Evidencing personal and professional development on FutureLearn

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Online CPD programme

Managing Behaviour

Science of Learning

STEM Careers Learning

Technicians (2 courses)

Primary Space (2 courses)

Primary Science

STEM Ambassadors (4 courses)

Assessment for Learning (3 courses)

Maths Subject Knowledge

Practical Biology (2 courses)

Practical Chemistry

Practical Physics

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Over 20 free-to-access professional development courses for teachers of STEM subjects and STEM Ambassador volunteers

Non-subject specific

Subject and phase specific

Teaching courses 3-5 weeks

STEM Ambassador courses 2 weeks

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Open online courses for teacher professional development

‘co-learning’ (Avalos, 2011 cited by Laurillard, 2016)

‘self-directed’ (Louws, 2017)

‘sustain and embed practice’ (DfE, 2016)

Context-specific literature which underpins our approach for online teacher professional development

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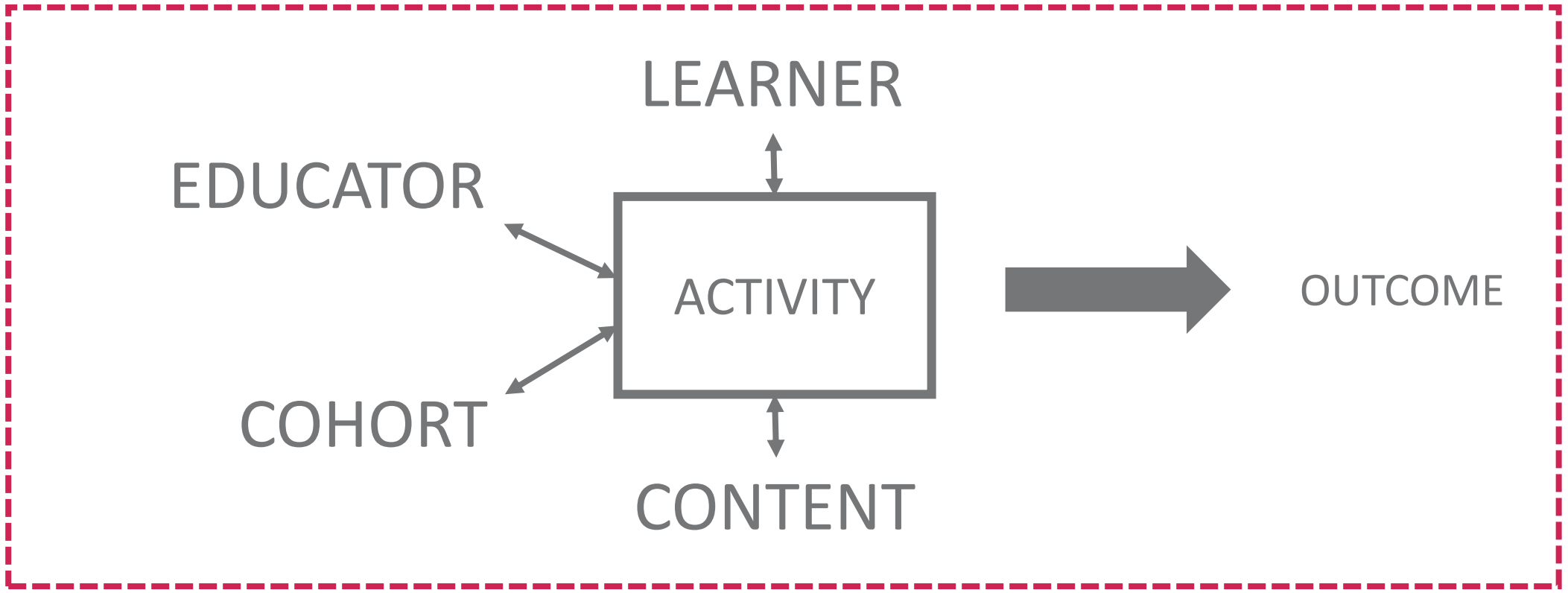
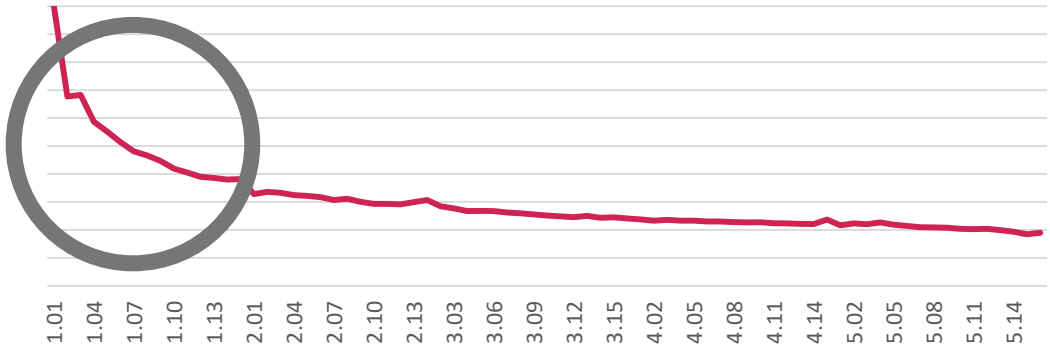
Learning design model



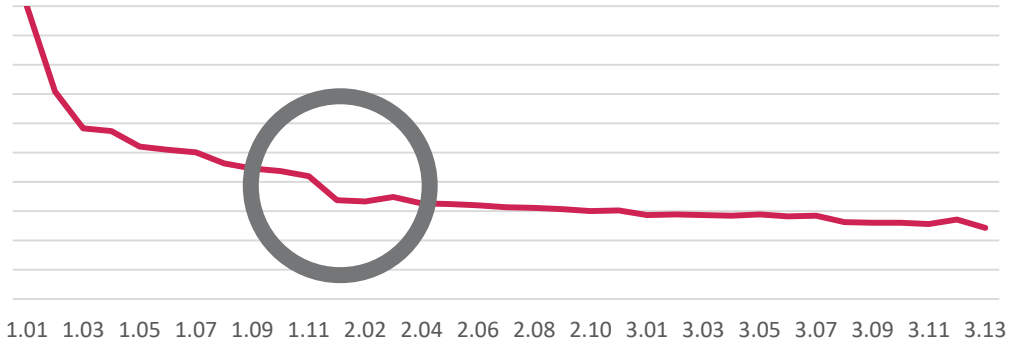
Simplified from Engeström (2001) (activity theory) and Anderson(2003) (models of interaction)

Measures of success: course retention?

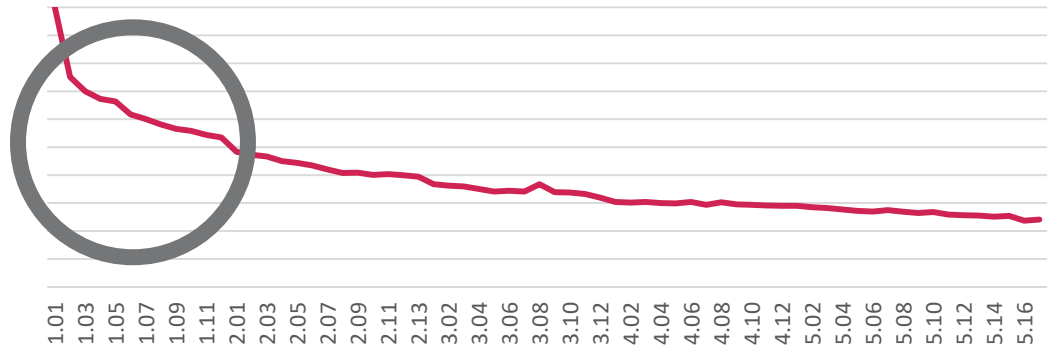
5 week non-specialist practice course



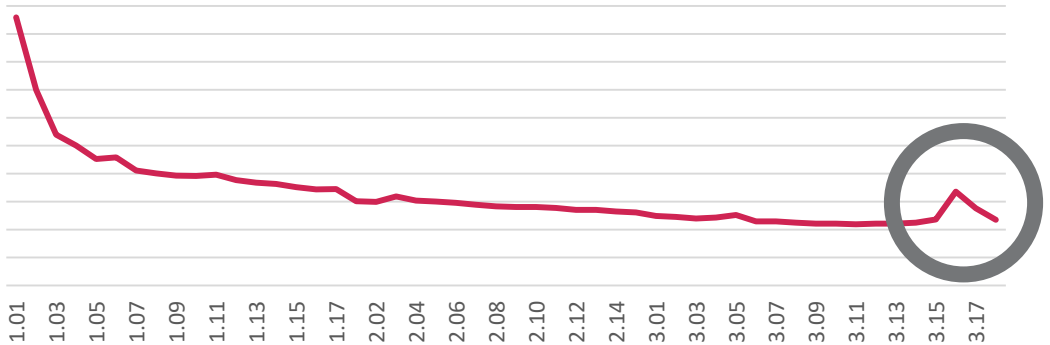
3 week subject specialist course



5 week non-specialist research course



3 week broad subject course



A few patterns, but nothing that indicates motivations, choices, learning taking place. Retention graphs show little.

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"It is not only the magnitude of data, but also the diversity of user intentions and backgrounds and the unconstrained asynchronicity of their activities that distinguish the MOOC context from conventional classrooms." (DeBoer, et al., 2014)

"First, it is interesting how many people who said they were not intending to finish the MOOC actually did (40 of 213, 19%). However, of the 191 people who reported their intention to finish the course… 125 (65%) did not." (Rieber, 2017)

Open online course success measures need to focus on outcomes

(We need to let go of retention)

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Range of learning needs

Different **approaches to practicals** to make these lessons more effective... **New style exam questions** have really exposed my students' lack of ability to apply their learnt skills in different contexts.

I want to **evaluate my current practices** and see which areas I could improve in general and to get ideas for relating the experiments to the **real world/ engaging students**.

I am a **non-specialist** and would like to improve my strategies as well as gain more **confidence** when conducting practical activities.

Teaching Practical Science: Chemistry
www.stem.org.uk/ne705

Range of learning needs

My **knowledge of approaches** to teaching practical science lessons.

Have better ideas on how to **resource my lessons**. Have more ideas on how to develop enquiry based learning in my classroom.

I would like to become more confident with teaching children to **work independently to inquire** about a scientific concept.

I'd like to gain **confidence** in **planning, resourcing and assessing** science in my own practice and also develop skills to **support my colleagues** in their own.

Teaching Primary Science: Getting Started
www.stem.org.uk/ne708

“If we were to conduct a formal evaluation of MOOCs, defining achievement in terms of intention while defining intention by action simply results in auditors achieving auditing, shoppers achieving shopping, and dabblers achieving dabbling.

It may be interesting to understand variation in user activity, but it is not helpful to ‘discover’ that the completion rate of completers is 100%.” (DeBoer, et al. ,2014)

Before/after comparison

What is your development goal / how did the course meet your goals?

Before: Confidence delivering practical science.

After: Developing more confidence in teaching practical science. Learning about more effective planning and tools. Practical ideas for the classroom. (UK teacher)

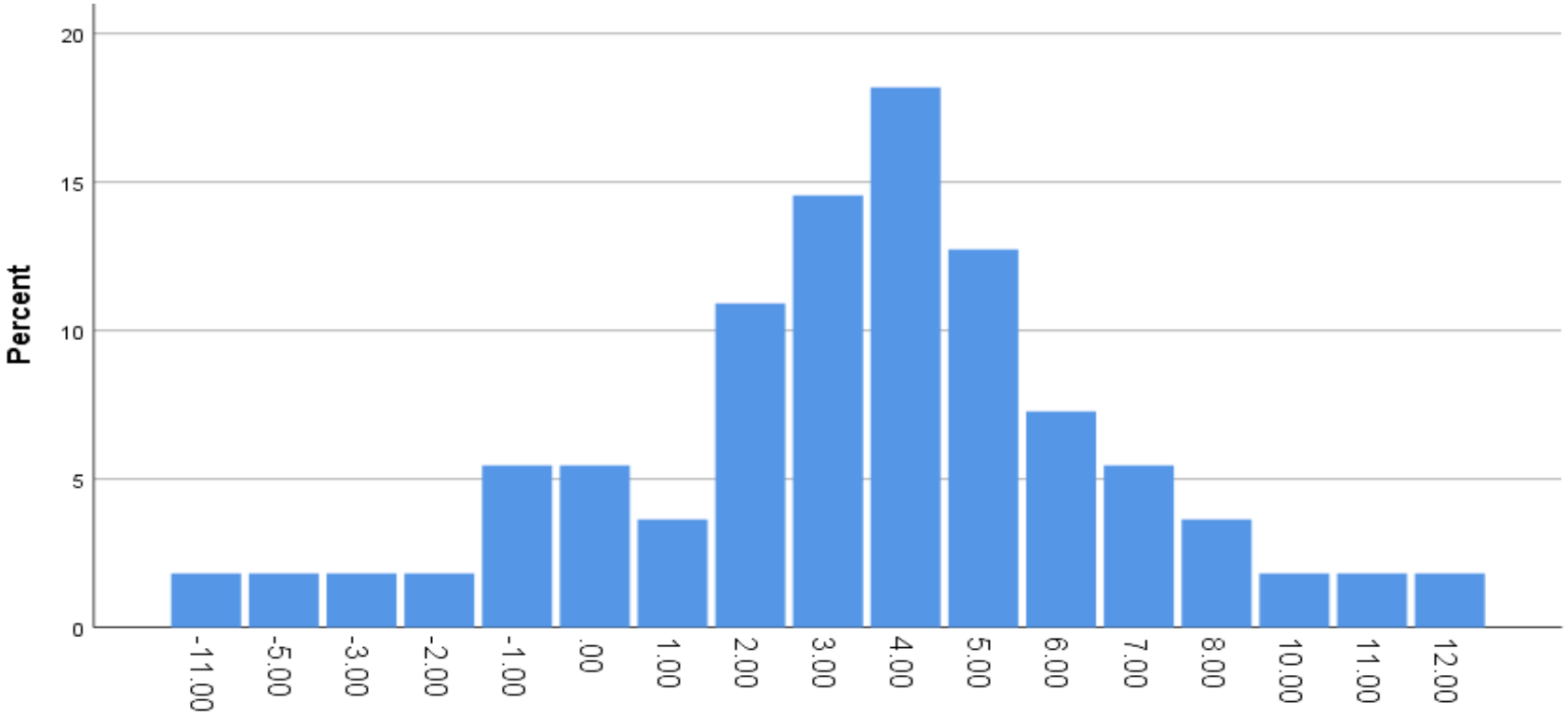
Before: Teach using a variety of inquiry skills.

After: I think it has really challenged me to build more practical elements in my science teaching lessons. (Non-UK teacher)

Teaching Primary Science: Getting Started
www.stem.org.uk/ne708

Matched outcomes

3 week subject specific course



Sum of change in responses to LO aligned self-audit (N=55 matched learners)

Overall positive change self-measured against course outcomes. NB completers only, so how do we assess personal learning outcomes throughout?

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Matched outcomes

3 week subject specific course

Changes in responses to pre/post self-audit is not determined by learner characteristics:

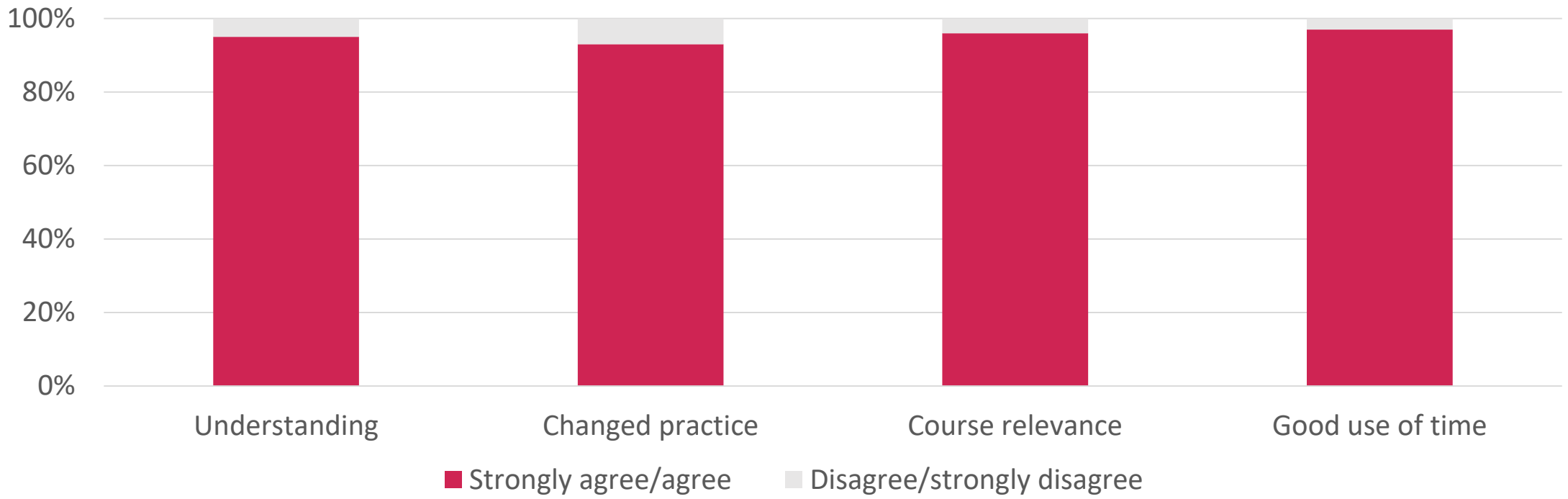
- UK/non-UK
- Having a science qualification
- Years of experience

Only statistically significant result was that those with a science qualification had more positive change in developing thinking and reasoning skills with their pupils (Mann-Whitney U=414, p=0.019; N=61)

Implication that course design is meeting broad personal learning objectives. Suggestion that those with prior science knowledge go deeper with practice.

Broad outcomes

Across programme (immediately at course end)

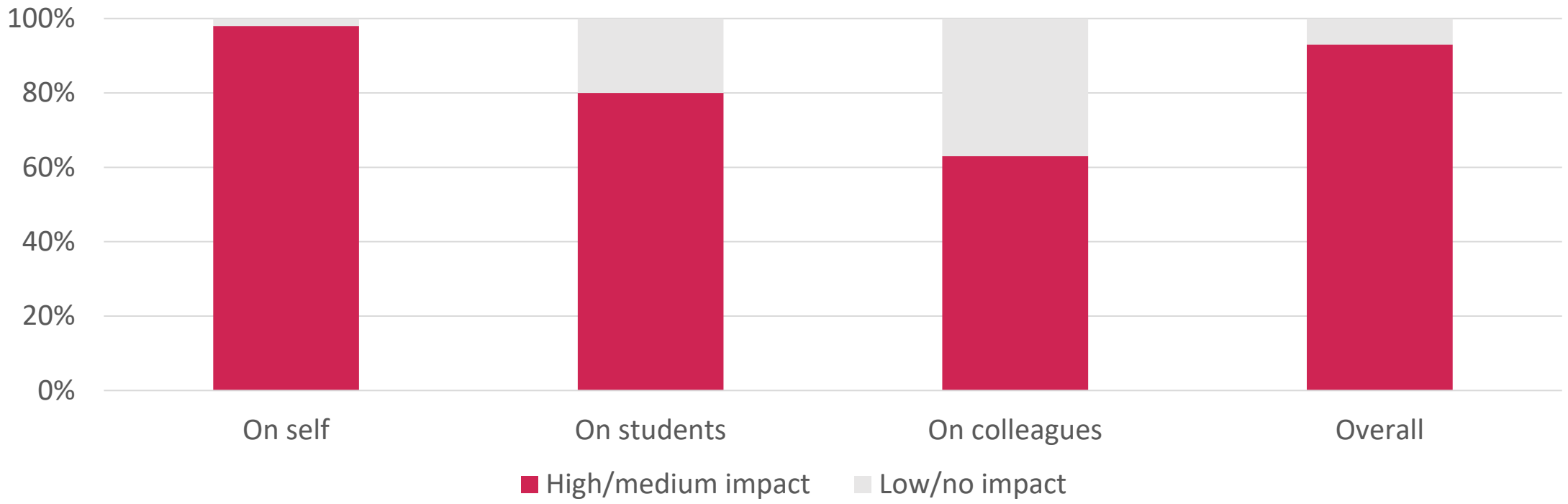


N=704 (UK only)

Across the programme, very positive results. NB completers only. How do we measure other participants?

Broad outcomes

Across programme (immediately at course end)



N=699 (UK only)

Measures of impact: Guskey (2002)

Impact measures match our face-to-face programme. Both programmes place reflection, practice and discussion as core learning activities.

Contradictions of open online course design

personal needs vs. sequence of activity
individualised timelines vs. socialisation
openness of access vs. self-efficacy of learners

See Cornock (2019) ALT-Conference Paper.

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Platform data as a proxy for learning: learner as the unit of analysis

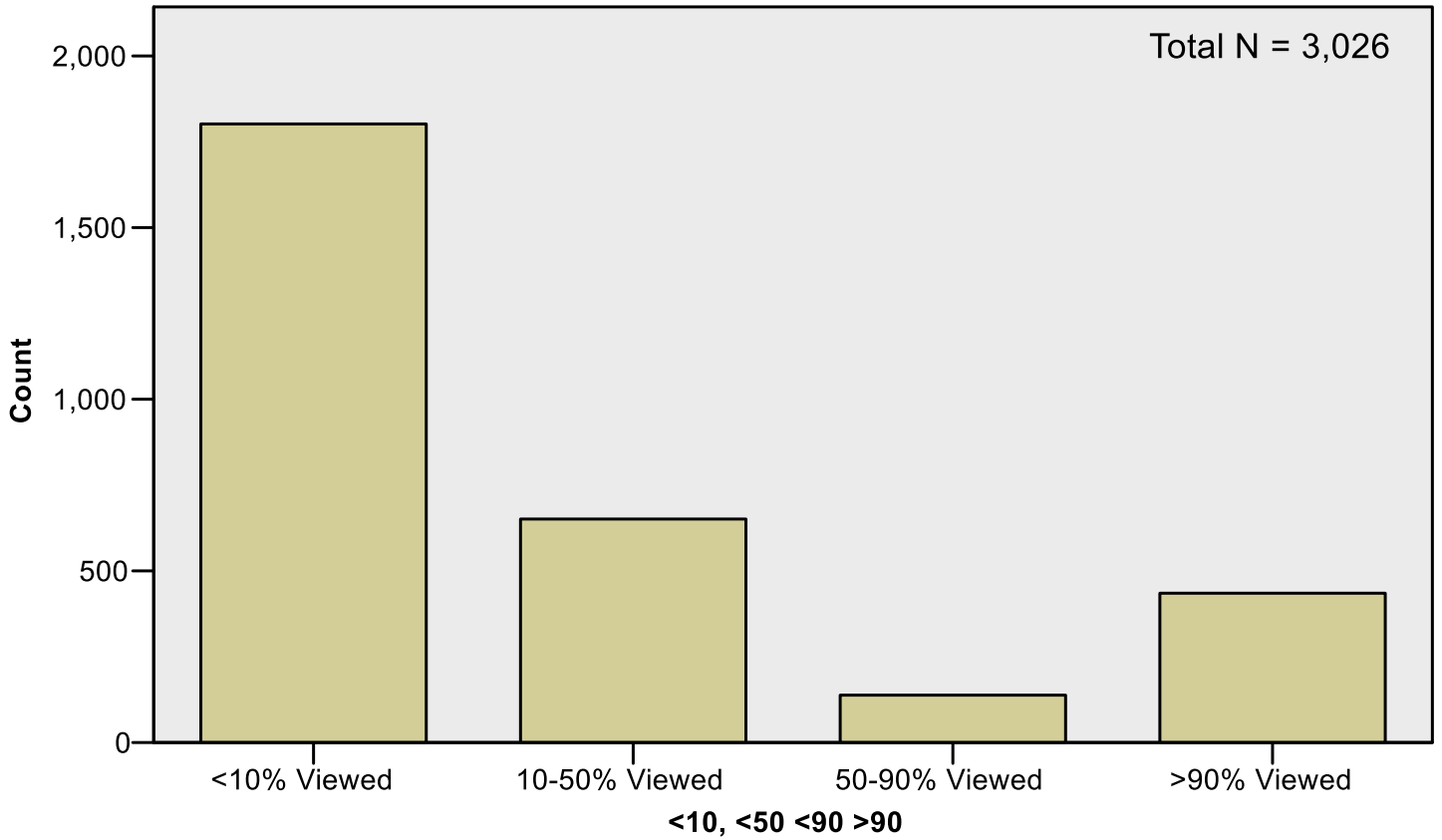
Guidance for processing FutureLearn data

http://bit.ly/32Wr5Zr

Ensure you only work with enrolments who have had a reasonable chance to complete the course, as the FutureLearn data set stops recording at a certain point. For example, don't work with enrolments later than the last data date in the FutureLearn step data set minus the course duration. Also filter out learners who appeared to access the course before start date (reviewers) and course team. Note also on invite-only courses, most learners do not have country detected.

Grouping learners

Total step view percentage



Graph represents total number of steps viewed (not necessarily viewed in order)

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Course-level learning activity

5 week non-specialist teaching practice course

Typical analysis is at the course level, exploring relationships between data available.

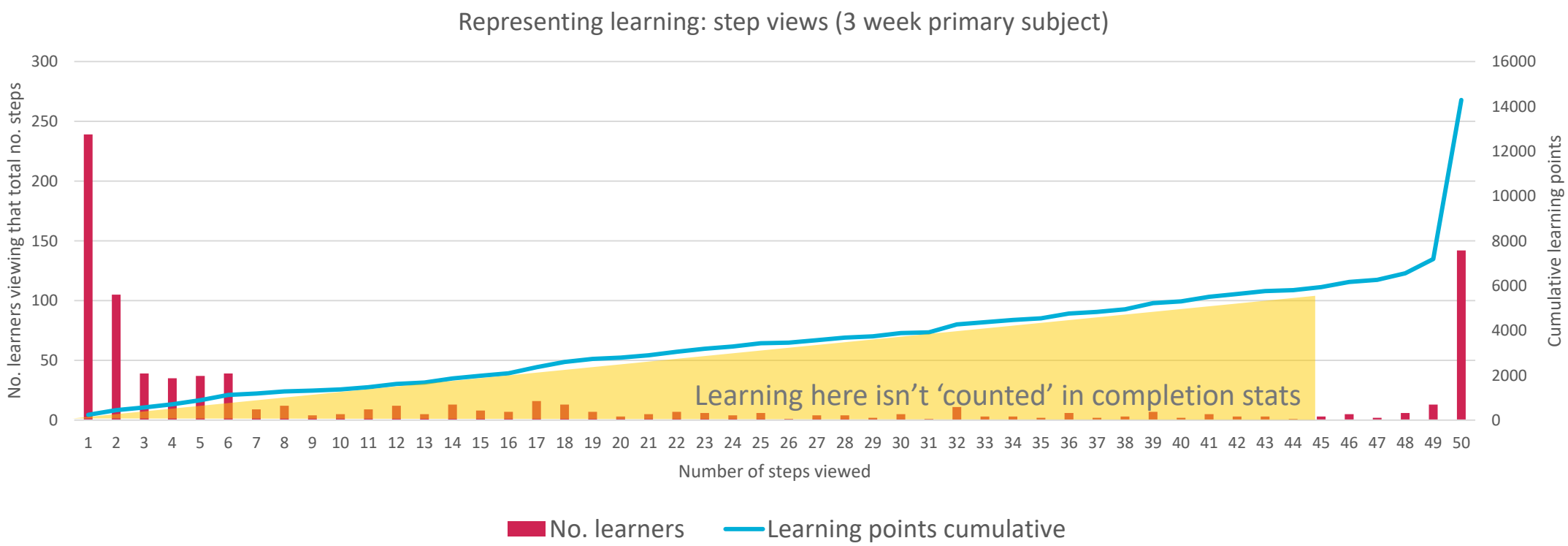
However, some of these (red) are dependent by their definition, leading to questionable conclusions.

Steps visited correlations	**Spearman's Rho**
Steps completed	0.937**
Comments per step visited	0.409**
Comments with replies	0.369**
Enrolment date (0=course start date)	-0.168**

**p<0.001

Swinnerton et al. (2017) noted that commenting is related to step view/completion and not independent. Course completion is not a useful measure.

Representing learning: step views



Learning opportunities can be represented by the individual step views. Up to half of step views are not made by completers, so how do we represent their learning?

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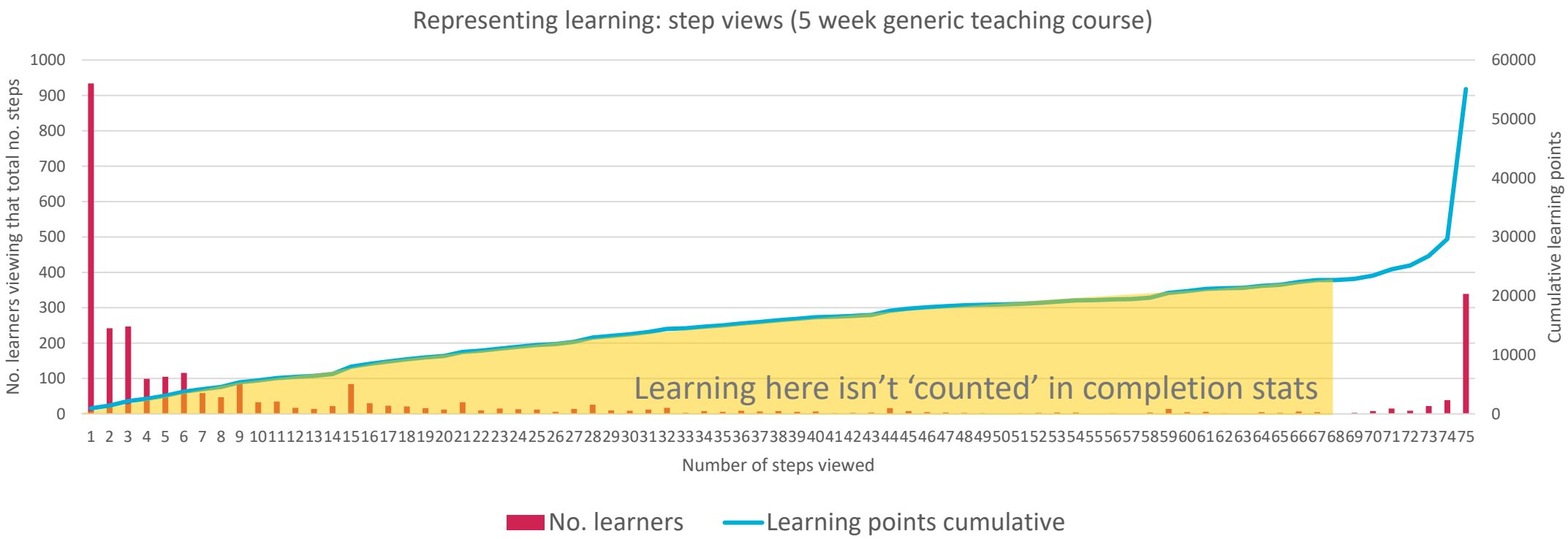
Representing learning: step views



The same patterns are seen on longer courses. Up to half participants step views are not considered as most analysis focuses on completers.

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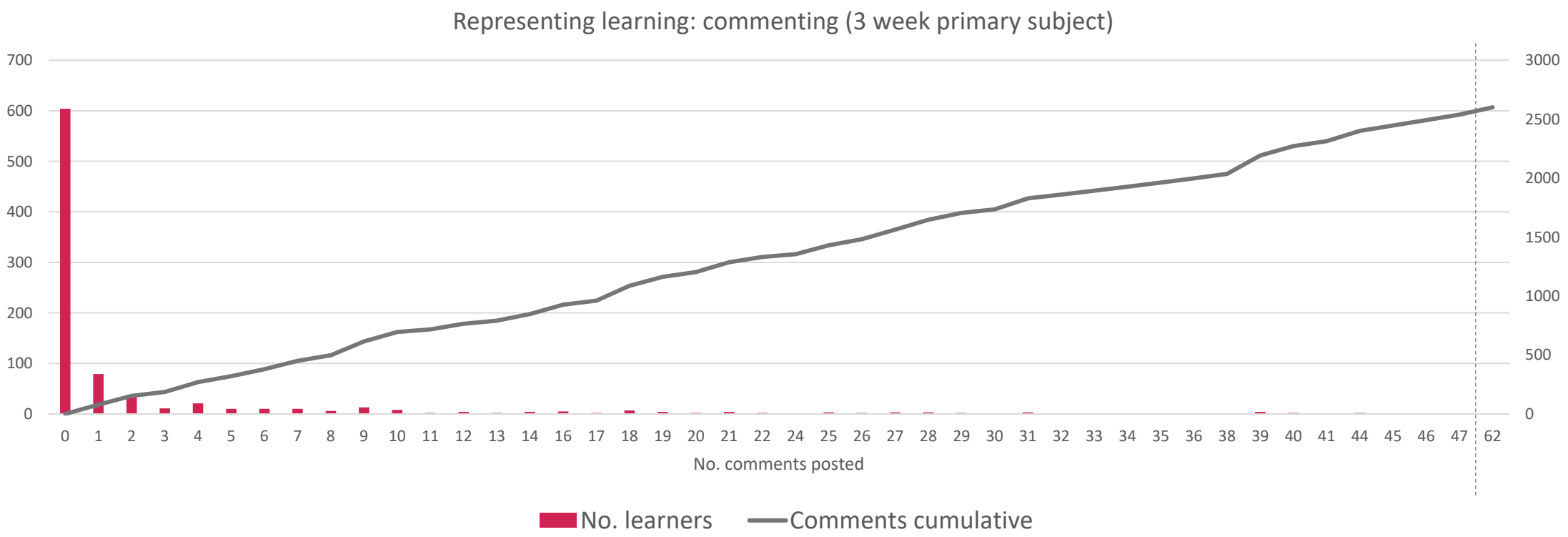
Representing learning: commenting



There is a long tail of commenting, with few people contributing most posts. What social learning takes place for those who don't comment?

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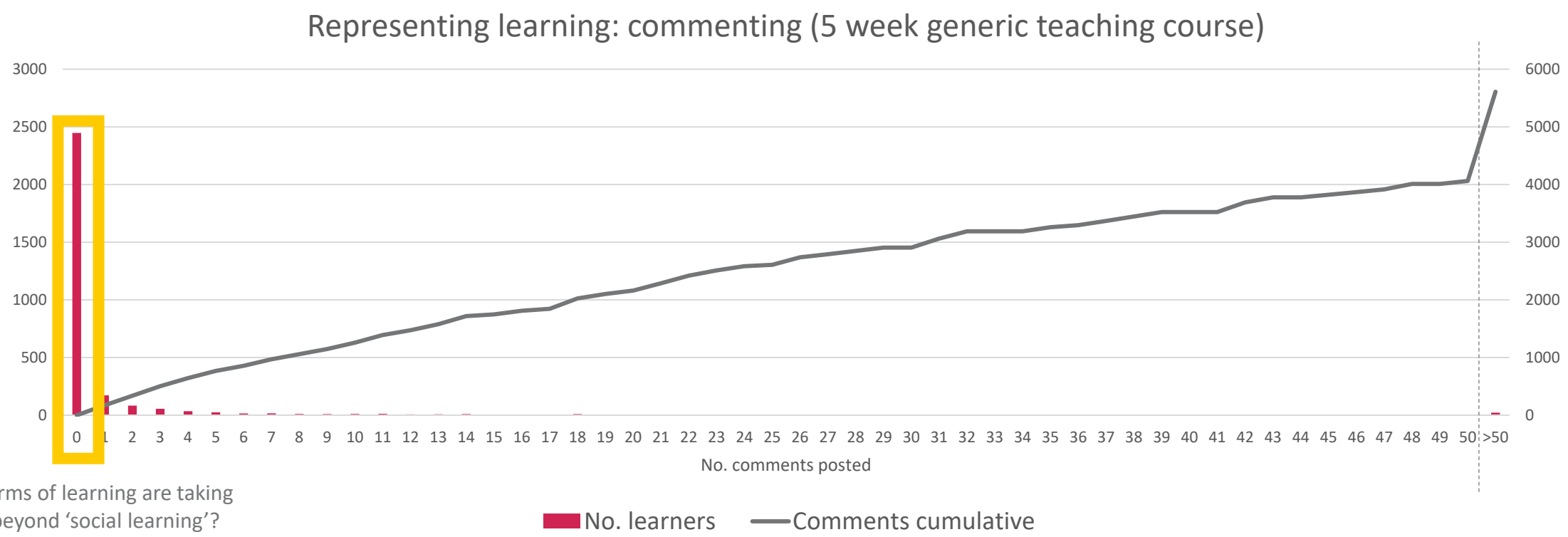
Representing learning: extreme commenting



What forms of learning are taking place beyond 'social learning'?

Particular extremes where an individual had 124 comments. In literature, social learning is still asserted, even though most learners don't comment.

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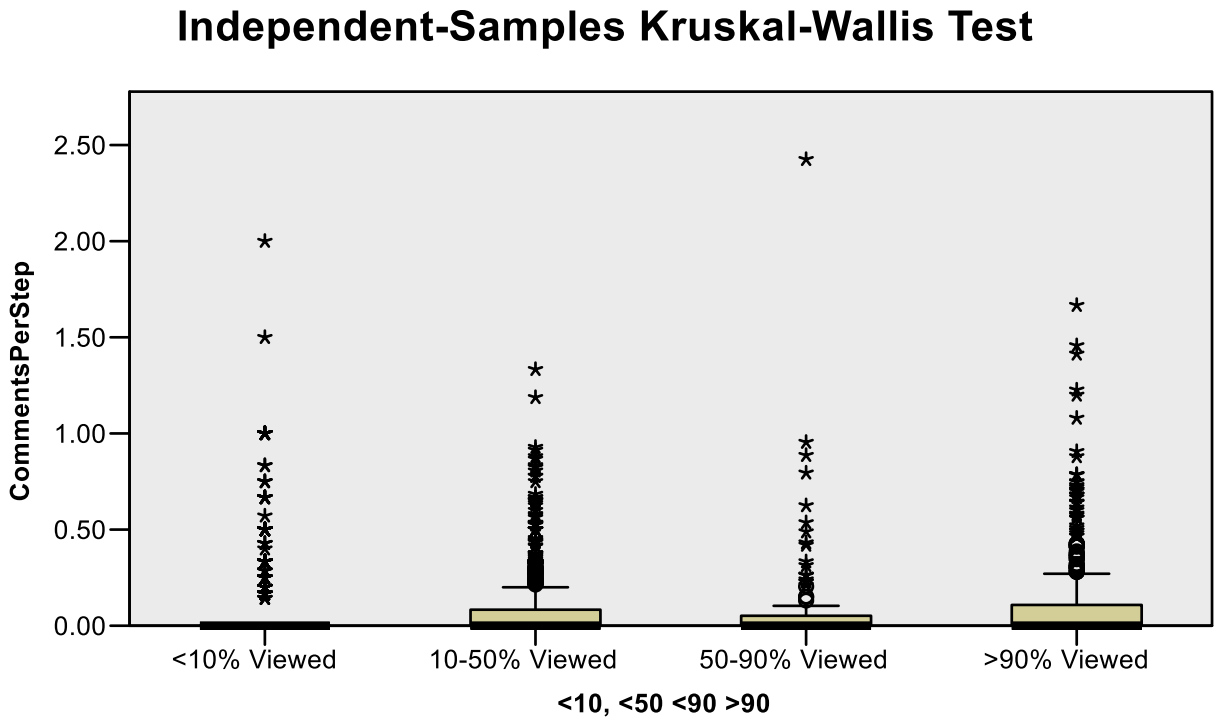
Patterns of mean comments/step visit



Between groups significant difference p<0.001 except for 10-50% -- 50%-90% (p=0.361), 50-90% -- >90% (p=0.725).

Grouping by completion, and a less dependent variable of comments/step visit, the difference only presents through extremes, not the 'middling' groups.

Our learners should be supported to learn and develop

‘flexible around work’

‘sharing’

‘try out new ideas’

‘rethink practice’

Our learners (completers) show how the course challenges their practice, the types of learning they undertake. How can we better support all learners, to extract what they need from the course to meet their own learning outcomes, even when what they need may be in later weeks?

Enabling professional development learning

"Love the structure - **bite-sized pieces**, and very useful **discussion** from participants. I'm new at teaching biology, feeling much more **confident** about planning."

"**Seeing the practical aspects** of this and exploring the comments and activities suggested by this **learning community** has been superb."

Teaching Practical Science: Biology
www.stem.org.uk/ne707

Some of our learners understand the online learning process.
We need to enable more to make the most of the course.

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Learning cannot exist solely online

(Professional learning sits within a practice context)

Making more of the course also includes learners realising that our course learning objectives sit within our context, and for their own practice, learners need to translate the course and undertake activities to address their practice context. Some of the learning should be offline, we can't capture that, but we could look at how learners are selecting parts of the course to complete.

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Course rhythms and learning routines

Most participants will take the course in a linear pattern.

Very few participants will start elsewhere than at the beginning.

Are learners bound by expectations of linear courses?

Linearity of step views

Linearity represented as difference between a learners' order of step views compared to a linear order through the course.

1.1, 1.2, 1.3 = 0 + 0 + 0 = 0

1.1, 1.4, 1.2 = 0 + 2 + |(-3)| = 5

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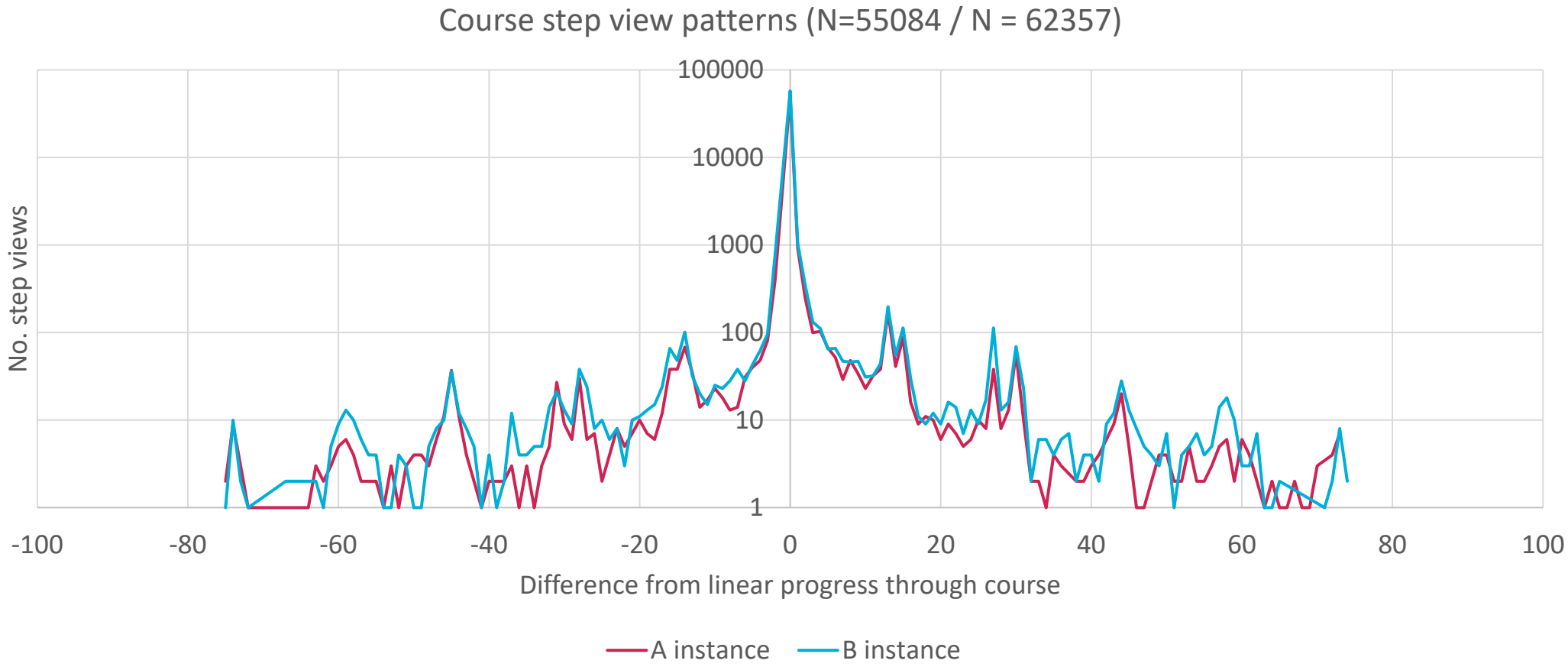
5 week non-specialist teaching course step view linearity

Each learner step view represented



The graph above shows that most learners, by several magnitudes (note log scale), adopt linear learning.

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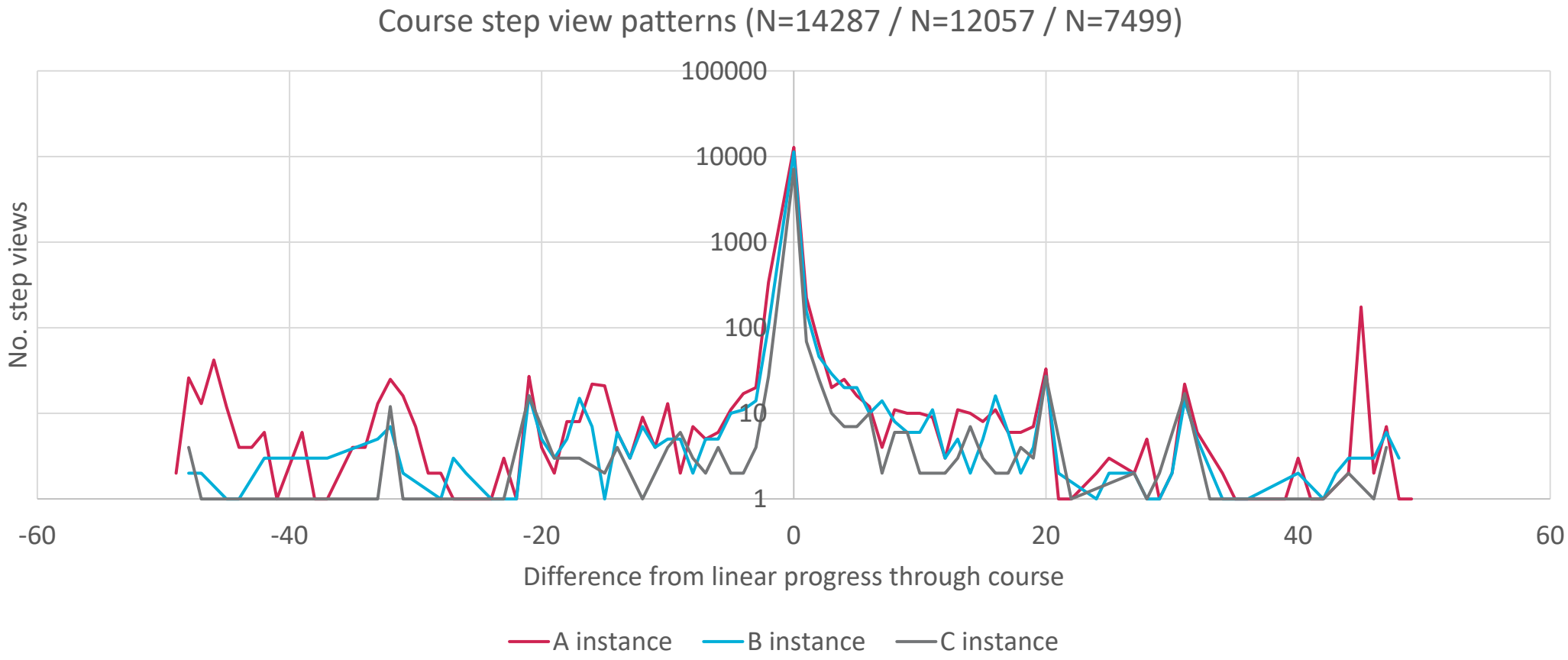
3 week subject specific teaching course step view linearity

Each learner step view represented



Some courses may show minor differences between runs, but is there any significant difference?

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What might influence non-linearity?

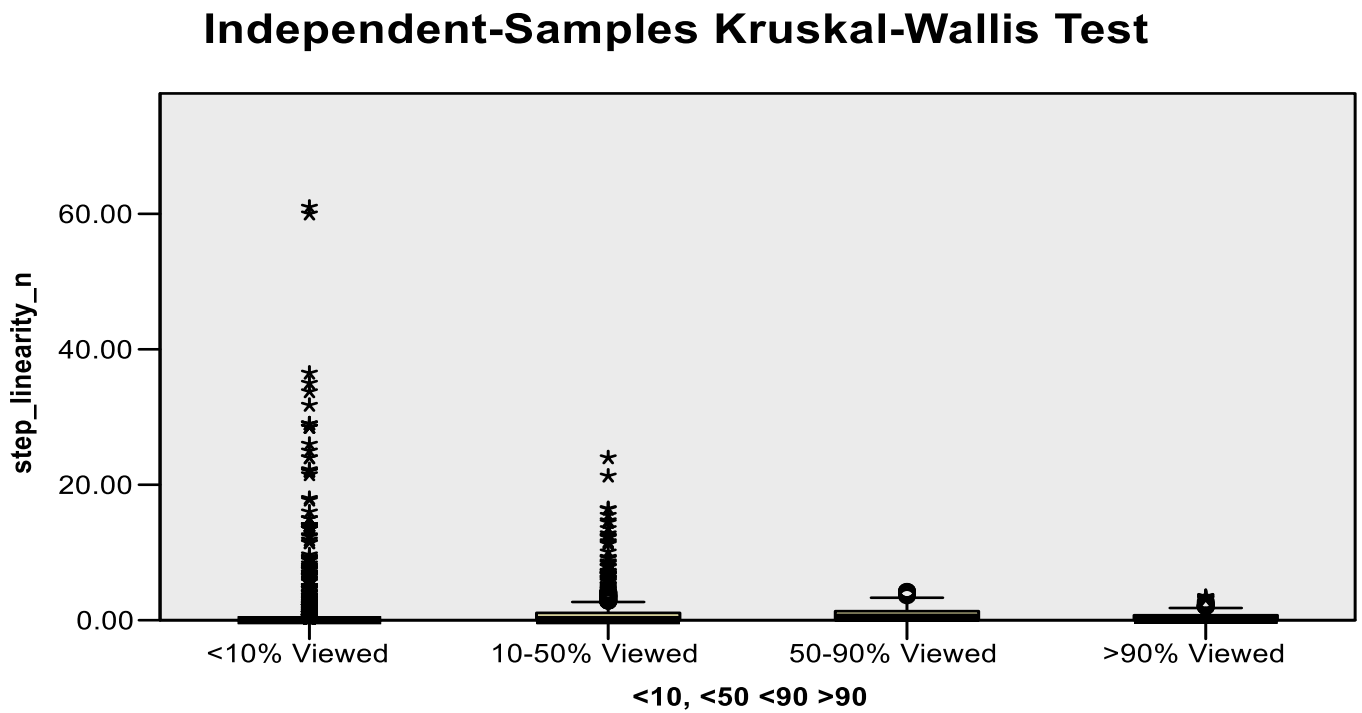
Self-audit responses	Non-linearity (mean abs)	UK	Non-UK	UK non-educator	Non-UK non-educator	UK without science qualification	Non-UK without science qualification
A instance (N=398)	1.7	61.1%	38.9%	9.9%	16.1%	13.8%	44.6%
B instance (N=344)	0.6	61.9%	38.1%	13.1%	10.7%	12.5%	41%
C instance (N=286)	0.6	50.3%	49.7%	14.6%	20.4%	19.7%	43.8%

The above figures come from our pre-course self-audit for three instances of the same course, showing little difference in characteristics leading to more non-linear behaviour for the first instance. UK/non-UK difference (from FL dataset) show difference for absolute values only across all instances. The A instance was at the start of the academic year, perhaps this influenced the non-linearity.

Primary science course across three instances A, B and C: absolute value linearity significantly different (Kruskal-Wallis, $p<0.01$); linearity not significantly different (ANOVA $F=0.204$, $p=0.816$). No significant difference in linearity based on UK vs non-UK (Independent Samples t-test $t=1.127$, $p=0.260$); absolute value linearity significantly different UK vs non-UK (Mann-Whitney $U = 124\text{x}10^6$, $p=0.009$).

Patterns of viewing linearity

Linearity represented as mean absolute value difference between viewed sequence of steps and linear sequence



Between groups significant difference p<0.001 except for 10-50% -- >90% (p=0.080), >90% -- 50-90% (p=0.099).

Again the extremes show differences, but linear completion very strong above 50% viewing.
The number of non-linear viewing past the first week is still very low, most dropping out in the first week.

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Where next?

How do we best enable learner self-efficacy?

How do we design activities that meet goals?

How can we evaluate the hidden learning?

References

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