Incorporating preferences & inclusivity into curriculum design

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The Open University

eSTEeM
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Incorporating preferences & inclusivity into curriculum design (M140, M248 and M348)

AIM What is the student perspective of current learning format, are any groups disadvantaged and what are student preferences regarding future content & format?

PURPOSE To feed into the upcoming reviews for assessment or lifecycle.

METHODS

1. Use Power BI data to ascertain whether neurodiverse or students with mental health conditions are underperforming or have lower completion rates

2. Student perspectives surveys aimed at getting detailed quantitative and qualitative feedback on the current module content and learning format and preferences going forward.

3. May hold focus groups for deeper understanding or to get feedback on potential changes. We aim to collaborate with students on curriculum design.

The modules

Three statistics modules within the School of maths and statistics but other cohorts such as economics and data science take the modules

The materials currently provided include textbooks, screencasts, quizzes and some online resources.

Earlier in this section, we determined probabilities when an individual was picked at random from a population. In practice, often we randomly sample a number of individuals or a number of items from a population. We shall use the *addition rule* and *multiplication rule* to look at probabilities for samples that do not consist of just one individual but of several. First we will look at probabilities for samples of size 2, before seeing how our results can be generalised to larger samples.

When we introduced random samples in Unit 4, we saw how they could be selected using random number tables. We selected a random number to give us the first member of the sample, then a second, and so on. If the same random number appeared a second time, we rejected it, because the same individual cannot appear more than once in a random sample. For the moment, we shall relax this restriction, because it makes the probabilities easier to find. Thus, if an individual or item is selected for a random sample, it can be picked again at a second selection. Later in this section, we shall return to proper random sampling and show that in practice for large populations, it makes hardly any difference to the probabilities.

We shall introduce the method of finding probabilities for a sample of size 2 by means of an example.

M140 – lots of text with point and click software

Suppose that the random variable X has range $(1, 2)$ and that its p.d.f. is given by

$$f(x) = 0.6x^2 + 0.2x - 0.7, \quad 1 < x < 2.$$

We want to calculate $P(1.2 \leq X \leq 1.5)$. This p.d.f. and the required probability are shown in Figure 17.

We have

$$\begin{aligned} P(1.2 \leq X \leq 1.5) &= \int_{1.2}^{1.5} (0.6x^2 + 0.2x - 0.7)\,dx \\ &= \left[0.6\frac{x^3}{3} + 0.2\frac{x^2}{2} - 0.7x\right]_{1.2}^{1.5} \\ &= \left[0.2x^3 + 0.1x^2 - 0.7x\right]_{1.2}^{1.5} \\ &= 0.2(1.5)^3 + 0.1(1.5)^2 - 0.7(1.5) \\ &\quad - \{0.2(1.2)^3 + 0.1(1.2)^2 - 0.7(1.2)\} \\ &= 0.2004. \end{aligned}$$

M248 – maths based with point and click software

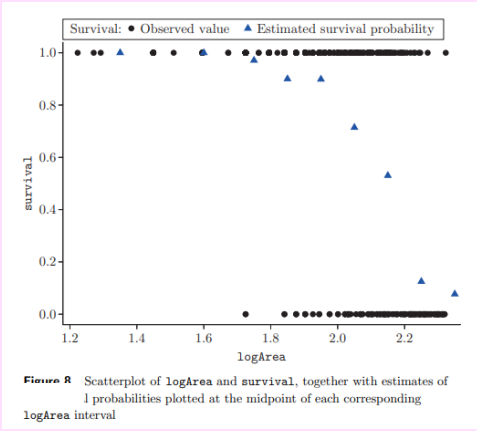

Figure 8 Scatterplot of `logArea` and `survival`, together with estimates of l probabilities plotted at the midpoint of each corresponding `logArea` interval

M348 – applied computer based statistics using R

Methods: Power BI data

Power BI data for each of the three modules was extracted for each of the years 2022-25
Of particular interest in our study are those with mental health and neurodiverse conditions

Completion rates
Completion rates based on those registered at the start not the Fee Liability Point (FLP)

Failure rates
Failure rates are calculated out of those who completed the module

Module	Level	Students 2022-25	Overall completion	OU level completion
M140	1	4863	63%	61%
M248	2	2044	72%	72%
M348	3	1274	79%	80%
Total		8181		

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Initial analysis – prevalence comparison

- How does disability prevalence at the start compare to the OU and UK?
- Other ND calculated as Neurodiversity – Autism numbers obtained from Power BI
- We do not know which groups are in the Neurodiverse (ND) or Learning Difficulties categories exactly
- Approximately 30-60% of ND individuals also have mental health issues (ADHD highest)

Prevelence	Our students	OU	UK recorded	Uk estimate
Disability	22%	29%	24% HE(20%)	
Autism	4.2%	3.3%	1.3%	1-3%
Other ND	4.4%	6.2%	ADHD 0.32%	2-5%
			Dyslexia 4%	10%
Mental Health	9%	14.5%	12% HE(9%)	22%

Table 1: Prevalence at registration

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Disability

Figures 1 and 2 compare the 22% of students with any recorded disability to all other students

Completion rates
As shown in Figure 1, the completion rates for students registered with any disability are considerably lower by 5% - 10% for the three modules.

Failure rates
Of those who complete, failure rates for disabled students are only slightly lower than for non-disabled students. Failure rates on M248 are consistently higher than the other modules

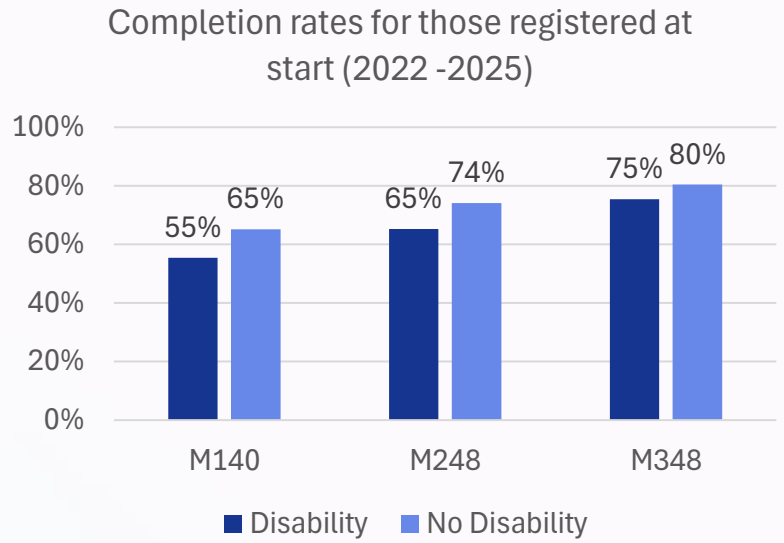

Figure 1 Completion rates

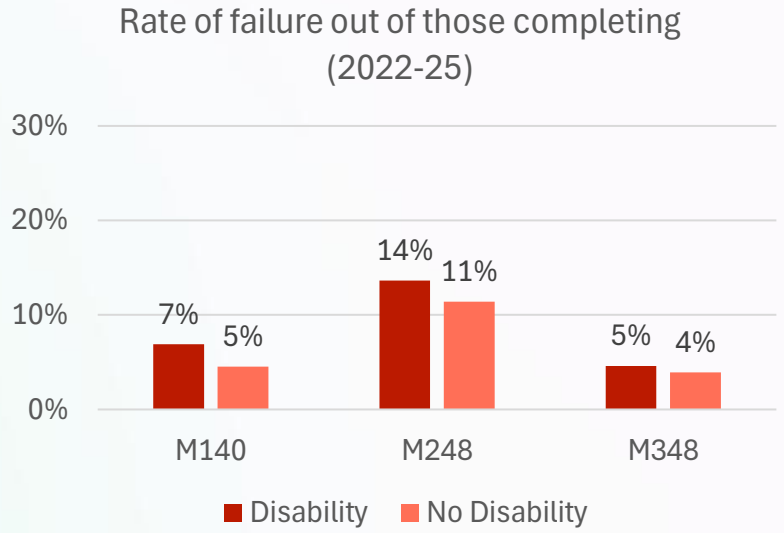

Figure 2 Pass rates

Disability breakdown

Figures 3 and 4 separate mental health conditions from those with other disabilities

Completion rates

Those with mental health conditions consistently have completion rates 6-9% lower than those with other registered disabilities

Failure rates

Failure rates are highest on M248 and largest for those without mental health conditions

In summary, those with mental health conditions are much less likely to complete but those who do complete, have similar levels of failure

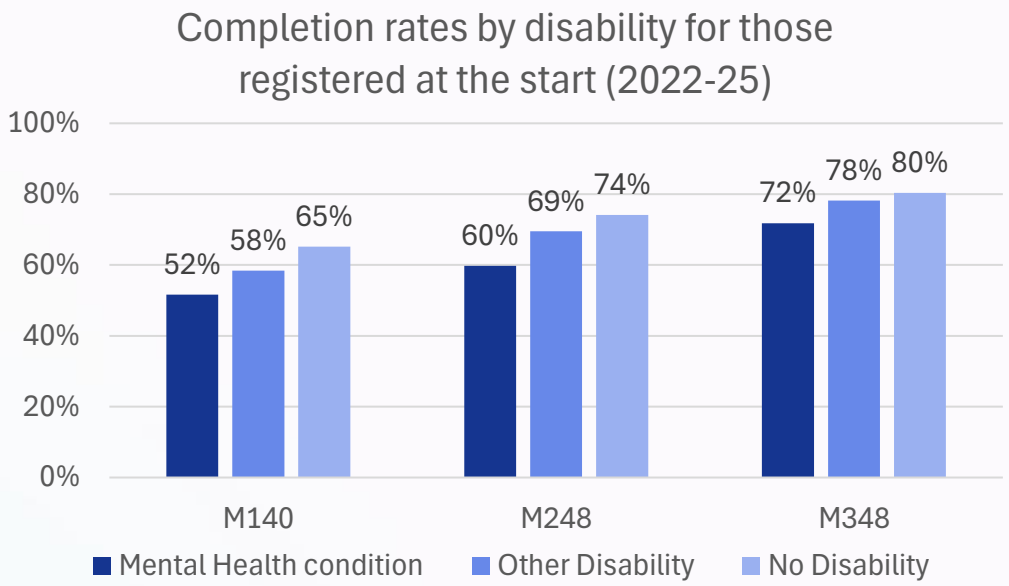

Figure 3 Completion rates

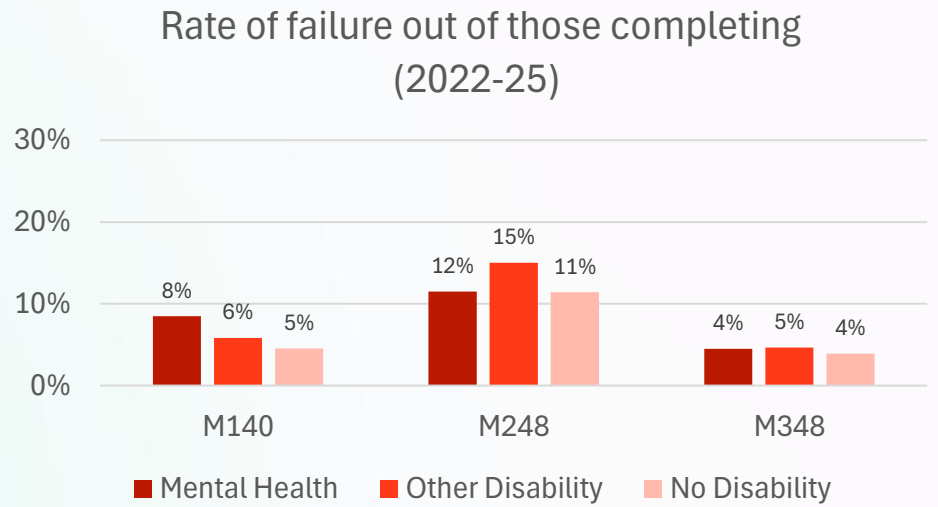

Figure 4 Pass rates

Figure 3 pass rates for students who completed the module

Neurodiversity breakdown

Figures 5 and 6 compare neurotypical (NT) with Autism and those with other neurodiverse traits but not Autism. Other ND: total neurodiverse – autism frequencies

Completion rates
Autistic students have the highest completion rates
ND students are less likely to complete the module

Failure rates
Autistic students are also the least likely to fail. Other ND students have higher failure rates particularly for M248

There are stark differences in the outcomes for Autistic students and other neurodiverse conditions such as ADHD and Dyslexia who are much less likely to complete or pass

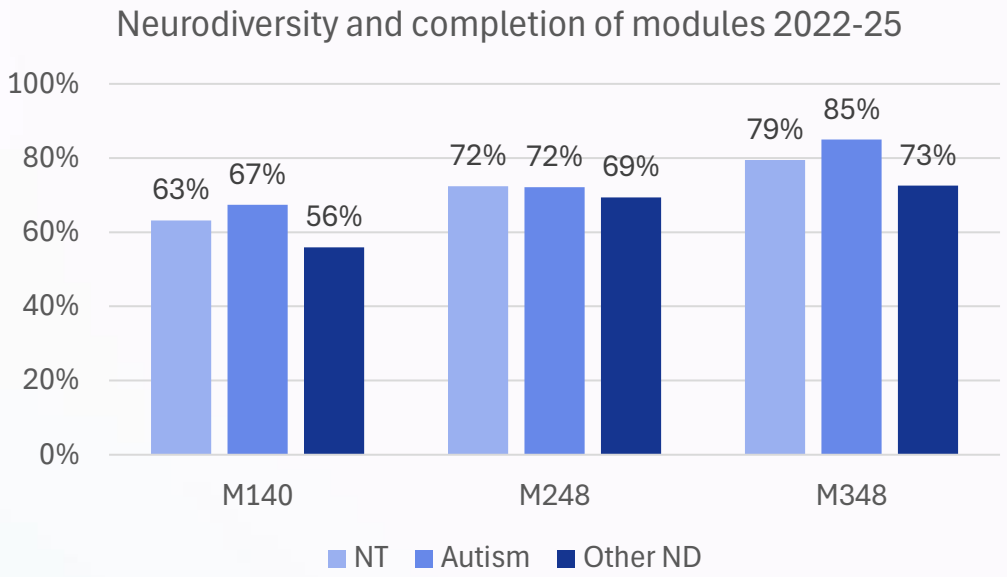

Figure 5: Completion rates by neurodivergent trait

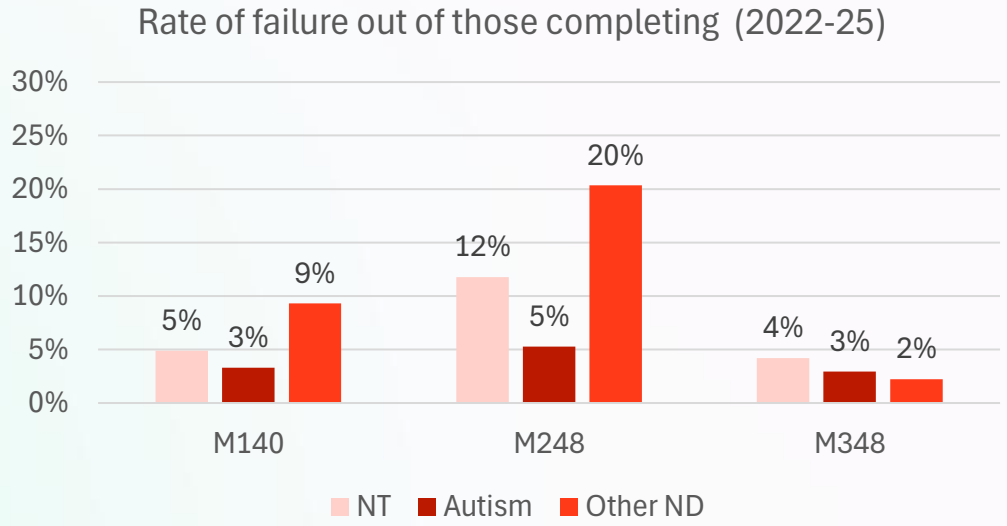

Figure 6 Failure rates by neurodivergent traits

Differences in preferences - literature

Condition	Preferences	Challenges
Autism	Self-paced, predictable, well-structured, written material. Clear instructions	Social components (group work, forums), open ended tasks, implied meaning, sudden changes
ADHD	Short, chunked, visually organised, multi-modal interactive content, regular feedback	Dense text without visual scaffolding, unstructured self-study, abstract, decontextualised content
Dyslexia	Verbal narration of text, inclusive formatting, mind maps, graphic organisers over linear text	Dense, text-heavy self-study materials with no verbal input
Anxiety	Low-stakes or formative assessment, clear structure, anonymous participation, worked solutions	High cognitive load as working memory reduced, perfectionism, procrastination
Depression	Connection to purpose, meaningful content, regular touch-points with tutor, short achievable milestones	Long, dense text, isolation

What next?

Two surveys have been designed to get detailed feedback on each module and understand student preferences for learning content and format going forward.

We will ask specifically which mental health conditions and neurodiverse traits students have, whether they have been formally or self diagnosed or awaiting assessment

Survey 1: Understanding how they utilise the learning materials, whether they are struggling or contemplating dropping out and what they think about the textbook. Qualitative questions will give deeper insight.

Survey 2: Learning preferences and inclusive design improvements. We will also ask about software and assessment preferences.

Focus groups: Students can volunteer for focus groups to deepen our insight into the learning experience and involve students as partners in curriculum design.

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Over to you!

Have you got any great ideas, things you have tried, or what to avoid?

Questions in mentimeter

Please scan the bar code

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Questions for you!

- What resources do you use on your module?
  - Options; Textbooks, Online module materials, Screencasts or videos, Quizzes, Other
- What software platforms do you use on your modules?
  - Options; Paid for menu driven software, eg. Minitab or SPSS, Excel, Free coding software such as python or R, Matlab, other
- What ideas have you tried with your students, or are thinking of trying, or is there anything else you would like to share?

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Thank you

Any questions?

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References

Ayano, G., Tsegay, L., Gizachew, Y., Necho, M., Yohannes, K., Abraha, M., Demelash, S., Anbesaw, T., & Alati, R. (2023). Prevalence of attention deficit hyperactivity disorder in adults: Umbrella review of evidence generated across the globe. *Psychiatry research*, *328*, 115449. https://doi.org/10.1016/j.psychres.2023.115449

Stiebahl, S. (2026, March 4). *FAQ: ADHD statistics (England)*. House of Commons Library. https://commonslibrary.parliament.uk/research-briefings/cbp-10551/

Tromans, S., Clery, E., Randall, E., Morris, S., Gullon-Scott, F., Morgan, Z., McManus, S., & Brugha, T. (2025). *Autism spectrum disorder*. In S. Morris, S. Hill, T. Brugha, & S. McManus (Eds.), *Adult Psychiatric Morbidity Survey: Survey of Mental Health and Wellbeing, England, 2023/4*. NHS England. https://digital.nhs.uk/data-and-information/publications/statistical/adult-psychiatric-morbidity-survey/survey-of-mental-health-and-wellbeing-england-2023-24/autism-spectrum-disorder-1

Polanczyk, G. V., Salum, G. A., Sugaya, L. S., Caye, A., & Rohde, L. A. (2015). Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of child psychology and psychiatry, and allied disciplines*, *56*(3), 345–365. https://doi.org/10.1111/jcpp.12381