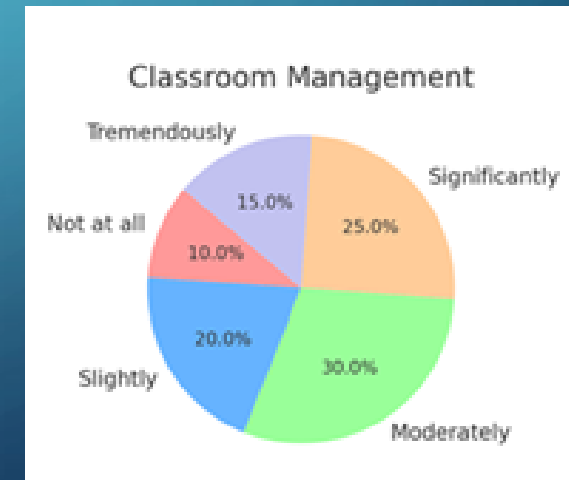
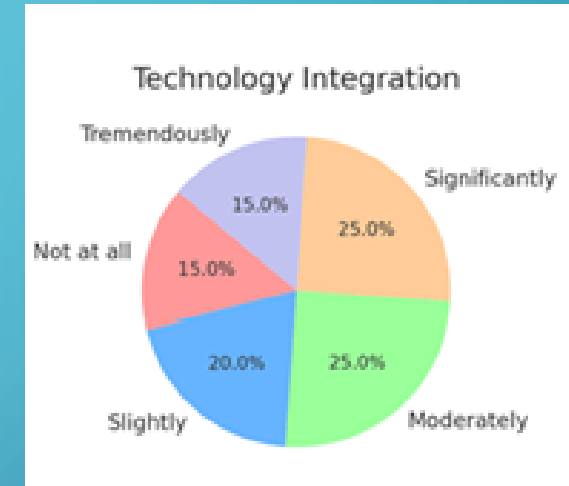
2. INSTRUCTIONAL PLANNING AND STRATEGIES

- Mixed opinions on whether objectives were met within the allocated time, suggesting time management challenges.
- Differentiation in teaching was present but not fully implemented, with varying levels of attention to individual student needs.
- Student engagement and motivation levels varied, indicating that some teachers struggled to maintain students' interest.
- The use of different teaching strategies showed inconsistency, with some relying on limited methods.



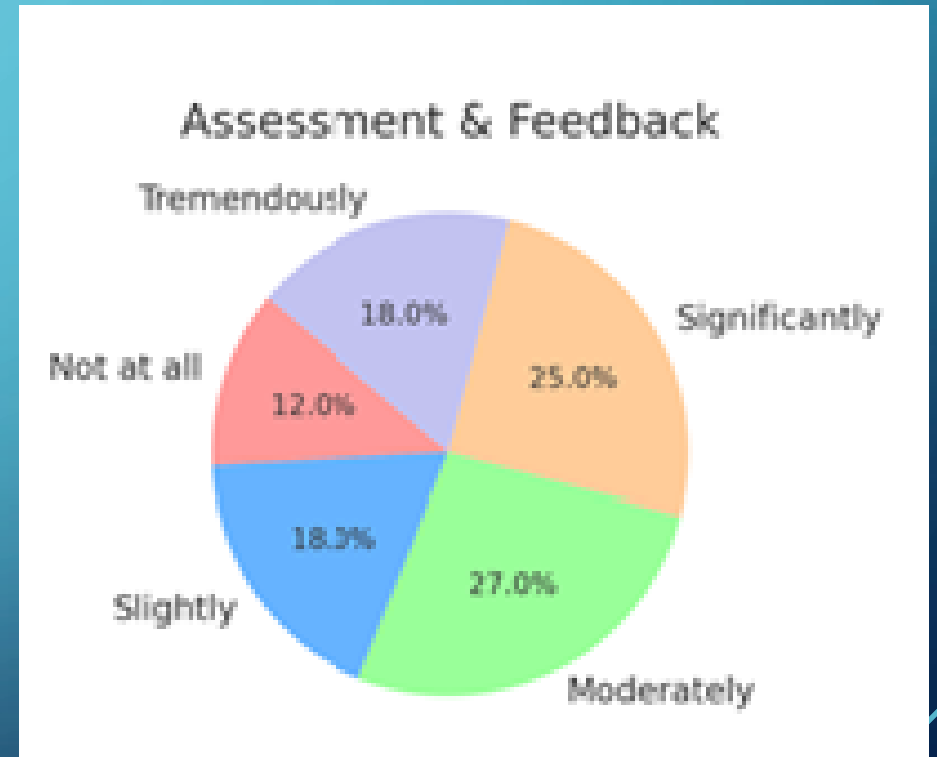
3. LEARNING ENVIRONMENT

- Teachers were generally seen as helpful, but not all ensured strong student-teacher interaction.
- Assignments were somewhat connected to prior knowledge but not consistently.
- Technology integration varied; some found it seamless, while others faced challenges.
- Classroom management was effective for some but problematic for others.
- Student participation and success for lower-achieving students were not universally ensured.



4. ASSESSMENT

- There was inconsistency in using diverse assessment strategies, indicating room for improvement in evaluating student understanding.
- Feedback on student performance was provided, but its frequency and effectiveness varied.



TESTIMONIALS

Open Questions 1/3

1. Please record unexpected events and how teacher dealt with them:

- ✓ “Small technical issues”
- ✓ “nothing unexpected happens”
- ✓ “there were no limitations, all went as planned. The mentors were great and helpful”
- ✓ “some groups had difficulties with language, so peer teacher worked these situations out very cleverly”
- ✓ “Student asked teacher that she do not understand and tscher and student together find out the solution”.

OPEN QUESTIONS 2/3

2. Describe two of three important examples that demonstrate teachers' imagination, originality and innovation.

- ✓ Using mentors: concrete building at the lines
- ✓ Each group had different tasks and the tasks were based on using imagination and creativity
- ✓ The training was very impressive and original. It was also nice that each group had a different activity
- ✓ There was 3 different tasks for different age, creating activity
- ✓ Very different tasks related to concrete, mobilizing all student, peer learning.
- ✓ Code changes for lights
- ✓ Colorful picture in the end
- ✓ Use AI in a new way, to write code needed

OPEN QUESTIONS 3/3

3. Would you like to add something extra in relation to the Steam teaching you attended?

- ✓ Chance to move around a bit
- ✓ It was a real STEAM lesson that have all the components as a multidisciplinary way
- ✓ Students did not undertstand assignment and how all was connected together. There was too much at one lesson
- ✓ I think it was quite enough

SUMMARY

- Many teachers connect content with past and future learning, linking theory to practical life remains inconsistent.
- In instructional planning, ratings on meeting objectives, adapting to individual differences, and student mobilization vary considerably.
- This variability indicates that some educators need support in employing a wider range of teaching strategies.
- The learning environment evaluations reveal moderate teacher helpfulness and classroom management.
- Integrating technology seamlessly and ensuring equitable participation.
- The use of varied strategies and feedback provision point to inconsistencies in how teachers measure and respond to student learning.

Overall, these results suggest that while there is a foundation of effective STEM teaching, there is also significant scope for targeted professional development to standardize best practices, enhance practical relevance, and improve evaluative feedback across diverse educational settings.



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