

Computer Science Outreach to Inform Secondary School Students' Perceptions of Computer Science: Preliminary Findings

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Introduction

This poster describes a longitudinal K-12 outreach programme to promote Computer Science in Ireland, which ran over a three-year period from 2017-2020. A pilot phase was conducted in the first year from 2017-2018 with 2900 students participating. The implementation phase began in 2018, when 7320 students participated across the 2018-2019 and 2019-2020 academic years. The programme consisted of a free onsite school delivery of a two-hour camp that introduced students to a range of Computing topics: addressing computing perceptions, introduction to coding, and exploration of computational thinking. Schools self-selected, and the programme reached a large number of schools with varied socio-economic and gender diversity, along with schools across every county in Ireland. The student ages ranged from third class (7 - 8 years old) in primary school to sixth year in second level (17 - 18 years old). This poster focuses specifically on the research data collected during the implementation phase (N=1211) from secondary school students (12 - 18 years old) not enrolled in the formal Leaving Certificate Computer Science subject. Looking at student perceptions of Computer Science and if the outreach positively impacted those perceptions and built student interest in pursuing further study in Computer Science.

Camp Structure

Pre-Survey Completed	Survey Handed out to consented students only to complete alone	10 mins
Introduction to the roles and careers of computer scientists	Interactive discussion using a presentation with visual aids to discuss what a job in Computer Science is like	15-20 mins
Hands on coding	Using micro:bit and the MakeCode offline IDE (on tablets brought by outreach team member) this coding session involves activities with increasing levels of difficulty	60 mins
Hands on problem solving	Pen and paper problem solving activities using the Bebras challenges. Students are free to work individually or in groups	20 mins
Post-Survey Completed	Closing and post-survey completed and collected	5 mins

Aims

- Develop and run an outreach model which presents fundamental CS concepts.
- Identify any student perceptions (good and bad) of CS prior to the outreach model.
- Investigate if the outreach model can positively influence students to consider a career in CS.

Sample Camp



Reasons that would discourage you from a career in computing:

Word	Occurrences	SA Positive	SA Negative
Computer(s)	155	4%	96%
Boring	134	1.5%	98.5%
(All) Day	(117) 113	(18%) 13%	(82%) 87%
Hard	88	2%	98%
Good	84	1%	99%
Sitting	80	7.5%	92.5%
Difficult(y)	78	1%	99%
Screen(s)	79	9%	91%
long	69	6%	94%
time	62	5%	95%

Possible Misconception

Question 10 asked: "I am good at using IT, so I think I will be good at computing/programming?" to determine students' self-reported belief that general IT and computing/programming skills are correlated. Table below contains the results, which anecdotally show students believe there is a correlation between general IT skills and computing skills, which indicates a misconception from students that general IT and computing skills are correlated. This question used the Likert scale of: Strongly Agree (1); Agree (2); No Opinion (3); Disagree (4); and Strongly Disagree (5).

1	2	3	4	5	Avg	SD
82	468	328	219	63	2.8	1.0

Feedback on Camp

Word	Occurrences	SA Positive	SA Negative
Good	466	97.8%	2.2%
Interesting	127	96.9%	3.1%
Fun	108	99%	1%
Enjoy(ed)(able)	93	100%	0%
Instructor	55	96%	4%
Great	52	98%	2%
Learned	39	100%	0%

Did the Camp Positively Influence Students to Consider a Career in CS?

For comparison of pre- question and post- question, on whether a student would consider a career in CS:

	Strongly Agree : 1	Agree : 2	No Opinion : 3	Disagree : 4	Strongly Disagree : 5	Avg	SD
Pre-	130	359	311	214	96	2.8	1.1
Post-	227	541	196	122	24	2.3	1

There is a marked shift in their answers pre- and post-survey from an average of 2.8081 to an average of 2.2568 (with less variance) post-camp. The chi-square statistic is 157.6355, where the p-value is < 0.00001 . Thus, the result is statistically significant at $p < .05$. Hence, the preliminary findings from the outreach seem to positively promote CS as a subject and CS as a career path and had a significant impact on students' perceptions of CS.