

# 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 1<sup>st</sup>:2:1 Vs 2:2 3<sup>rd</sup> 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 Oualification, 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<sup>2</sup> 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**





# **Perceived Usefulness of Units**



Understanding where statistical methods come from

Confidence and Comfort with Maths

#### Holly Moore



"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** 

# Use of Skills



Lucy Bettinson



# **Skills and Habit Formation**





# **Skills and Habit Formation**

		"the importance of something like maths is like you know you need to be there to gain the full like like benefit of it."			
"Again when you're a uni if you don't get something it's worth asking different people to explain it to you in a different way Habit of reaching out when stuck."	Good A	Good Approach		"Maybe never missing lessons. Like you kind of know the importance from having done maths at like. Like missing one lessons was as crucial as all the other one's. So like you feel behind having missed one I'd say."	
			"Yeah I just remember in A level like just		
"My de co stro lovo lst	work ethic was finitely more insistent and onger during a- ls than it was in t year of uni"	"I've always had the habit of working a lot from the start basically."	write down every single step you do"		
			Lu	ıcy Bettinson	



## **Skills and Habit Formation**

"So kind of like people didn't have the motivation to go to those lectures because of the way the social events were laid out."

"...we don't have that strict schedule, where at school it's kind of hard to just like, because you're the one who is responsible for making yourself get up . You haven't got as much motivation"

#### Bad Work Ethic

"So like I kind of took that with me to uni because again I would leave things a little late and then not fully understand what I was doing so I would have to turn to things that would tell me information quickly..."

Yeah lots of people have got such a different outlook when they come to University that it actually doesn't matter if you don't turn up to lectures or if we need to get sixty percent you know that sort of thing.."

".It will literally be a week sometimes where I will not do no uni work and it'll be fine, it won't affect me if I'll be honest."

Lucy Bettinson



# **Motivation and Independence**



Rachael Kay



# **Motivation and Independence**



Rachael Kay



# Transition













# 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</li>

### **Future Directions**

- Mathematical Sciences Students
- Transition