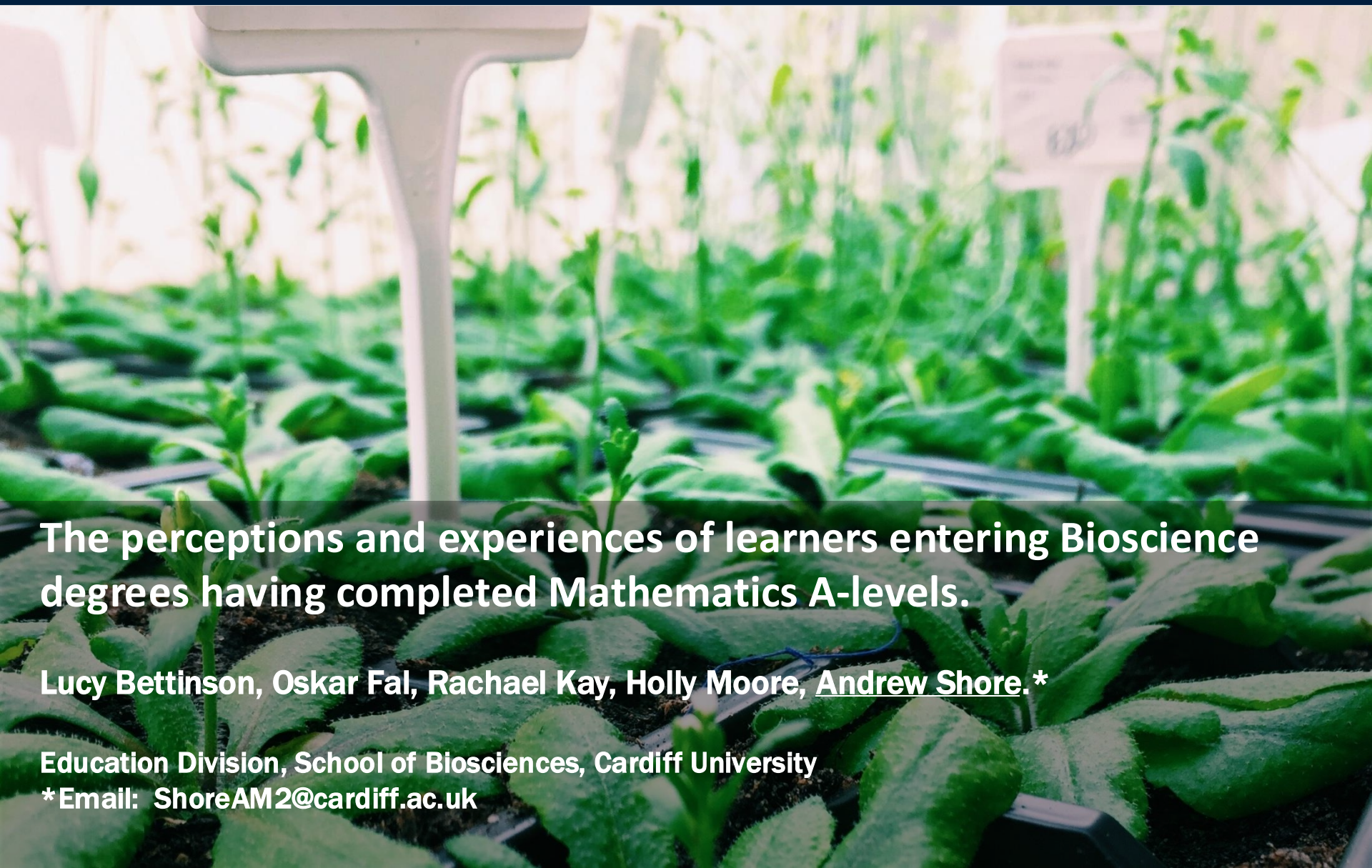
The Relative Imprtance of Mathematics A-level



The perceptions and experiences of learners entering Bioscience degrees having completed Mathematics A-levels.

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Background - Key findings from BERA 2018

Data Set Summary

- 2014/15 & 2015/16 graduates from England and Wales
- Holding 3 or more A-levels
- Containing 122,799 STEM graduates
- JACS 3 Subject Areas 1-9
    - JACS 3 Principle Subjects A0-J9

Outcome Measure

Degree classification – binary logistic regression models examine 1st:2:1 Vs 2:2 3rd as well as individual degree classifications

Variables

Gender (male female), age (young/mature students), ethnicity (White, Non White), school funding type (private, state, other), year of graduation (2015, 2016), prior attainment (tariff of top 3 A-levels), A-level subjects, Welsh Baccalaureate Qualification, university mission group.

Background - Key findings from BERA 2018

Key Findings

- Possessing STEM A-level subjects appears to be positively associated with STEM degree outcomes.
- The effect of chemistry A-level does not outweigh that of Biology A-level
- Prior attainment appears to outweigh the impact of A-level subject choice at 1 to 2 grade points
- While possessing a single mathematics A-level is associated with higher degree classifications, possessing further mathematics does not.
- R^2 values are <0.2

This year ....

Research Strategy

Aim

To investigate how the study of A-level mathematics has impacted upon the experiences of Bioscience undergraduates at a UK HEI.

Approach

Small focus groups (3-4), grounded theory approach. Recordings transcribed into NVivo and coded independently, line by line, by two researchers. In addition each participant filled out a questionnaire to collect demographic data.

Four Themes

- Unit Choice
- Skills and Habits
- Motivation and Independence
- Transition

Participants

Final year students undertaking Bioscience degrees at a UK HEI. All participants undertook pre-reform A-levels in England or Wales. N=15

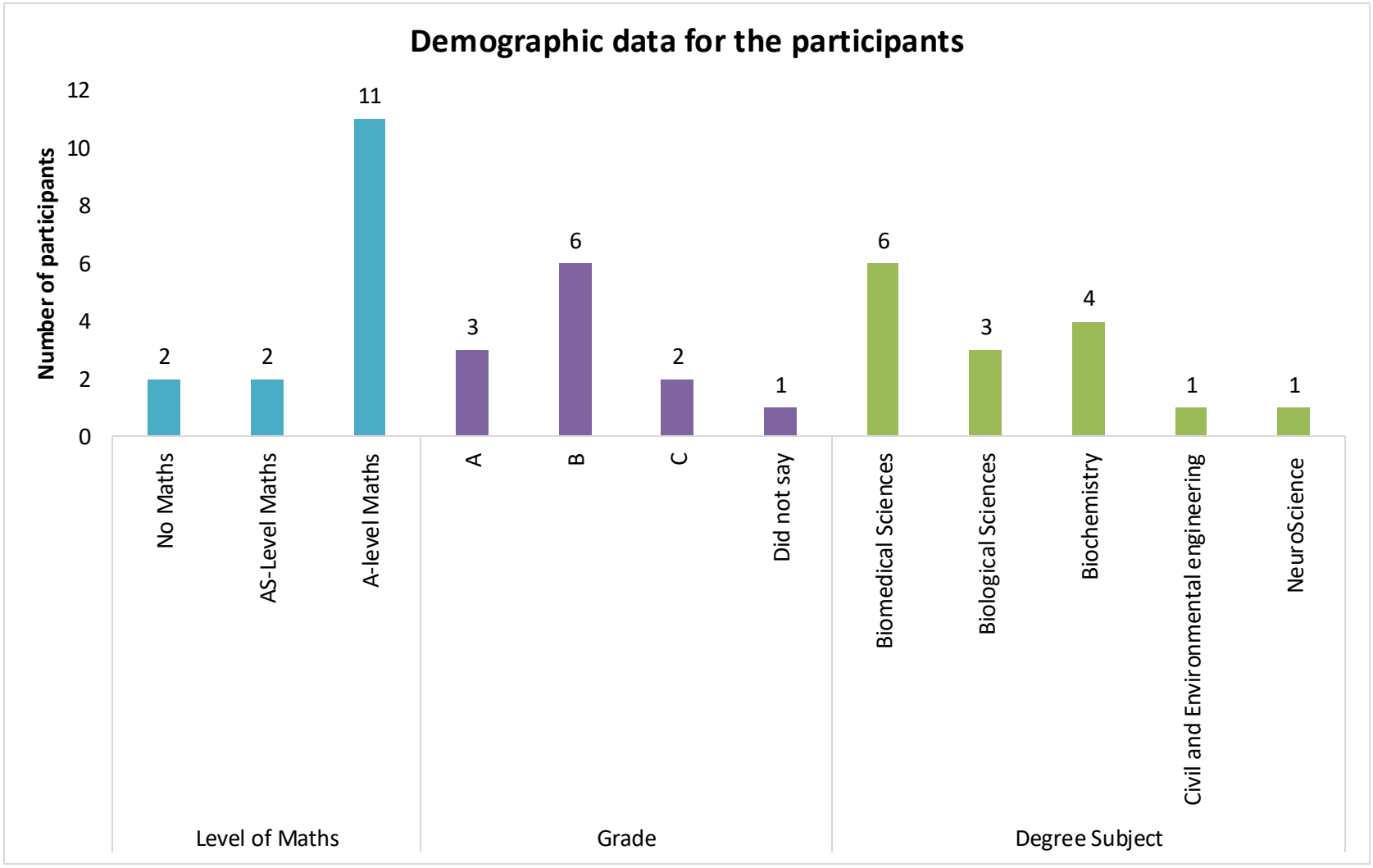
Research Strategy

Participant	*Line*	*Code*
Fred	I think I would, I mean I only had the option to do stats or mechanics, and they said	Some Choice;
Fred	because I was thinking of doing Biology, that stats would be better to take, so I was kind of	Statistics helpful
Fred	restricted to that. But I think, it makes sense. I did all the sciences for my A-levels, because I	Science A-levels
Fred	knew I wanted to do biology. You know, I'm very happy with it, it's been fine (laughter).	Happy with A-levels
Lauren	I think I certainly would have done the same A-levels I did, I may have been tempted	Same choice
Lauren	to take mechanics rather than decision, but at the time it was quite nice doing decision. But	Mechanics>Decision
Lauren	maybe looking back, something a bit more challenging and different may have been a bit	Wanted more challenge
Lauren	more interesting to do. But certainly, the stats I wouldn't have done any different.	Statistics helpful
Harry	I don't think I would have changed anything. The modules or the units I had to do.	Same choice
Harry	Yeah I just, because I found M1 interesting and S1 useful.	Statistics helpful; Mechanics interesting
Calvin	Yeah, same as Lauren. Um, yeah S1 was very helpful, um, and I think I would have	Statistics helpful
Calvin	done D1 again just because it was easier, and mechanics looked to be a bit more challenging	Decision easier than Mechanics
Calvin	from the offset.	-

Theme	Number of times coded
Statistics helpful	4
Same choice	2
Science A-levels	1
Happy with A-levels	1
Some Choice	1
Mechanics > Decision	1
Wanted more of a challenge	1
Mechanics interesting	1
Decision easier than Mechanics	1

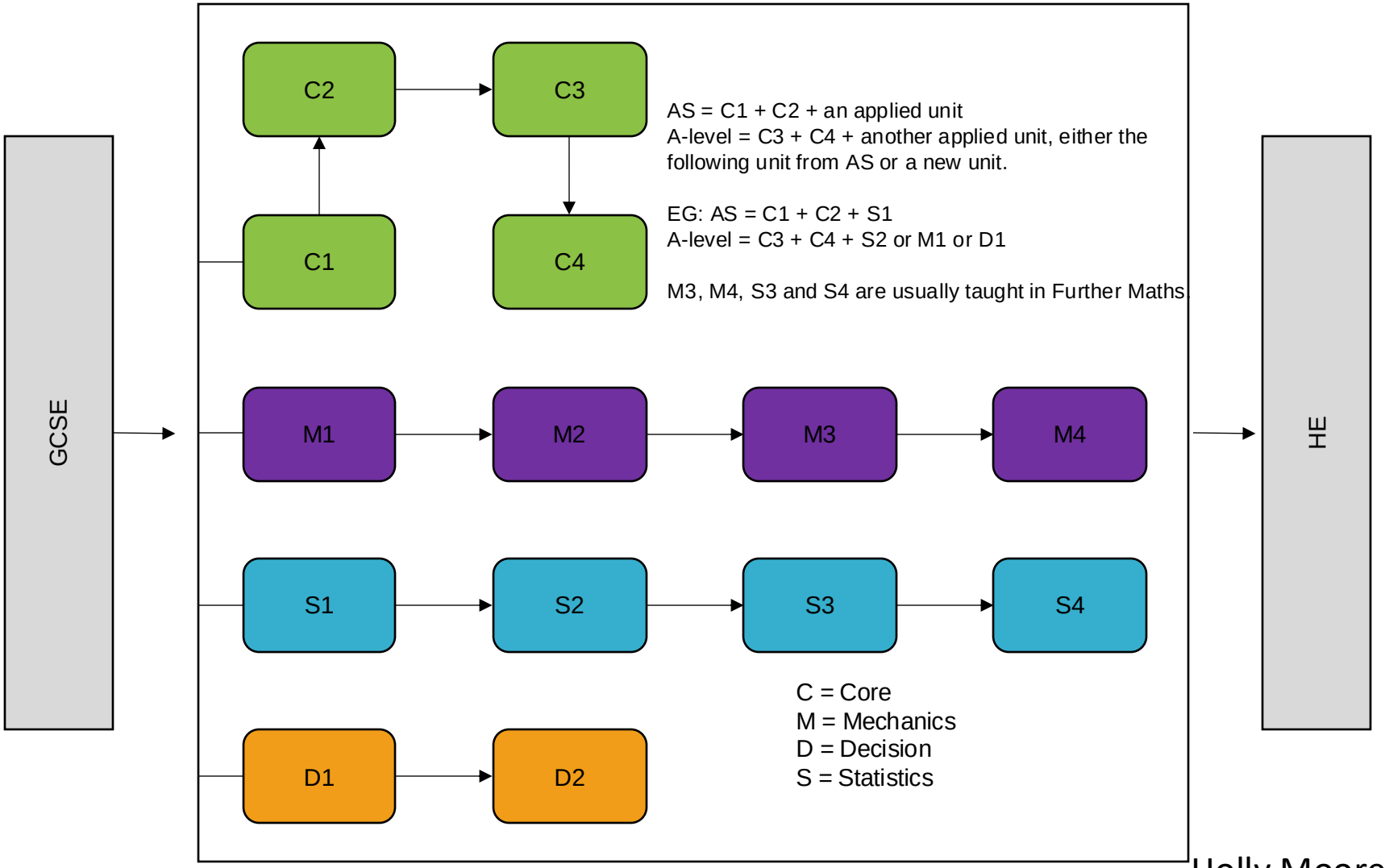
Holly Moore

Research Strategy



Holly Moore

Perceived Usefulness of Units



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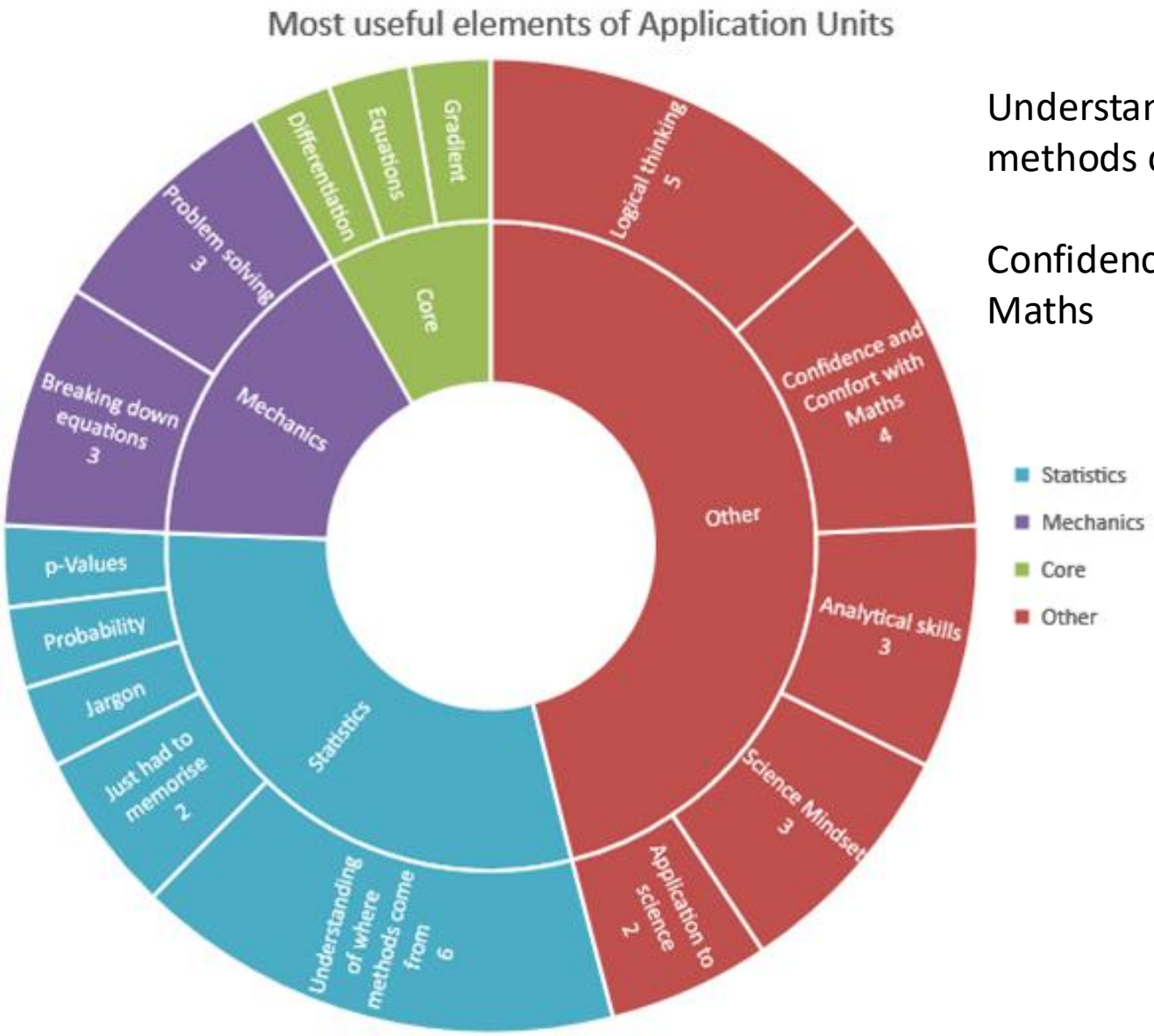
Perceived Usefulness of Units



Understanding where statistical methods come from

Confidence and Comfort with Maths

Holly Moore

Perceived Usefulness of Units

"Knowing the basics of maths like understanding fractions"

"I think it's just count ability, having that and done it, I'd say I feel way more comfortable approaching any equation … it's almost like it feels normal to me. It's not like I look and think oh my gosh."

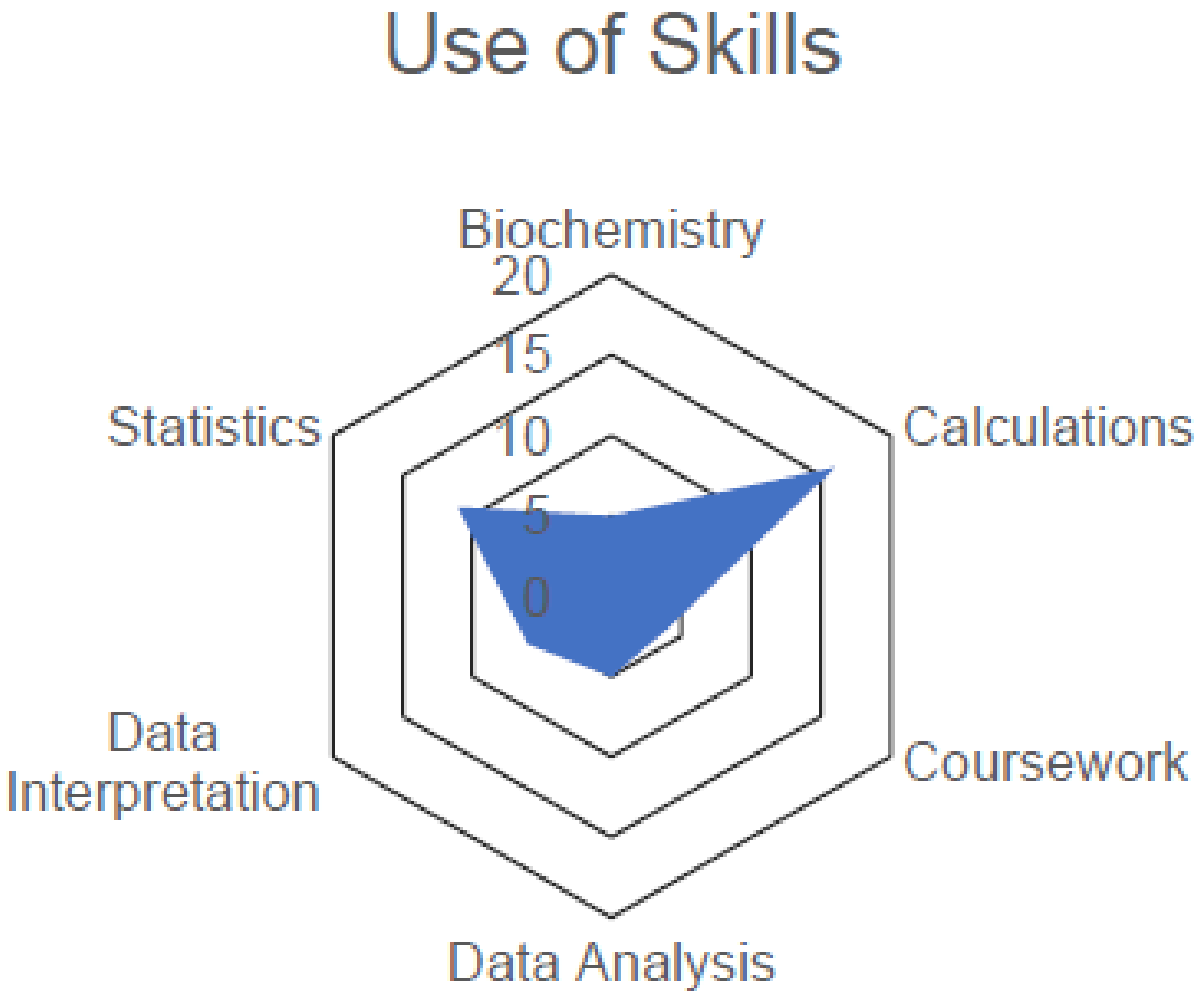
"I thought D1 was quite easy, but I think that's kind of a widespread thing."

"I understood the names stuff like what it meant when it was talking about standard deviation, like I knew what that meant and how to work it out and what it means rather than just a name"

"Stats is just like a memory game its literally like remembering what steps to take next."

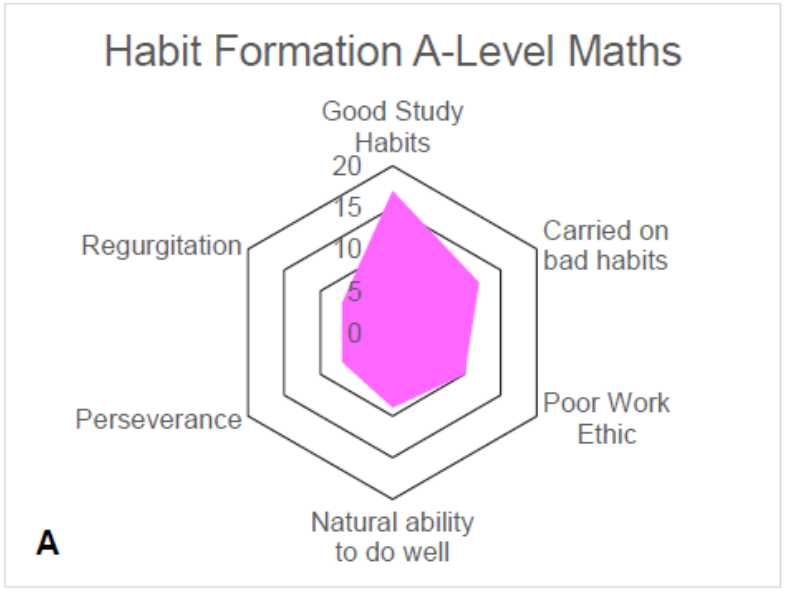
"I think just having a better understanding of probability, and then how I guess that's relevant within Biology makes sense, to actually be able to say this is likely to be because of this, and not because of something else."

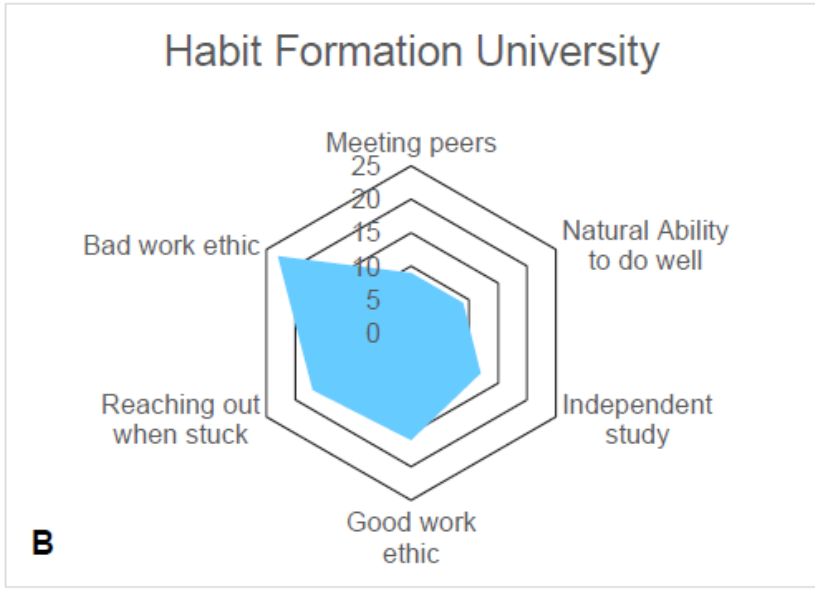
Perceived Usefulness of Units

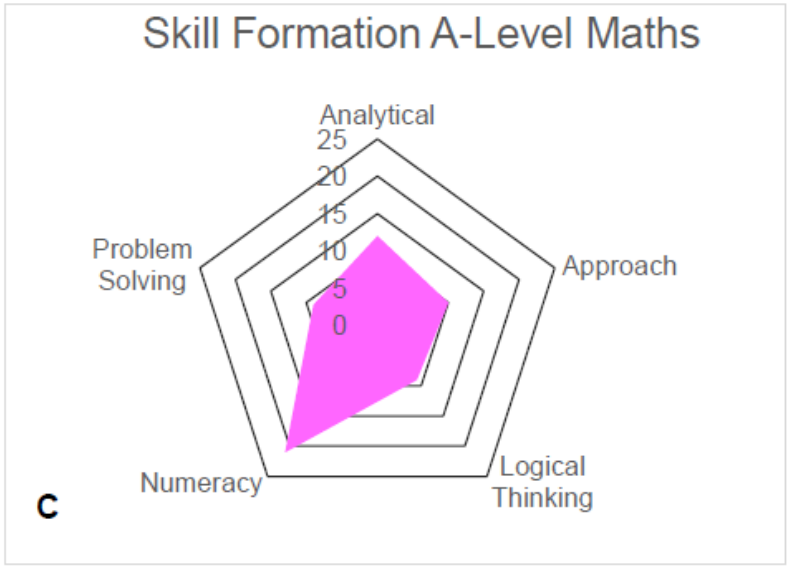


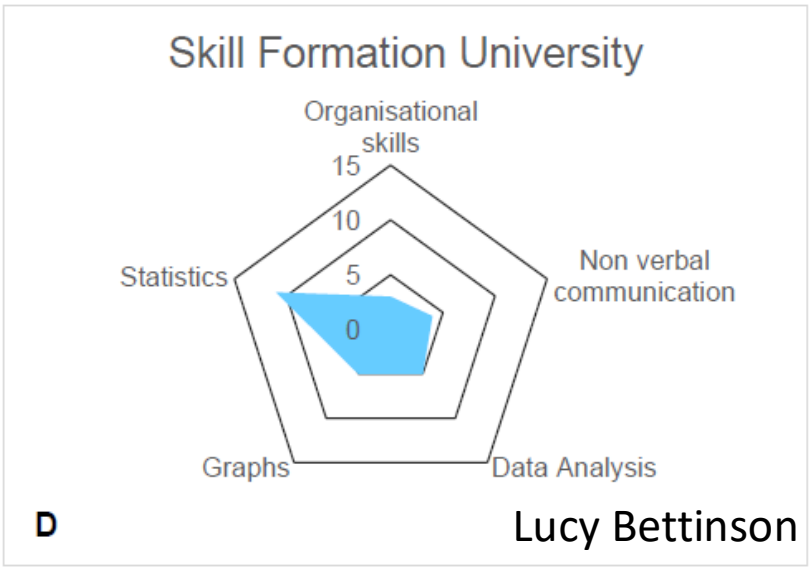
Lucy Bettinson

Skills and Habit Formation







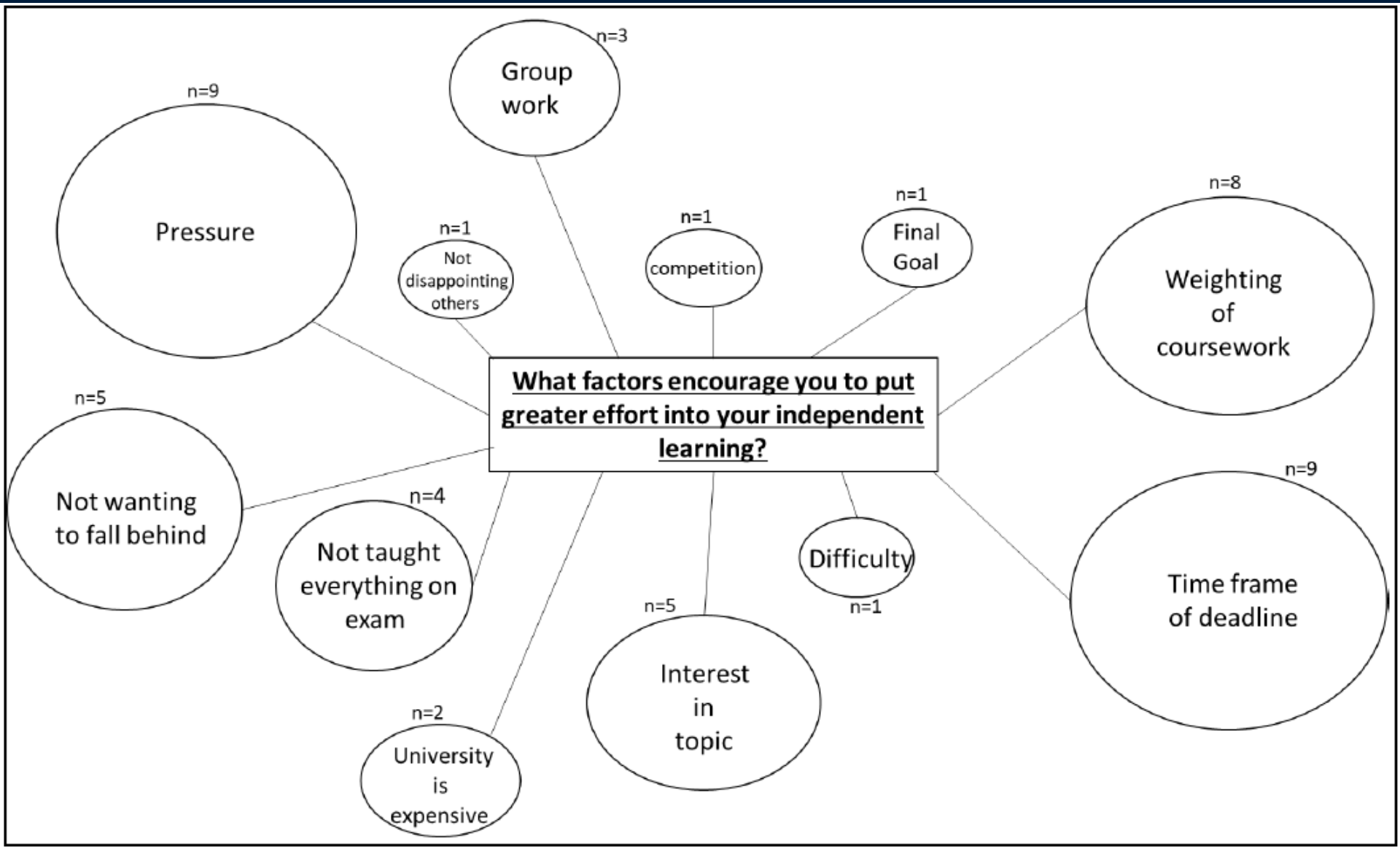


Lucy Bettinson

Skills and Habit Formation

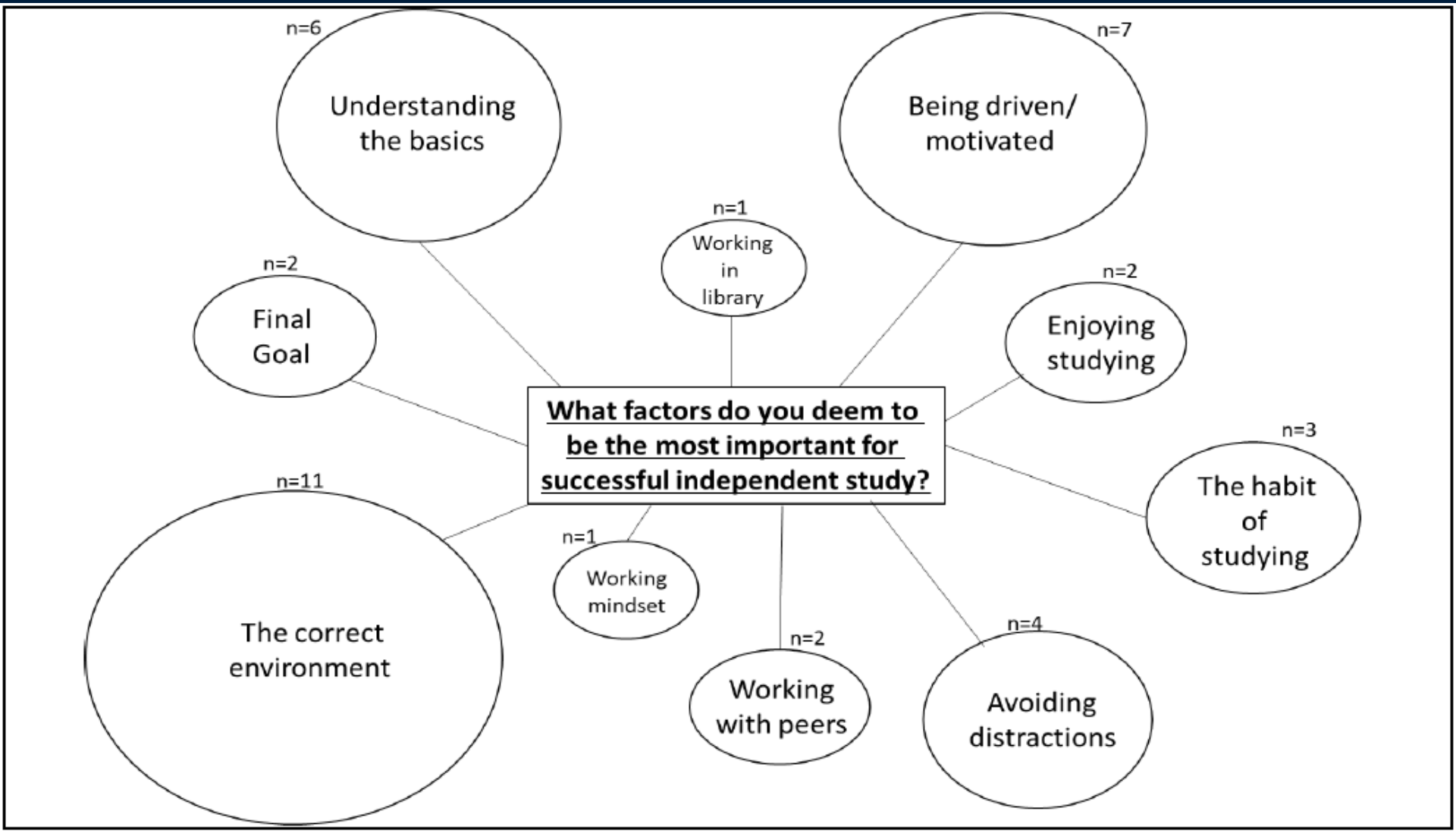
Skills and Habit Formation

Motivation and Independence



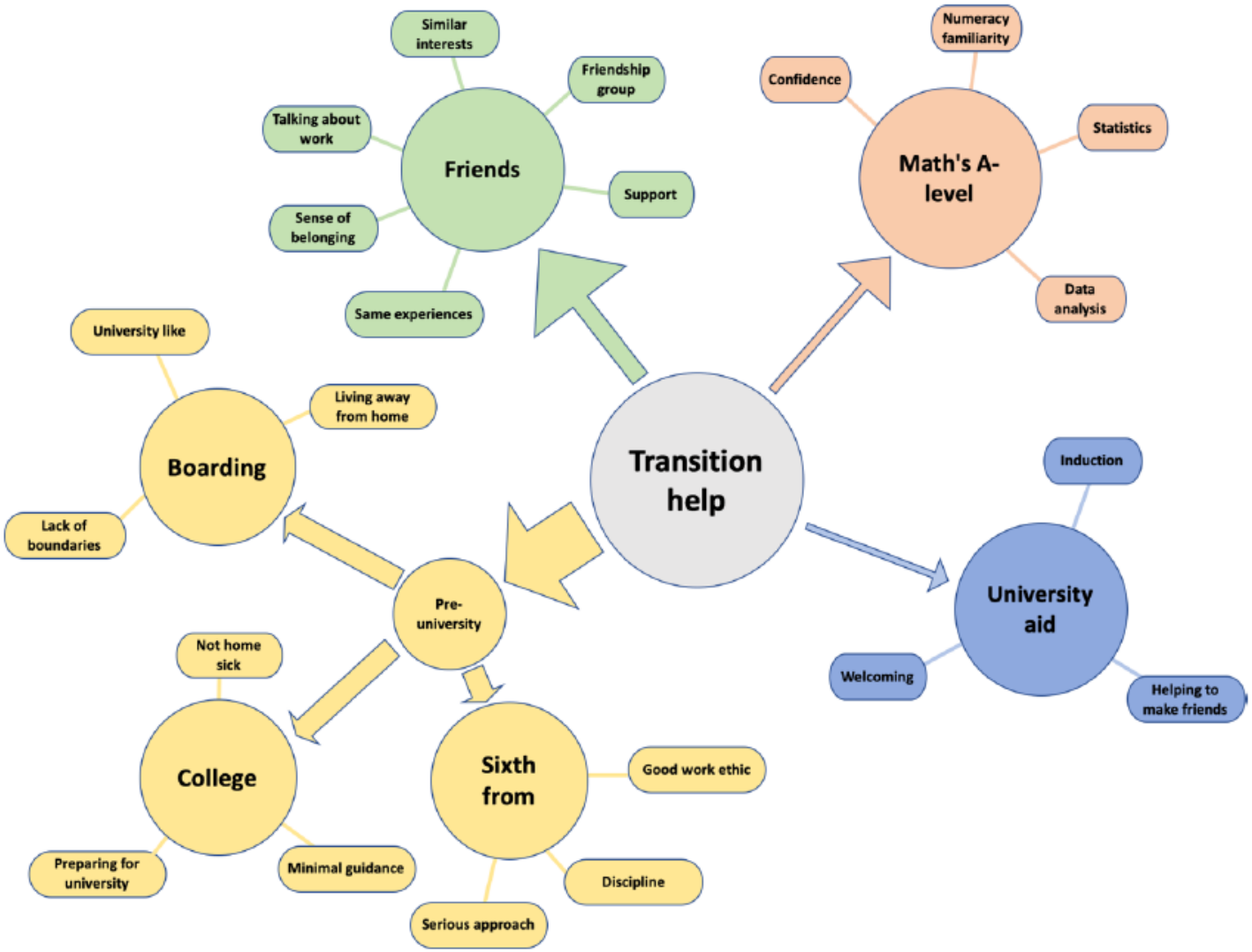
Rachael Kay

Motivation and Independence



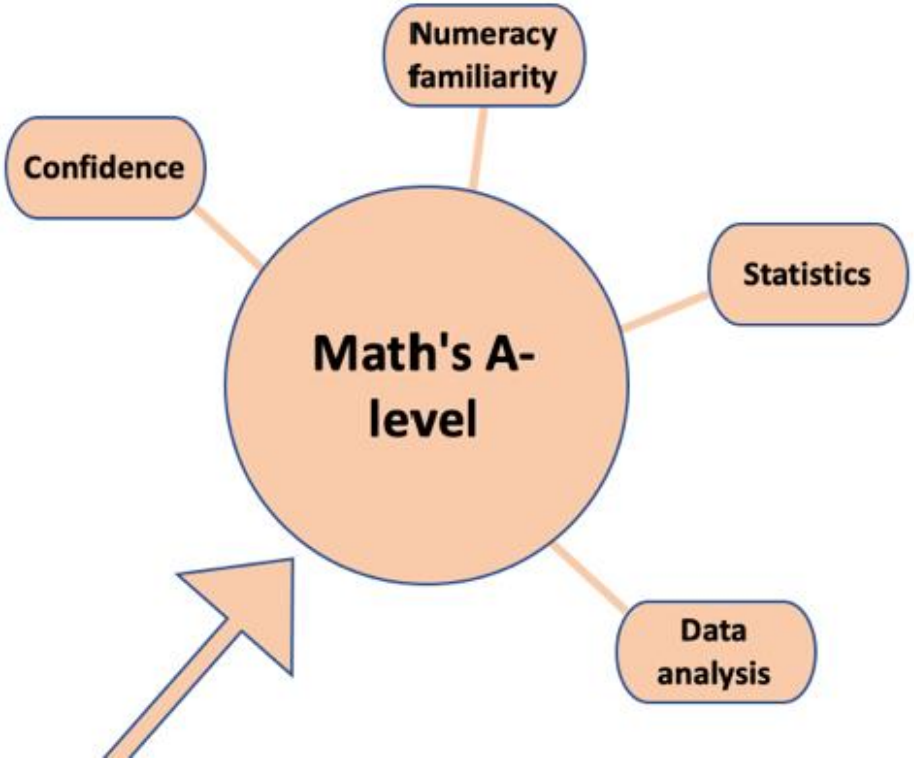
Rachael Kay

Transition



Oskar Fal

Transition



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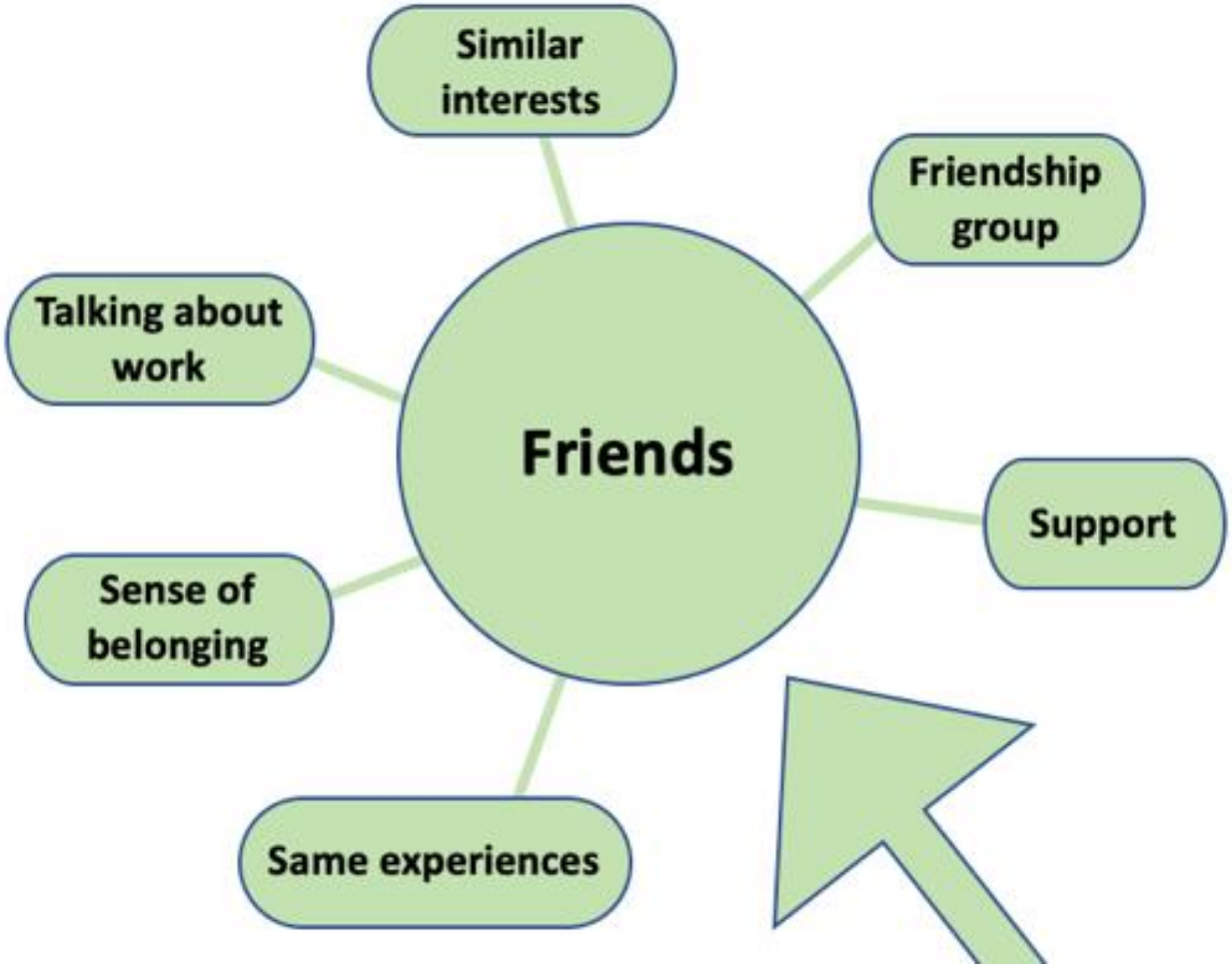

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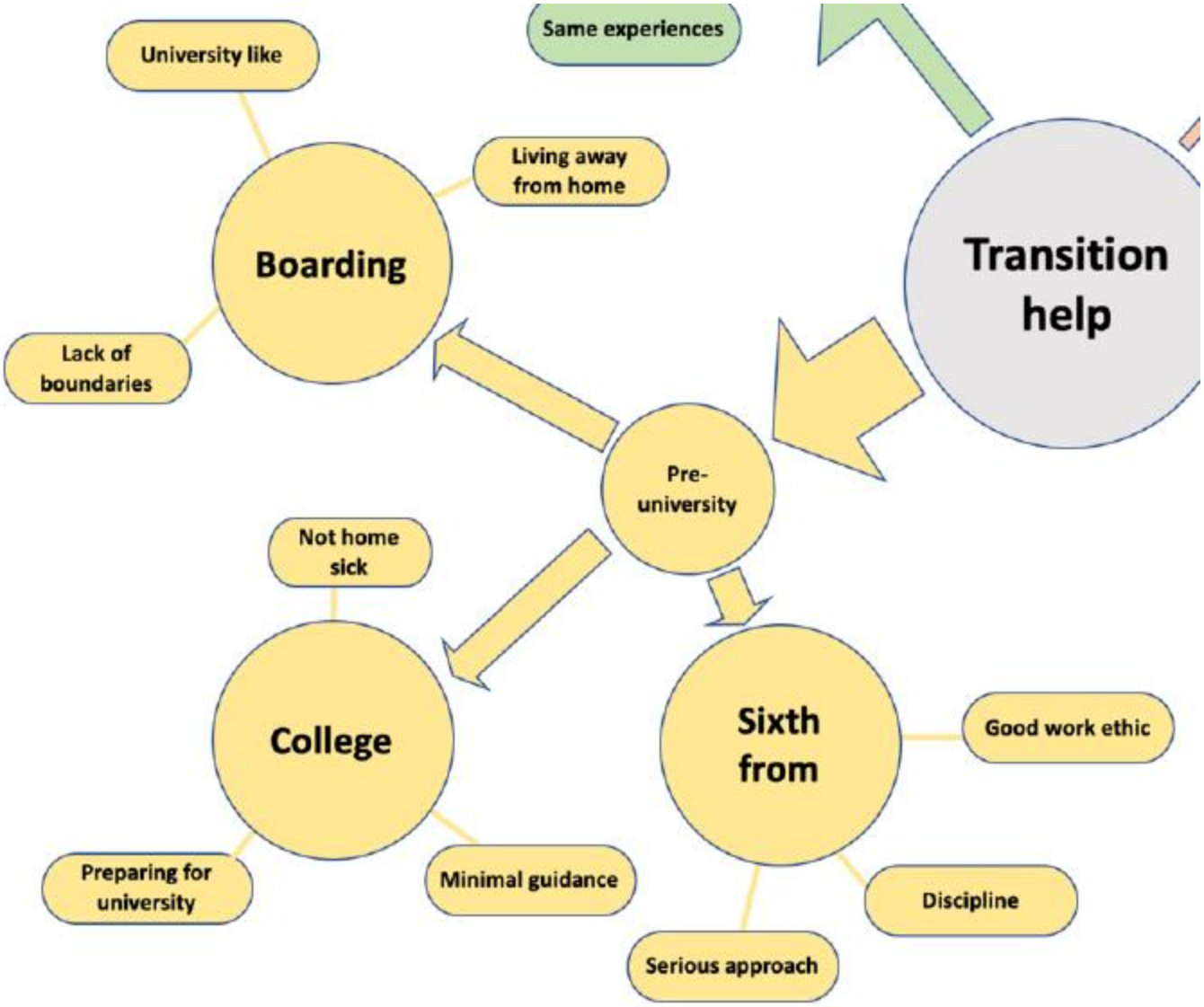

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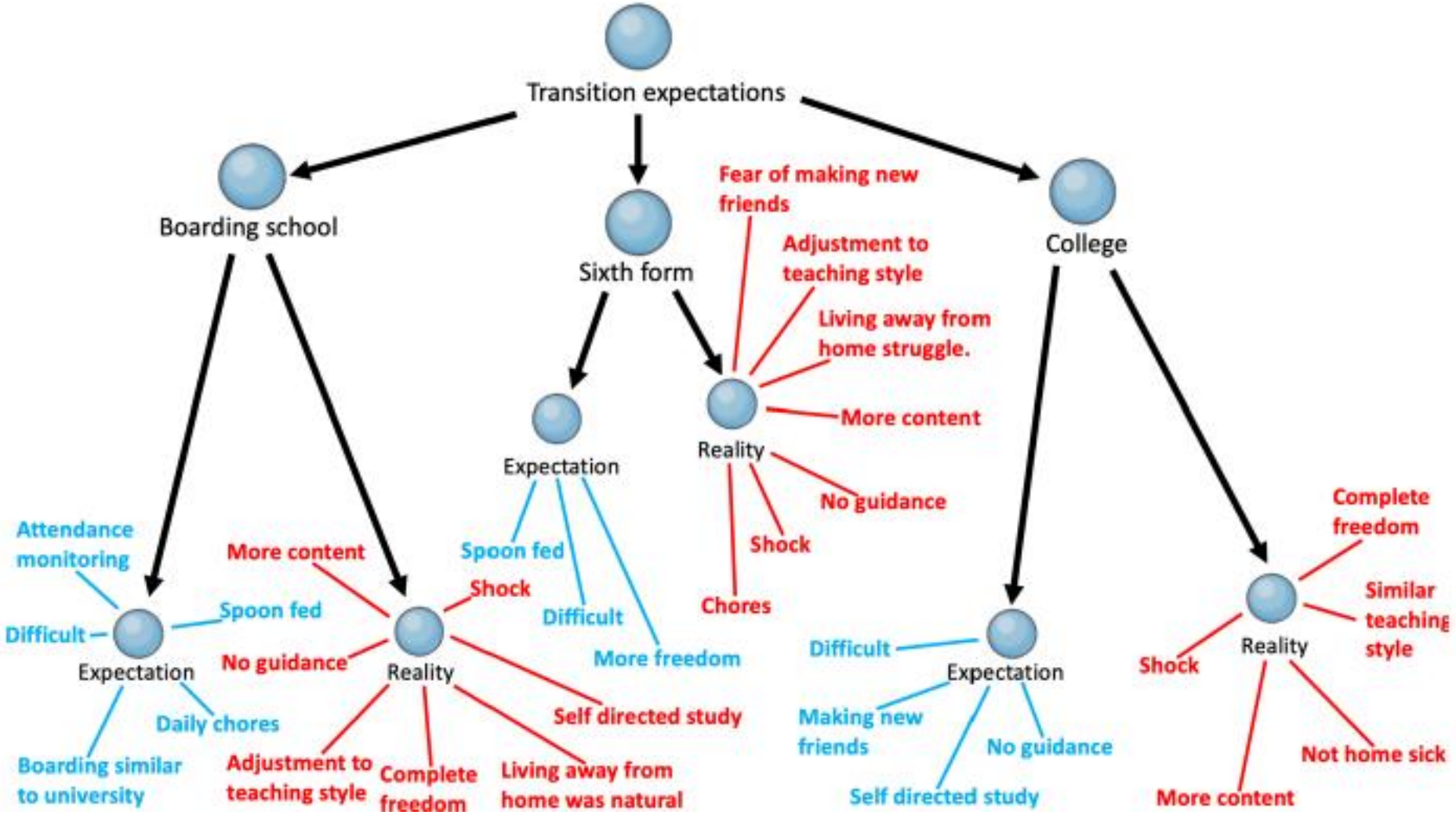

Oskar Fal

Transition

"Living away from home for the first time, and obviously trying to settle in, as well as dealing with the step up in content, so you're kind of having to do two things at the same time, rather than just focus on one of them, so that might kind of negatively impact."

"The college that I went to they did certainly take a step back, I think compared to a lot of colleges they were trying to prepare you for uni and they in that way they weren't behaving like it was school. It was like well were going to sort of leave this up to you, we'll give you the guidance but we're not sort of here to walk you through it."

"As a border it was pretty much the same except I didn't have someone watching over me"

Summary of Perceptions

On Mathematics

Familiarity, numeracy, statistics

The Wider Context

- The struggle with independence
- The loss of 'good habits from A-level' - that are perhaps associated with less independent learners
- Are the growth of 'bad habits' associated with increasing independence? – particularly year 1
- Transition influenced by school type, with those from Colleges reporting more similar prior experiences to HE.
- No wonder the quantitative models accounted for <20% of the variance

Future Directions

- Mathematical Sciences Students
- Transition