

Exploring Learner Resilience and Performance of First-Year Computer Science Undergraduate students during the COVID-19 Pandemic



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Background

- Working definition of resilience:
 - *“the ability bounce back from tough times or even triumph in the face of adversity; to display tenacity, but not at the expense of reason” [13, p. 1]*
- Has been reported that learner resilience contributes to effective learning in higher education [37,41,71] including computer science [24,50]
- Resilience is one aspect of *positive psychology* which some studies suggest it is possible to enhance/develop.

‘Pandemia’ [76] – emergency remote teaching/shift to online



Photo by [Chris Montgomery](#) on
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‘Pandemia’ [76] – hybrid learning?



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Covid: Northumbria University confirms 770 cases among students

🕒 3 October 2020



‘Pandemia’ [76] – oops

‘Pandemia’ [76] – more hybrid, a new (ab)normal?



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Resilience

“the ability bounce back from tough times or even triumph in the face of adversity; to display tenacity, but not at the expense of reason” [13, p. 1]

Nicholson McBride Resilience Questionnaire (NMRQ) short version [13]

Question	
Q1	In difficult situations, my thoughts turn immediately to what can be done to put things right
Q2	I influence what I can rather than worry about what I cannot
Q3	I don't take criticism personally
Q4	I generally manage to keep things in perspective
Q5	I am calm in a crisis
Q6	I am good at finding solutions to new problems
Q7	I wouldn't describe myself as an anxious person
Q8	I don't tend to avoid conflict
Q9	I try to control events rather than be victim of circumstance
Q10	I trust my intuition
Q11	I manage my stress levels well
Q12	I feel confident and secure in my position

Strongly Disagree (1)

Disagree (2)

Neither Agree nor
Disagree (3)

Agree (4)

Strongly Agree (5)

Research questions

- RQ1: *Are there differences in resilience between pre and post pandemic learners?*
- RQ2: *What is the relationship between first-year CS learner success and resilience during the COVID-19 pandemic?*
- RQ3: *What is the relationship between first-year CS learner success and individual NMRQ factors during the COVID-19 pandemic*

Data Collection and analysis

- Data collected for first year BSc(Hons) Computer Science;
- Semester 2 core module (January to May);
- Microsoft Forms data collection
 - Students asked to *opt-in* for the use of their data in the project
- Students supported in interpretation of results and provided guidance how to enhance in the context of studies;
- Student performance data obtained at end of year and consists of NMRQ data and student results over both semesters;
- Statistical analysis with R (v4.1.2).

RQ 1 and Overview of the sample

			NMRQ Score		Year Mean	
Year	Sample size	Cohort size	Mean	SD	Mean	SD
19-20	113	183	43.6	4.9	68.8	18.0
20-21	101	176	41.9	5.7	63.7	17.4

19-20 semester 1 pre pandemic / 20-21 during pandemic

Welch's t-test - (H0: NMRQ mean scores are equal between years) $t = -0.46$ $p\text{-value} = 0.65$

Welch's t-test - (H0: Year averages are equal between years) $t = 0.45$, $p\text{-value} = 0.65$

Hence NMRQ and Overall results statistically similar

RQ 2 - What is the relationship between first-year CS learner success and resilience during the COVID-19 pandemic?

- Pearson correlation coefficient between NMRQ and overall year mark 0.02;
- Overall NMRQ not significantly related with overall year mark;
- Different to that reported pre-pandemic [50] but...
- ...Pandemia! [71]

RQ3 - What is the relationship between first-year CS learner success and individual NMRQ factors during the COVID-19 pandemic

No	NMRQ question	Correlation			ANOVA	
		R	t	p	F	P
Q9	I try to control events rather than being a victim of circumstance	0.21	3.19	0.002	10.19	0.002
Q10	I trust my intuition	-0.15	-2.20	0.03	4.83	0.030
These are significant at the 5% level						

Results for the other NMRQ questions in the paper itself.

Threats to validity

- Statistics – correlations are not causations;
- Response rate not 100%;
- Two cohorts / one institution / small sample;
- Data collection occurred across one week so may be differing learner behaviour at later seminars;
- Students know we are reading there responses;
- Social desirability factors.

Why? - I try to control events rather than being a victim of circumstance



- Is this a crude measure of learner agency [43, 44]
 - the feeling of ownership and control learners have over the own learning.
- Hence, learner agency could be promoting effective learning.

Why? – “I trust my intuition“ (ok it’s a meme but...)

"good morning class"

"good morning professor"



<https://knowyourmeme.com/photos/2091626-animated-dads-on-computers>

Further work

- Learning in pandemic likely not typical(!)
 - Impact of Resilience and Learner agency may be productive avenues for further work;
 - Learning mode may be critical (online, blended, face to face)
 - (as may the originally chosen mode as opposed to the delivered mode)
 - Supplement quantitative work with qualitative work;
 - Multi-institutional, cohort/longitudinal approach.

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Questions?

ITiCSE'22 paper available here:

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