



AN INVESTIGATION ON STUDENTS' PERCEIVED CHANGE IN ATTITUDES TOWARDS STEM AND CAREER DECISION SELF-EFFICACY IN DAYLIGHTING RIVERS

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the aim:

To investigate the impact of Daylighting Rivers project on secondary students' perceived change in

- their attitudes towards science,technology, engineering and mathematics (STEM) disciplines, and
- their career decision self-efficacy towards STEM subjects.
- and the relationship between





STEM, Inquiry & Daylighting Rivers

Science, Technology, Engineering & Mathematics (STEM)

 have the potential to create opportunities for innovation, economic development and existence in the world of science and technology

- many studies have shown a sharp decline in young people's interest for STEM fields
- the European Commission Report, known as Rocard Report (2007), recommended that inquiry-based approaches be brought in schools to encourage more students to follow a career path in STEM areas.





STEM, Inquiry & Daylighting Rivers

Inquiry-based learning (IBL)

- engage with phenomena,
- develop inquiry skills and scientific reasoning,
- understand the meaning of doing and talking science,
- develop epistemological awareness of the nature of science and
- develop positive attitudes towards science" (Constantinou, Tsivitanidou, & Rybska, 2018, p. 9).





STEM, Inquiry & Daylighting Rivers

Daylighting Rivers

- based on the research about STEM and IBL, the project aims to show that science is in all parts of people's lives and in our decision-making processes
- involve young students in a dialogue and scientific investigation
- the project aims to increase the interest for and attitudes towards STEM
- engage students in effective collaborative knowledge and obtain inquiry learning skills





Research Questions

Is there a perceived change in students' attitudes towards STEM disciplines after engagement in Daylighting Rivers learning units? Is there a perceived change in students' career decision self-efficacy towards STEM subjects after engagement in Daylighting Rivers learning units?



Learning Units

INTRODUCTION **CONCEPTUALIZATION**

engages students by raising their curiosity and eliciting prior knowledge on the topic

INVESTIGATION

indicates investigation activities that concern different aspects (e.g. data collection and analysis about urban sprawl, tracking the covered rivers etc.)



CONCLUSION DISCUSSION

explanation of the results and problem solutions



Learning Units list

Zeylightingrivers



RIVER

Learning Units





Depiction of rivers in cultural and popular images through time

shorturl.at/MW459

River ecosystems: plant biodiversity

shorturl.at/aUZ79



River pollution and economic impact

shorturl.at/osIY7





Study Design

Participants



Data Collection

Change in Attitudes towards STEM Questionnaire

Change in Career Decision Self-**Efficacy Questionnaire**

Data analysis

11 students from Greece, 23 students from Spain, and 33 students from Italy

(1) The descriptive analyses (2) The correlation to investigate the relationship between change in attitudes towards STEM and change in career decision self-efficacy



Results



Change in attitudes towards STEM



Change in career decision selfefficacy



The relationship between change in attitudes towards STEM and change in career decision self-efficacy





Change in attitudes towards STEM



Graph 1. Change in attitudes towards STEM values (attitudes towards science, towards math, towards technology, and towards engineering)

• Perceived change in attitude towards each STEM subject is slightly towards a little more positive than before

• Overall, the change in attitudes towards STEM is also slightly towards a little more positive than before (=3.59, sd=.56).





Change in attitudes towards STEM

Table 1. The comparison between high schools in change in attitudes towards STEN						
	HS	Mean	SD	χ2	р	
<u>AttSci</u>	LSS	3.85	.63			
	GLR	4.02	1.44	4.15	.13	
	IES ME	3.89	.92			
AttMath	LSS	3.55	.84			
	GLR	3.65	.80	3.29	.19	
	IES ME	3.99	.58			
AttTech	LSS	3.23	.70			- 1 1 1 1 1 1 1
	GLR	3.77	.73	6.37	.04	
	IES ME	3.62	.69			
AttEng	LSS	3.37	.78			1 1 1 1 1 1 1 1
	GLR	3.56	.61	1.98	.37	1 1 1 1 1 1 1
	IES ME	3.05	1.08			
Attitude	LSS	3.50	.59			
	GLR	3.75	.51	2.61	.27	
	IES ME	3 64	54			1 1 1 1



• The high schools did not differ in their change in attitudes towards STEM.

When change in attitudes towards each STEM subject was examined,

• there was a statistical significance in change in attitudes towards technology scores (χ^2 (2, n = 67) = 6.37, p = .04),

• the GLR indicated a slightly more positive attitude towards technology with a recorded higher median score (Md=3.91).





Change in career decision self-efficacy



Graph 1. Change in career decision self-efficacy values (self-appraisal, occupational information, goal selection, planning, problem solving)

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- Perceived change in career decision selfefficacy is slightly towards a little more likely
- Overall, the change in career decision selfefficacy is also slightly towards a little more likely than before (=3.70, sd=.65).



Change in career decision self-efficacy



	HS	Mean	SD	χ2	Р
Self-	LSS	3.63	.89		
Appraisal	GLR	4.14	.46	3.00	.22
	IES ME	3.91	.68		
Occupational	LSS	3.41	.75		, 1 1 1 1 1 1 1
Information	GLR	3.82	.26	3.19	.20
	IES ME	3.68	.63		
Goal	LSS	3.53	.84		
Selection	GLR	3.84	.46	1.09	.58
	IES ME	3.79	.61		
Planning	LSS	3.54	.73		
	GLR	4.04	.44	4.30	.12
	IES ME	3.82	.59		
Problem-	LSS	3.50	.80		
Solving	GLR	3.85	.41	4.74	.09
	IES ME	3.92	.68		
Career	LSS	3.52	.76		
Decision	GLR	3.94	.30	3.05	.22
Self-efficacy	IES ME	3.82	.57		-



- The high schools did not differ in their change in career decision self-efficacy.
- When change in each dimension of career decision self-efficacy was examined,
 - there is no statistical significance between high schools in any dimension (p>.05).





The relationship between change in attitudes towards STEM and change in career decision self-efficacy

Table 3. The correlation between change in attitudes towards STEM and change in career decision selfefficacy scores

Spearman's rho	Attitude	Correlation Coefficient	
		Sig. (2-tailed)	
		Ν	

**. Correlation is significant at the 0.01 level (2-tailed).

• There is a strong, positive correlation between the two variables, rho=.496, n=67, p<.001, with positive change in attitudes towards STEM associated with higher levels of change in career decision self-efficacy.



Attitude	CareerDecSE
1,000	,496**
-	,000
67	63





Conclusions

- Students developed slightly more positive attitudes towards STEM subjects. The result can be interpreted as the positive impact of the learning units developed in Daylighting Rivers project in contributing to the development of students' positive attitudes in STEM subjects.
- Students feel slightly more self-efficacy in making career decision in STEM disciplines. The result can be interpreted as the positive impact of the educational modules developed in Daylighting Rivers project in increasing students' self-efficacy in making decisions related to STEM careers.

- efficacy.



• The implementation of Daylighting Rivers learning units with high school students has students to perceive slightly positive changes in their attitudes towards STEM subjects and slightly higher levels of career decision self-

 Moreover, the results indicated that students who perceive a positive change in their attitudes towards STEM subjects as a result of educational modules, also perceived higher self-efficacy in career decision-making.



DAYLIGHTING

DAYLIGHTING SCIENCE EDUCATION FOR CIVIC ECOLOGY

Daylighting Rivers

https://www.daylightingrivers.com/







Thank You For Attending!

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