A Survey of the Learning Behaviour of Open University students

Other

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Learning Innovation, Technology Enhanced Learning

Abstract

This survey forms a crucial part of research completed by the Learning Innovation team to gain a deeper understanding of the underlying study habits and learning behaviour of Open University (OU) students to inform the future development of systems, tools and platforms.

This research validates the themes that emerged from the previous report, 'Study behaviours in an increasingly digital world: Learning habits, top tips and 'study hacks' questionnaire survey' (Ellis, Gallagher and Peasgood, 2017). Analysis carried out on the data from that survey revealed eight possible learning behaviours that underpinned the student responses. In order to validate those original findings a new survey was designed. This report explains the findings of that survey.

The survey consisted of 55 behavioural and attitudinal statements aligned to the learning behaviours, some of which were based upon survey instruments from the literature. Survey statements were written to explore each of these on a five-point scale ('Very true for me' to 'Not at all true for me') in order to identify the concepts that describe the behaviours and preferences of OU students through a process of Principle Component Analysis (PCA). In addition, the survey included questions to inform the analysis and explore potential confounding factors: accessing OU content, access to the web, and technological self-efficacy. The technological self-efficacy statements were selected from the OU's Digital Competency Framework for Level 1 students. The survey was peer reviewed and piloted, before being sent to a generalised student population. The overall response rate was 12.7% with 524 valid responses received.

Seven clear learning behaviours were identified through PCA, and a cluster analysis of the data was carried out. These learning behaviours are:

- Goal-setting
- Time
- Focus
- Note-making
- Digital-preferred
- Help-seeking
- Elaboration

Contents

1. Introduction

1.1 Aims and objectives of the Learning Behaviour survey

This research validates the themes that emerged from the previous report, 'Study behaviours in an increasingly digital world: Learning habits, top tips and 'study hacks' questionnaire survey' (Ellis, Gallagher and Peasgood, 2017).

That research sought to understand Open University (OU) students' current study behaviours, and the analysis produced a number of interesting personas:

> digital connector: wants online interaction with others; wants OU online interaction functionality beyond current provision
>
> digital seeker: seeks out digital information; uses websites beyond OU module, outside OU
>
> digital as clutter: states that website is too cluttered; too much digital information
>
> digital as distraction: switches off device or app; closes tabs onscreen; avoids online interaction
>
> digitally limited: can't access internet when required; connectivity issues affect studies

The validation survey was designed to explore these themes from a larger sample of OU students and provide descriptions of OU student learning behaviour and preferences that could improve the university's digital provision.

Eight initial themes were identified from the personas. Survey statements were written to explore each of these on a five-point scale ('Very true for me' to 'Not at all true for me'). Some statements were based upon survey instruments from the literature. The full survey is presented in Appendix 1, showing how the statements and questions relate to the initial topics, which are listed in Table 1.

Table 1 Pilot survey design based upon eight initial topics

Initial topic description	**Origin of survey statements**
Help-seeking (A) (includes connecting with other people)	4 items from Kizilcec et al. (2017b) Added item about digital/f2f
Elaboration (B) (includes information seeking)	3 items from Kizilcec et al. (2017b) Added item about digital/f2f Also see Wang et al. (2013)
Goal-setting (C)	Adapted 4 items from Kizilcec et al. (2017b) to cover task or time focus in study session
Time-management (D)	Adapted 7 items from Wang et al. (2013)
Focus (E) (reduce distractions, whether regular location)	Adapted 7 items from Wang et al. (2013) and added new items

Note-making (F)	Wrote new items based upon previous study
Digital or paper (G)	Wrote new items to explore issues raised in previous study about which is the main priority
Assessment (H)	Wrote new items to explore differences in behaviour when preparing for an assignment, project or exam

In addition, the initial survey design included questions to inform the analysis and explore potential confounding factors: accessing OU content, access to the internet and technological self-efficacy. The technological self-efficacy statements were selected from a list of Level 1 digital skills used by the OU.

The initial survey was peer reviewed before being piloted with the OU's Curriculum Design Student Panel. Thirteen replies were received, which included feedback from the students about the survey design as well as responses to the pilot questions. After the pilot, the survey instrument was modified. 'Digital or paper' was renamed 'digital-preferred.'

1.2 Sample and response rates

The live online survey ran from 11 October to 8 November 2017. Of the 606 responses, 82 had missing data in Questions 1 to 7, rendering them invalid for cluster analysis. The analysis was carried out on the remaining 524 responses, two of which had a single missing data point in questions 8 to 10.

The overall response rate was 12.7%. The initial sample was compiled from four separate samples: new undergraduate, continuing undergraduate, new postgraduate and continuing postgraduate.

Table 2 summarises response rates for each of these subsamples.

Table 2 Response rates

Sample and responses	Sample count	Total response count	Total response rate	Valid response count	Valid response rate
Whole cohort	*4777*	**606*	*12.7%*	*524*	*11.0%*
New undergraduate	2000	188	9.4%	161	8.1%
Continuing undergraduate	1200	139	11.6%	119	9.9%
New postgraduate	720	105	14.6%	90	12.5%
Continuing postgraduate	857	173	20.2%	154	18.0%

* One response had missing data in the new/continuing field, level field and in Questions 1 to 7

The response demographics were compared with the general OU student population[1]. These differences raise questions about the extent to which general conclusions can be drawn from this data. In particular, the higher proportion of older and retired learners needs to be noted when

[1] Details are available in Appendix 2

planning for the future. There were some differences that are worth noting. Compared with the general OU population, the survey data has:

- a higher percentage of women
- a higher percentage of students over 45 and over 55
- a higher percentage of students with previous educational qualifications at HE or higher
- a higher percentage of students who are retired
- a higher percentage of students with motivation 'mainly for personal development'
- a lower percentage of students under 25
- a lower percentage of students with previous educational qualifications at A-level or less
- a lower percentage of students in low Social Economic Segment.

To mitigate the effects of this bias, analysis was carried out for various subsamples in addition to the whole cohort. These are described in Sections 3 and 4.

2. The seven learning behaviours for the whole cohort

The behavioural and attitudinal survey questions were based upon the initial themes, which were suggested from Ellis et al. (2017). The current survey was designed to explore which concepts best describe the behaviours and preferences of students, through a statistical process. Principal Component Analysis[2] (PCA) was carried out to extract the main components that described the variability in the data. This analysis produced a list of seven learning behaviours, with their abbreviations shown in capitals:

TIME	Time
NOTE	Note-making
HELP	Help-seeking
GOAL	Goal-setting
FOCUS	Focus
ELAB	Elaboration
DIGI	Digital-preferred

These replace the eight initial themes derived from the personas identified in the previous study. Some concepts are similar to the themes, others combine elements from different themes.

Note that following the PCA assessment no longer appears as a separate entity. Some aspects of assessment were combined into other concepts, some aspects were found not to be relevant in describing the variability. This may be due to the ubiquity of assessment as a student experience, so all students have similar experiences, thus 'assessment' doesn't feature in measures of variability. The results of the assessment questions are discussed in Section 2.3.

2.1 Interpreting the seven learning behaviours concepts in terms of the survey questions

The seven learning behaviour concepts are described in more detail below, with the statements in the survey that relate to them. For each statement in the survey, the student responded on a scale from 5 for 'Very true for me' to 1 for 'Not at all true for me'. Each concept score combines the

[2] Details are available in Appendix 3

responses for the relevant statements. These are discussed in more detail below. Note that a concept score can be calculated for each student, for a group of students, or for the whole cohort.

Chart 1 shows the mean values of the concept scores for the whole cohort (TIME01 etc). For ease of interpretation, the concept scores have been standardised so the maximum possible score is 1 and the minimum possible score is 0. On average, students have low scores for DIGI and HELP, high scores on ELAB, and moderate scores for the other concepts.

Chart 1

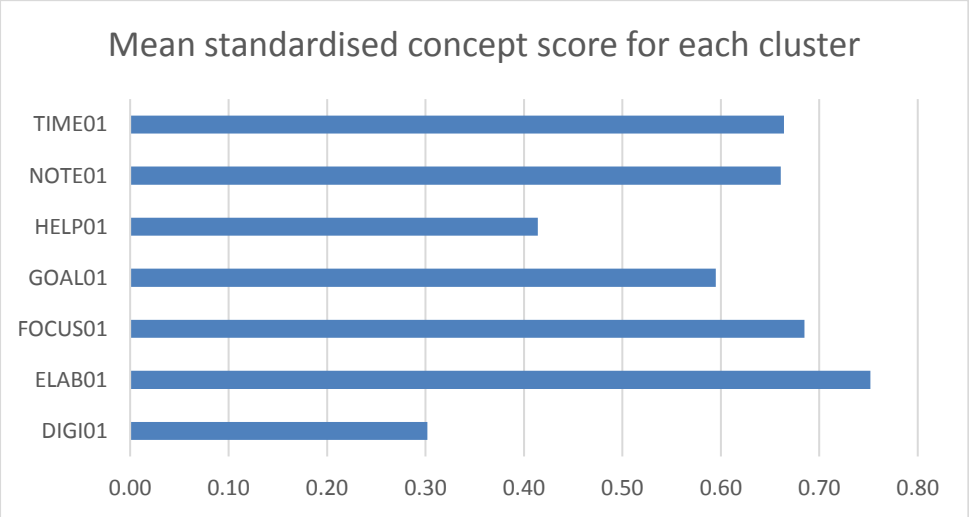


Table 3 Key to concept score interpretation

Concept score (or mean score)	Responses contributing to this score
1	All responses 'very true for me'
0.75 to 1	
0.75	All responses 'true for me'
0.5 to 0.75	
0.5	All responses 'quite true for me'
0.25 to 0.5	
0.25	All responses 'sometimes true for me'
0 to 0.25	
0	All responses 'not at all true for me'

GOAL Goal-setting

A student with a high GOAL score has a tendency to set goals and plan ahead. All the contributing statements, listed below with their abbreviations, describe student behaviours. The statement abbreviations are useful for understanding the PCA results.

A high score on these statements contributes to a high GOAL score:

I set goals to help me manage study time for my learning.	time goals
I set short-term (daily or weekly) goals as well as long-term goals (for the whole module).	short long goals
I set realistic deadlines for learning.	deadlines

I plan each study session to work on a specific task.	session task
I set personal standards for performance in my learning.	personal standds
I plan my study to match the needs of the assessment.	plan assess
I make good use of my study time.	good use time

TIME Time

Students with a high TIME score prioritise time to spend studying. They tend to keep to a study schedule and keep up with the work for the module. This concept has aspects of time-management ability, although the statement about 'other activities' touches upon some factors that may be beyond the student's control. For example, other activities may be childcare or employment.

Note that some questions relating to TIME asked about negative factors ('no time to review' etc.), so those contribute a negative value to the TIME score. For example, a student who responded 'Very true for me' to the statement 'I find it hard to stick to a study schedule' scores minus 5 towards the TIME concept.

I often find that I don't spend very much time on my module because of other activities. (negative)	other activities
I rarely find time to review my notes or readings. (negative)	no time review
I find it hard to stick to a study schedule. (negative)	hard stick sched
I make sure that I keep up with the readings and assignments for my module.	keep up

FOCUS Focus

A student with a high FOCUS score tends to avoid clutter and distraction, including online. The statements generally relate to behaviours, although 'I have a regular place set aside for studying' could be an environmental factor. Not all students have a regular place due to their living or working situation, for example someone in a busy family home, or someone who travels extensively for work. This new concept includes aspects of the original themes 'digital as distraction' and 'digital as clutter'.

I usually choose to study in a place where I can concentrate on my course work.	concentrate
I avoid websites that are cluttered with many features on each page.	avoid clutter
When I want to concentrate, I avoid communicating with other students online (forums or social media).	avoid online
When I study online, I mainly use the OU module website.	mainly OU
When I want to concentrate, I only open the webpages I need for studying.	only web I need
I have a regular place set aside for studying.	regular place

NOTE Note-making

A student with a high NOTE score tends to make notes. This concept includes physical storage of notes. Digital storage of notes is included in the concept 'digital preferred'. The two statements about reading guidance for assessment on paper or digitally cover both digital and physical media, with different signs. A preference for reading assessment guidance on paper will contribute to a high score for NOTE.

I make handwritten notes as I study material for the first time.	handwrite notes
I read my own notes mainly on paper (handwritten or printed out).	read note paper
At the end of my module, I will physically store the notes and work I have written (on paper including printouts).	store physical
When I am studying, I make a note of where to find information I will need for the assessment.	note assess
When I am studying material for the first time, I make a note of sections I want to come back to later.	note to return
When I am working on an assessment, I read the questions and guidance on paper (including printouts).	assess paper
When I am working on an assessment, I only read the questions and guidance on screen (no paper or printouts at all). (negative)	assess digi

DIGI Digital-preferred

A student with a high DIGI score tends to use digital technologies or media. The survey explored alternative media and technologies for carrying out tasks. Use of digital technologies is the main feature of this concept. This may be instead of physical technologies, or in addition to them.

I make digital notes as I study material for the first time.	digi notes
I read my own notes mainly digitally (on screen).	read note digi
I use a digital tool or digital document (on screen) to plan my goals.	digi goal
I use a digital tool or digital document (on screen) to organize my study time.	digi organize
At the end of my module, I will digitally store the notes and work I have written (on screen).	store physical

HELP Help-seeking

A student with a high HELP score tends to connect with other people for support with their studies. Help-seeking may be online or face-to-face, and may include peer or OU support. This is about connecting with other people to support study. A student who prefers to work alone would have a lower HELP score, as that statement has a negative contribution.

When I do not understand something, I ask others for help.	ask help
I ask others for more information when I need it.	ask info
I try to identify others whom I can ask for help if necessary.	identify helpers
I ask for help from other students online.	ask online
Even if I am having trouble learning, I prefer to do the work on my own. (negative)	prefer alone

ELAB Elaboration

A student with a high ELAB score tends to seek information and relate new ideas to ones already known. This concept includes aspects of the original theme 'digital seeker', which was about looking for information online. Elaboration is primarily about information. In contrast, help-seeking is about people.

I try to apply my previous experience when learning.	apply exp
When I am learning, I try to relate new information to what I already know.	relate new to old
When I am learning, I combine different sources of information (for example: people, websites, printed material).	combine info
When I am learning, I look for information online beyond what is available from Open University websites.	beyond OU

2.2 Interpreting the learning behaviour concepts

When interpreting the learning behaviour concepts, care is needed to distinguish between the patterns in the responses and the patterns in the concepts. The response to each statement was scored as shown in Table 4.

Table 4 Key to score for each question

5	Very true for me
4	True for me
3	Quite true for me
2	Sometimes true for me
1	Not at all true for me

Appendix 4 is a summary of results for each question, sorted with highest scores listed first (for the 524 responses used in the analysis).[3] The 'Interpretation of score' column suggests how to translate the mean concept score into a statement from 'very true' to 'not at all true' for me. Some scores lie between two scale categories, so a range of interpretations is suggested. The concept column shows

[3] These are the means of the raw scores. Elsewhere in this report, the scores are standardised to a 0 to 1 scale.

which responses have been extracted to which of the concepts for the whole cohort. A negative sign indicates scores that are subtracted from rather than added to the total score for that concept

Concept scores show which response scores vary in a similar way in the data. Mathematically, the concepts are orthogonal, with minimum correlation between concepts. So, scores on the statements for one concept mainly affect that overall concept score. They do not have much effect on the scores on other concepts, although there will be a small contribution.

Statements not allocated to a concept did make enough of a contribution to the variability of the data to be included. For example, most students responded 'very true' or 'true' to 'When I am working on an assessment, I reread the relevant sections of the module'. The variation between responses was too small for that statement to be included in a concept, probably because this experience is common to many students. But it is still useful information when discussing student behaviour and preferences.

As an example of a statement that was allocated to a concept, many students responded 'very true' or 'true' to 'I try to apply my previous experience when learning.' For this statement, however, there was sufficient variation between responses to show a similar pattern to 'When I am learning, I try to relate new information to what I already know,' and all the other statements allocated to ELAB.

The responses to 'I usually choose to study in a place where I can concentrate on my course work,' showed a different pattern, so that statement was allocated to a different concept, called FOCUS. 'At the end of my module, I will physically store the notes and work I have written (on paper including printouts),' showed different pattern again, so that statement was allocated to a different concept, NOTE.

The concepts show patterns of similar variability in the data. In isolation, they do not show whether that was all high scores, all low scores or a mix of high and low. For example, the concept DIGI combines scores from five statements. Looking at the last few rows of the table in Appendix 4 reveals that mean scores on four of these statements were low, in the region of 'sometimes true 'not at all true for me.' So, interpretation of DIGI concept scores needs to be considered in this context.

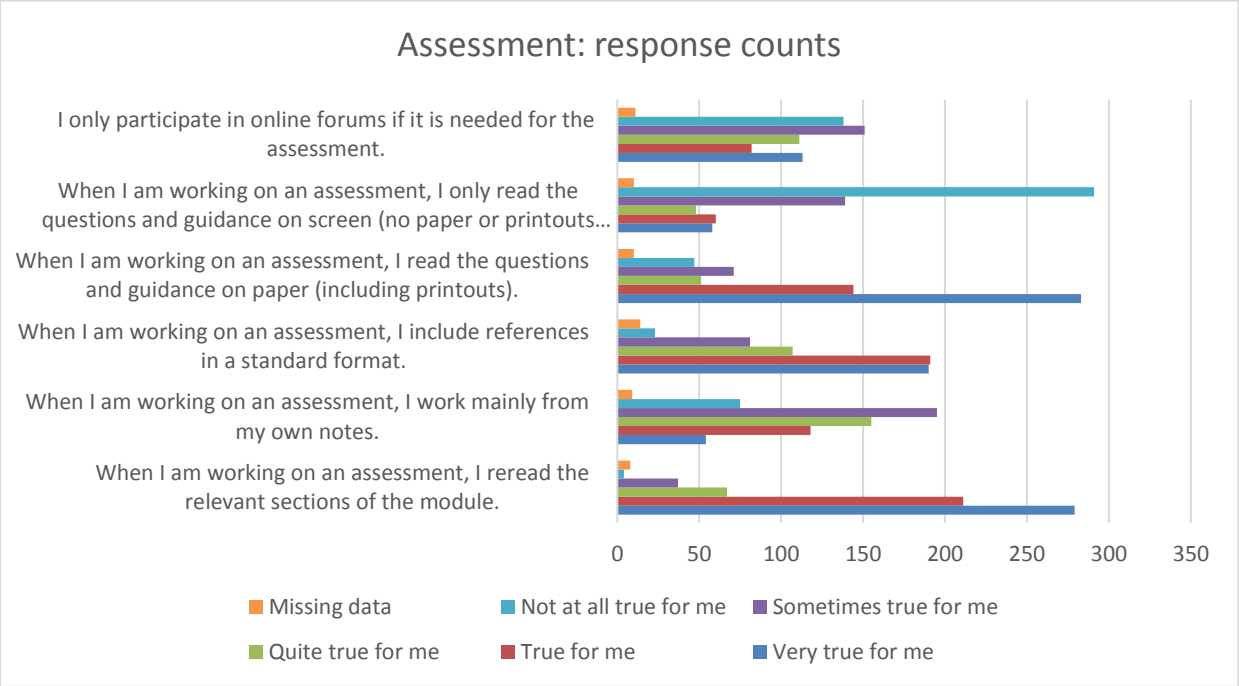
2.3 Statements about assessment

Some of the survey statements about assessment were not included in the seven concepts. Chart 2 summarises those responses. The horizontal scale shows the number of responses in each category (response count). The PCA identifies components that contribute to the variability of the data, so these statements did not make a large enough contribution. The results are still of interest, showing that:

- When working on an assessment, most students read the questions and guidance on paper (including printouts), with high values for 'true and 'very true'. When asked whether they read this information only from a screen, most students replied 'not at all true' or 'sometimes true.'
- There is a spread of responses to 'I only participate in online forums if it is needed for the assessment,' indicating a range of behaviours.

- There is a spread of responses to ‘When I am working on an assessment, I include references in a standard format,’ although ‘very true’ and ‘true’ have relatively high numbers. This may be related to the requirements of the subjects studied.
- There is a spread of responses to ‘When I am working on an assessment, I work mainly from my own notes,’ although ‘sometimes true’ and ‘quite true’ have relatively high numbers, indicating that many students do this to some extent.
- ‘When I am working on an assessment, I reread the relevant sections of the module’ has mainly ‘very true’ or ‘true’, indicating that many students do this.

Chart 2



2.4 Internet access and access to OU content

One of the original personas was ‘digitally limited’ which referred to students whose studies were negatively affected by environmental limitations on their access to digital content. The survey explored how students mainly access the module content and issues with internet access in the following questions:

> Q8 For your current Open University studies, please choose one of the following options to describe how you access the content. (mainly physical/mainly digital/some physical and some digital)
>
> Q9.1 I can access the internet at home when I want to study. (always/sometimes/never)
>
> Q9.2 I have to travel to a location other than my home to access the internet. (always/sometimes/never)
>
> Q9.3 My studying is made more difficult because OU systems or websites do not work with the desktop or laptop computer I am using. (always/sometimes/never)

Q9.4 My studying is made more difficult because OU systems or websites do not work with the mobile device I am using (smartphone or tablet computer). (always/sometimes/never)

These results are combined in the following charts which summarise all 606 survey responses (up to 4 missing data points for some questions). Looking at Chart 3 and Chart 4, note that most students can access the internet at home when they want to study. Considering the students who mainly access content digitally (the centre bar in each group), there were a total of 32 students who sometimes or always had to travel beyond their home to access the web. This is 5% of the sample, or 1 in 20 students. Although this is a small proportion, the potential negative impact on these students is high.

Chart 3

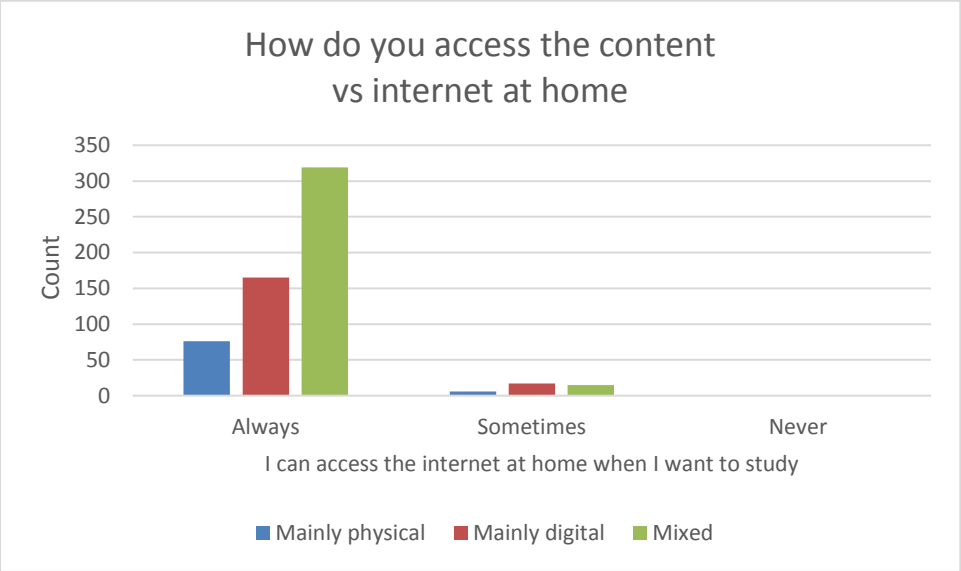


Chart 4

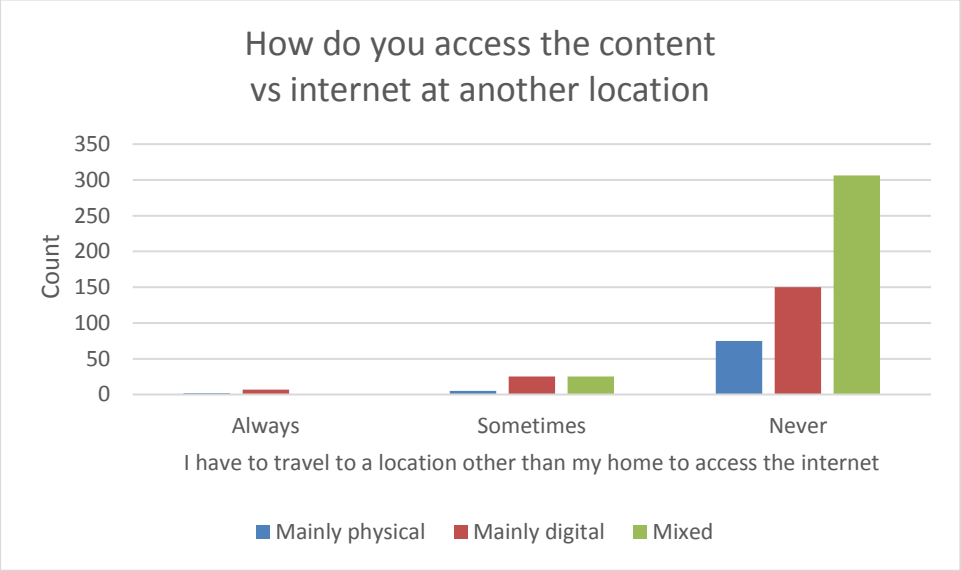


Chart 4 and Chart 5 summarise responses about difficulties with OU systems and computers available to the students. Note that there are more difficulties reported for mobile devices than

laptops or desktops. For students mainly accessing digital content, these counts are 33 for desktop/laptop and 43 for mobile devices, which is 5% to 7% of students in this sample.

Chart 4

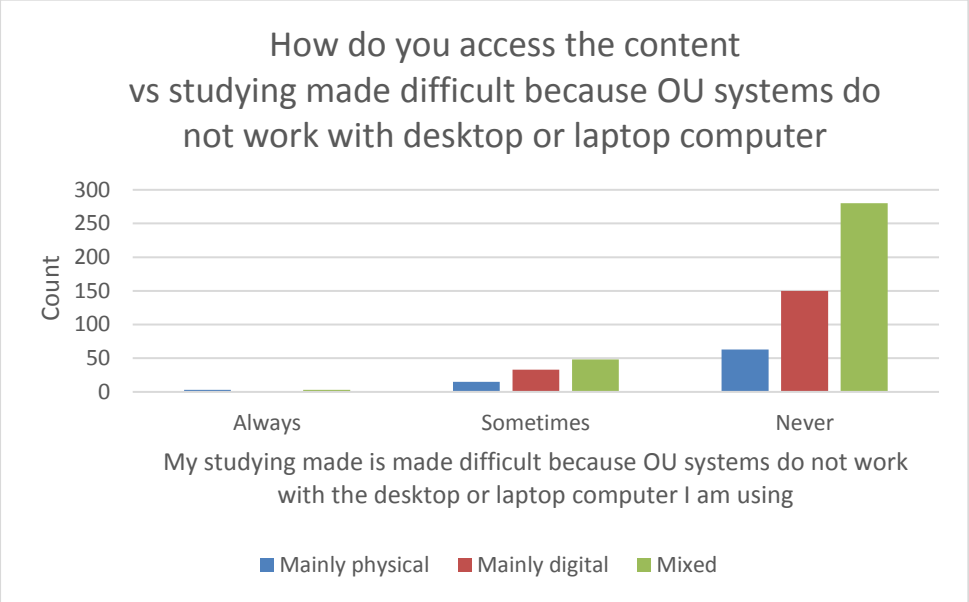
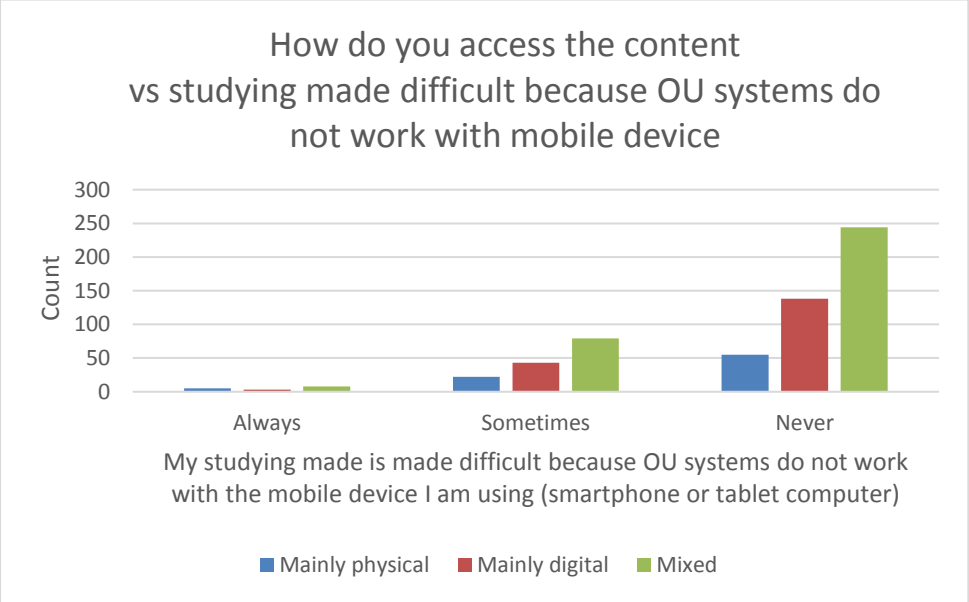


Chart 5



2.5 Technological self-efficacy

Another aspect of access to digital content is each student's confidence in using digital technologies. This was explored in the following survey questions, in which the student was asked to state how confident they felt in carrying out these tasks:

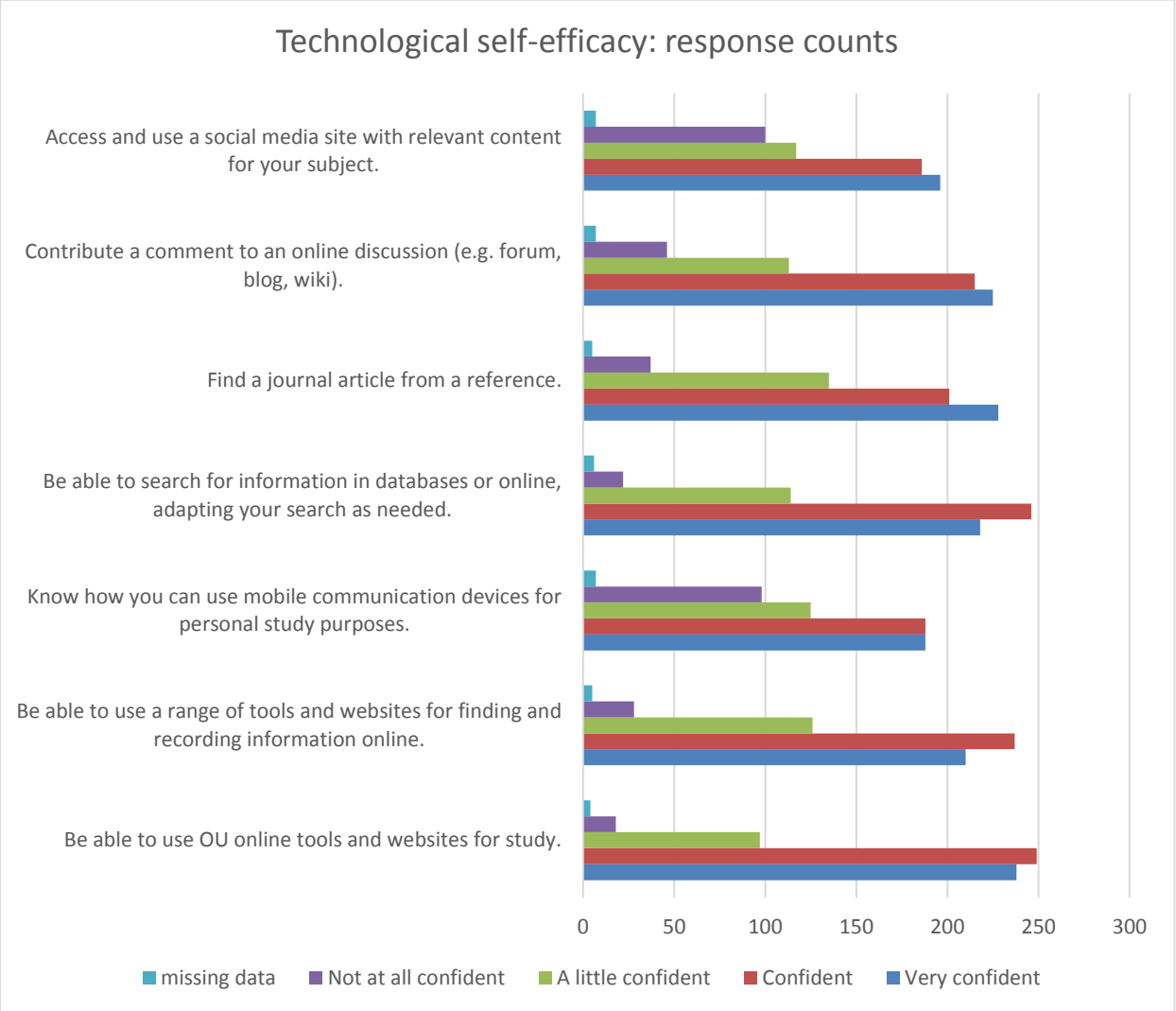
Q10.1 Be able to use OU online tools and websites for study. (very confident/confident/a little confident/not at all confident)

Q10.2 Be able to use a range of tools and websites for finding and recording information online. (very confident/confident/a little confident/not at all confident)

Q10.3 Know how you can use mobile communication devices for personal study purposes. (very confident/confident/a little confident/not at all confident)
Q10.4 Be able to search for information in databases or online, adapting your search as needed. (very confident/confident/a little confident/not at all confident)
Q10.5 Find a journal article from a reference. (very confident/confident/a little confident/not at all confident)
Q10.6 Contribute a comment to an online discussion (e.g. forum, blog, wiki). (very confident/confident/a little confident/not at all confident)
Q10.7 Access and use a social media site with relevant content for your subject. (very confident/confident/a little confident/not at all confident)

The results are summarised in Chart 6, which shows the number of responses in each category (response count). Overall, there are high levels of confidence, although 100 to 125 students (16% to 20% of the sample) responded 'a little confident' to each statement. Two statements elicited higher numbers of 'not at all confident' responses: 'Access and use a social media site with relevant content for your subject,' and 'Know how you can use mobile communication devices for personal study purposes'. These tasks are less likely to be explained in OU study materials. In contrast, modules that require students to find a journal article from a reference usually provide instructions.

Chart 6



3. Comparing scores across demographics

3.1 Comparing DIGI and technological self-efficacy scores for subsamples new/continuing, undergraduate/postgraduate

Chart 7 shows the number of students with each standardised DIGI score, split into the four subsamples. This shows differences in the shape of the distribution between the groups. Most participants in the survey have a DIGI score of less than 0.5, indicating low use of digital technology. A sizeable minority have a score of zero. Looking at scores of 0.7 or higher, there's a peak in the new undergraduate distribution, which can be interpreted as a willingness to engage with digital technologies early in students' OU career. There are slightly more students with scores over 0.7 for new postgraduates than other groups, although caution is required due to small numbers. However, contributing factors could be the increasing conversion to provision of online-only postgraduate modules.

Table 5 Key to concept score interpretation

Concept score (or mean score)	Responses contributing to this score
1	All responses 'very true for me'
0.75 to 1	
0.75	All responses 'true for me'
0.5 to 0.75	
0.5	All responses 'quite true for me'
0.25 to 0.5	
0.25	All responses 'sometimes true for me'
0 to 0.25	
0	All responses 'not at all true for me'

Chart 7

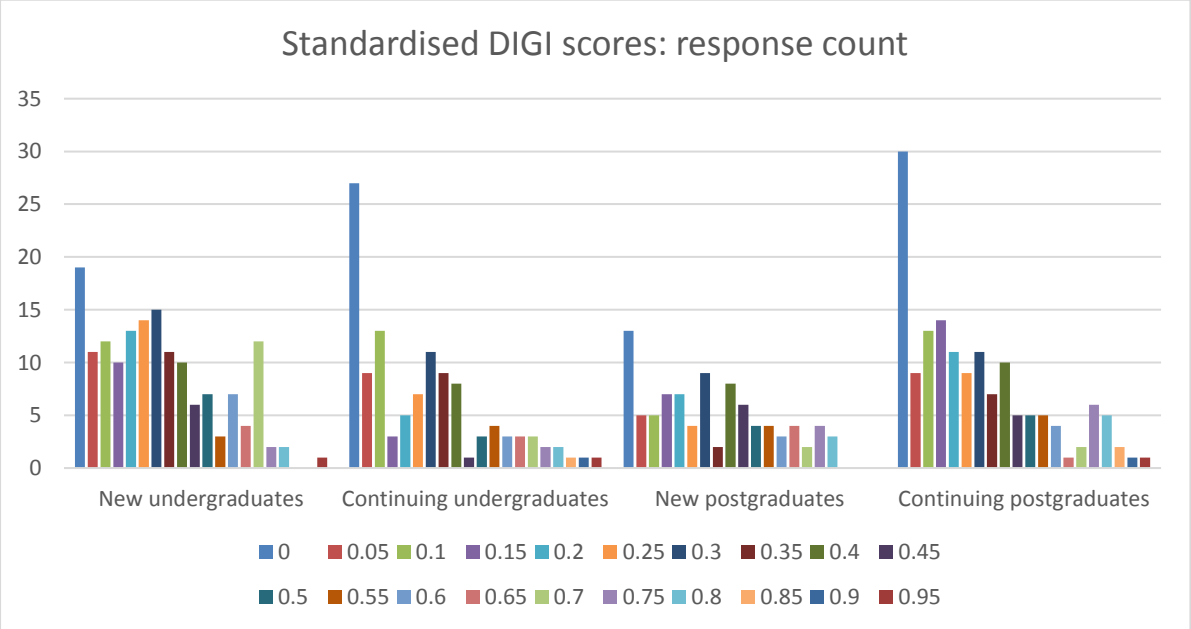
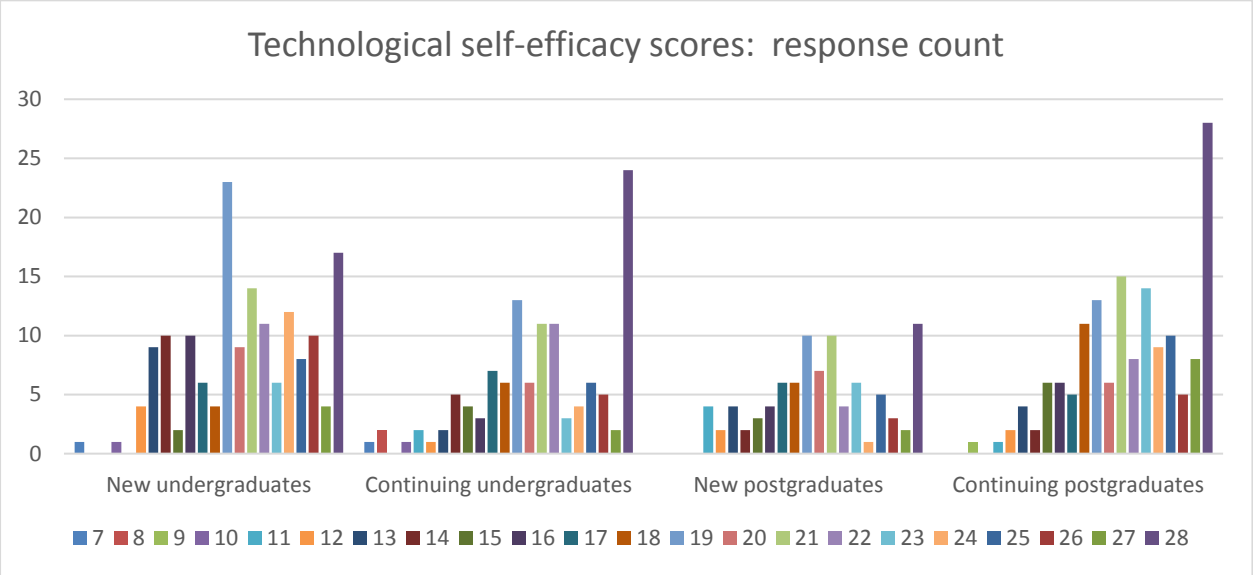


Chart 8 shows the number of students with each technological self-efficacy score, split into the four subsamples. This shows differences in the shape of the distribution between the groups.

Technological self-efficacy is the sum of the scores from seven questions. Each question is scored from 1 (not at all confident) to 4 (very confident). Thus, a student with a sum of 28 is very confident of all seven tasks. Someone with a sum score of 7 is not at all confident.

The shapes of the distributions differ. For all four subsamples, there is a peak at 28, showing high confidence. There is also a peak lower down, at 19 for new undergraduates, and 19 to 22 for continuing undergraduates. There are more technological self-efficacy scores below 16 in new undergraduates than continuing undergraduates, indicating a lack of digital skills for study among students who are new the OU, new to higher education, or both. Differences between new and continuing postgraduates are less obvious. It should be noted that these are counts of student numbers, so lower totals for postgraduates are also due to lower numbers of postgraduates in the sample. For example, out of 90 new postgraduates in sample, 11 scored 28 for technological self-efficacy.

Chart 8



3.2 Tests of significance

Seven learning behaviour concept scores (GOAL, TIME, FOCUS etc.) and a technological self-efficacy score were calculated for each survey respondent. To explore variations in these scores across demographics, the cohort was split for each of the variables in Table 6.

Table 6 Demographic groups for significance tests

Demographic categories	**Variables**	
Age	Under 56	56 and over
Study motivation	Mainly personal development	Mainly career/employment
Level	Undergraduates	Postgraduates
Subject studied at time of survey	Non STEM module	STEM module
OU study experience	New students	Continuing students

For each demographic category, the two groups were treated as independent samples and t-tests for equality of means were carried out in SPSS, using the concept scores and technological self-efficacy scores as the dependent variable[4].

Out of these 40 T-tests, 13 showed statistically significant differences between the two groups at p=<.05. The rest showed no significant difference. Eta squared values were calculated for all significant differences. These indicated that all effect sizes were small (eta squared 0.05 or lower). These small effect sizes indicate that less than 5% of the variance in the dependent variable is due to the demographic factor.

In conclusion, there is little significant difference in any of the learning behaviours or technological self-efficacy by age, motivation, level, subject area, or OU study experience.

4. Extracting different learning behaviour concepts for different subgroups

In Section 3, the scores on the seven learning behaviour concepts were compared for various subgroups. Another approach was to carry out a PCA on a subsample, so to see whether the same concepts are extracted.

4.1 Concepts for new undergraduates and continuing postgraduates

The survey sample was composed from four subsamples:

New undergraduates
Continuing postgraduates
New postgraduates
Continuing postgraduates

Of these, only two groups had sufficient responses for a separate PCA (new undergraduates and continuing postgraduates). These two subsamples illustrate different stages in the student lifetime. As this survey is a snapshot rather than a longitudinal survey, the results do not represent the same students at different times. With that caveat, the results of the PCA[5] do show some interesting differences. PCA identifies variables with a similar pattern of variation in the data.

For example, as discussed in Section 2, the whole cohort has the learning behaviour concept TIME which has the following four contributing statements:

I often find that I don't spend very much time on my module because of other activities. (negative)	other activities
I rarely find time to review my notes or readings. (negative)	no time review
I find it hard to stick to a study schedule. (negative)	hard stick sched
I make sure that I keep up with the readings and assignments for my module.	keep up

[4] Details are available in Appendix 5
[5] Details are available in Appendix 6

For new undergraduates, responses to the 'I make good use of my study time' (good use time) statement varied in the same way. So, the learning behaviour concept has five contributions and has been renamed TIMEPLUS. For continuing postgraduates, four of these statements and several from the GOAL learning behaviour concept are combined, making the new concept of GOALTIME. GOALTIME combines two activities where experienced students might be expected score highly: goal-setting and time for study. Because these appear in the same concept, it is reasonable to consider these behaviours collectively when discussing more experienced students. TIME was not extracted to a separate component for continuing postgraduates, because aspects of time combined with other concepts.

See Chart 9 (next page) for a comparison between learning behaviour concepts for new undergraduates and continuing postgraduates. The five concepts specific to new undergraduates are listed on the left. The four concepts specific to continuing postgraduates are listed on the right. The diagonal lines indicate the differences between the allocations of the contributing statements. See Section 2 and Appendix 1 for a key to the abbreviations used for each survey statement contributing to the concepts.

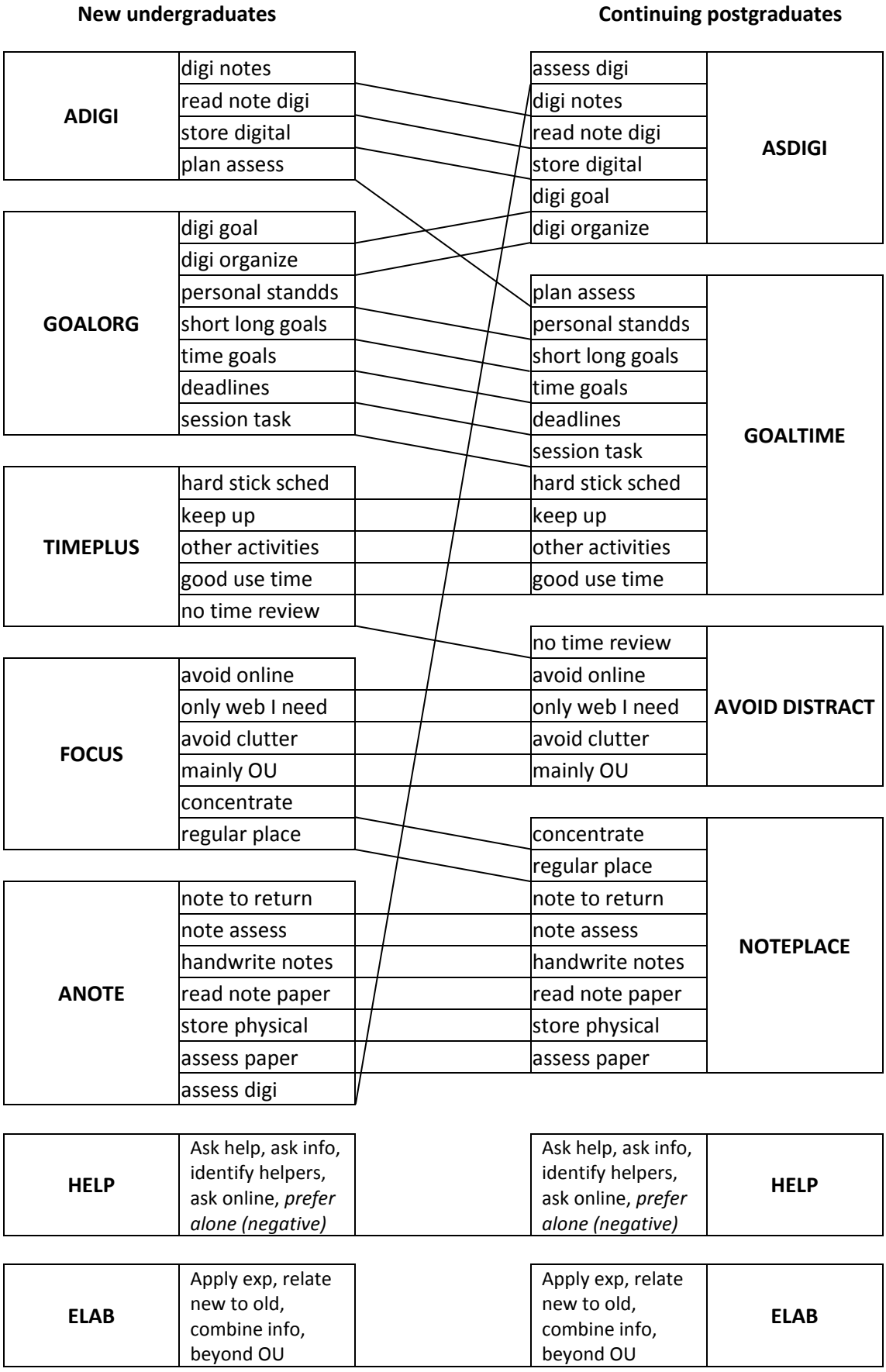
Two concepts are the same as for the whole cohort (HELP, ELAB) which means that these two concepts apply for all subsamples and the main cohort. The implication is that these concepts, help-seeking and elaboration, are distinct sets of learning behaviours that explain the variability in the results across all groups tested. Thus, they may be particularly useful when implementing the results of this survey.

Table 7 summarises the concept names for the subsamples. The comparison between TIME, FOCUS and AVOID_DISTRACT is interesting. AVOID_DISTRACT combines aspects of two of the original themes from Ellis et al. (2017): avoid clutter and avoid distraction. The differences described in Chart 9 and Table 7 may be helpful in discussing student behaviours and preferences at different stages in their study.

Table 7 Comparing concepts across subsamples: summary

Whole cohort	**New undergraduates**	**Continuing postgraduates**
DIGI	ADIGI	ASDIGI
GOAL	GOALORG	GOALTIME
TIME	TIMEPLUS	
FOCUS	FOCUS	AVOID_DISTRACT
NOTE	ANOTE	NOTEPLACE
HELP	HELP	HELP
ELAB	ELAB	ELAB

Chart 9 Comparing concepts for new undergraduates and continuing postgraduates



4.2 Learning behaviour concepts for students with previous educational qualifications at A-level or lower

Initial cluster analysis indicated that participants with previous educational qualifications at A-level or lower seemed to form a different cluster. The cohort had a large proportion of people with previous education at HE degree level or higher, so the A-level or lower group was investigated as a subsample.

199 responses out of 524 declared previous educational qualifications at A-level or lower. PCA was repeated for this subsample[6]. 7 components were extracted, although when compared with the learning behaviour concepts (components) for the whole cohort, some variables had been extracted to different components (see Table 8).

Five learning behaviour concepts are the same as for whole cohort: HELP, ELAB, GOAL, NOTE, DIGI

Two learning behaviour concepts are different. These have swapped one variable:

- FOCUS_CONC is the same as FOCUS without the contributing statement 'I have a regular place set aside for studying' (regular place).
- TIME_PLACE is the same as TIME with 'regular place' as positive variability.

These concepts are very similar to the main seven concepts, indicating that the variability in this subsample can be described in the very similar terms to the main cohort.

Table 8 Seven learning behaviour concepts in terms of contributing survey questions for previous educational qualifications at A-level or lower

GOAL **goal-setting**	**NOTE** **note-making**	**HELP** **help-seeking**	**TIMEPLACE** **time-management with 'regular place'**	**FOCUSCONC** **focus without 'regular place'**	**DIGI** **digital-preferred**	**ELAB** **elaboration**
time goals	handwrite notes	ask help	*other activities (negative)*	only web I need	digi notes	apply exp
short long goals	read note paper	ask info	*no time review (negative)*	avoid clutter	read note digi	relate new to old
deadlines	store physical	identify helpers	*hard stick sched (negative)*	avoid online	digi goal	combine info
session task	assess paper	ask online	keep up	mainly OU	digi organize	beyond OU
personal standds	note assess	*prefer alone (negative)*	regular place	concentrate	store digital	
plan assess	*assess digi (negative)*					
good use time	note to return					

[6] Details are available in Appendix 8

5. Cluster analysis: groups of students with similar learning behaviour profiles

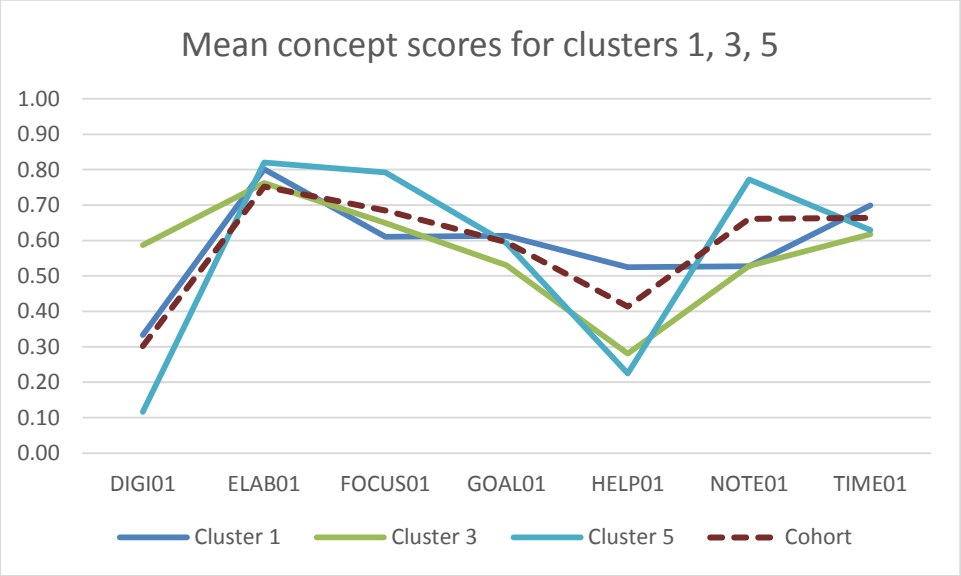
Seven clusters were identified, which are groups of students with similar learning behaviour concept profiles. A hierarchical cluster analysis was carried out on 524 responses using the seven main learning behaviour concepts for the whole cohort as the clustering variables[7]. The fact that there are the same number of groups as concepts is a coincidence, not a fundamental feature of the data.

Cluster can be interpreted in terms of individual students or groups of students. In contrast, the concepts discussed in the previous section can be discussed in terms of student behaviours. If the concept scores are known for a specific student, those scores can be discussed in terms of that student's experiences. Those scores can also be used to allocate a specific student to a particular group. Section 2 explores the learning behaviour concept and technological self-efficacy scores. Section 5 explores demographic factors across identified groups and summarises the features of each of these groups.

5.1 Learning behaviour concept scores and technological self-efficacy for the seven clusters

This section describes overall patterns in the groups in terms of the learning behaviour concept scores and technological self-efficacy. Section 5.2 describes demographic patterns. Section 5.3 describes each cluster in more detail, including demographic factors. For ease of interpretation, the learning behaviour concept scores have been rescaled so the maximum possible score is 1 and the minimum possible score is 0.

Chart 10a Clusters with concept scores either side of the mean for the cohort



Cluster 1

Very high score: HELP
High score:
Average score: DIGI ELAB GOAL TIME
Low score: FOCUS NOTE
Very low score:

[7] Details are available in Appendix 9

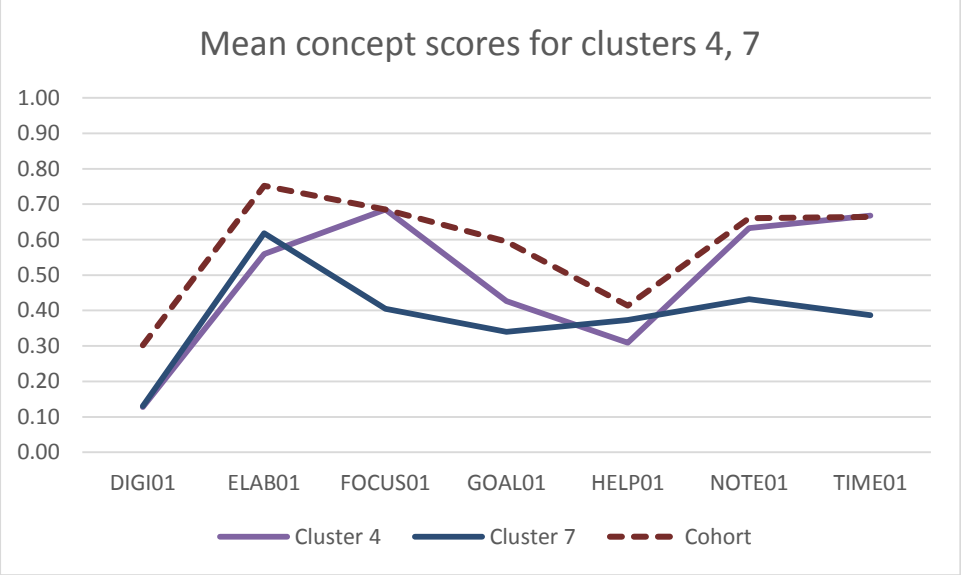
Cluster 3

Very high score:	DIGI
High score:	
Average score:	ELAB FOCUS
Low score:	GOAL TIME
Very low score:	HELP NOTE

Cluster 5

Very high score:	
High score:	NOTE
Average score:	ELAB GOAL TIME
Low score:	
Very low score:	DIGI FOCUS HELP

Chart 10b Clusters with concept scores lower than the mean for the cohort



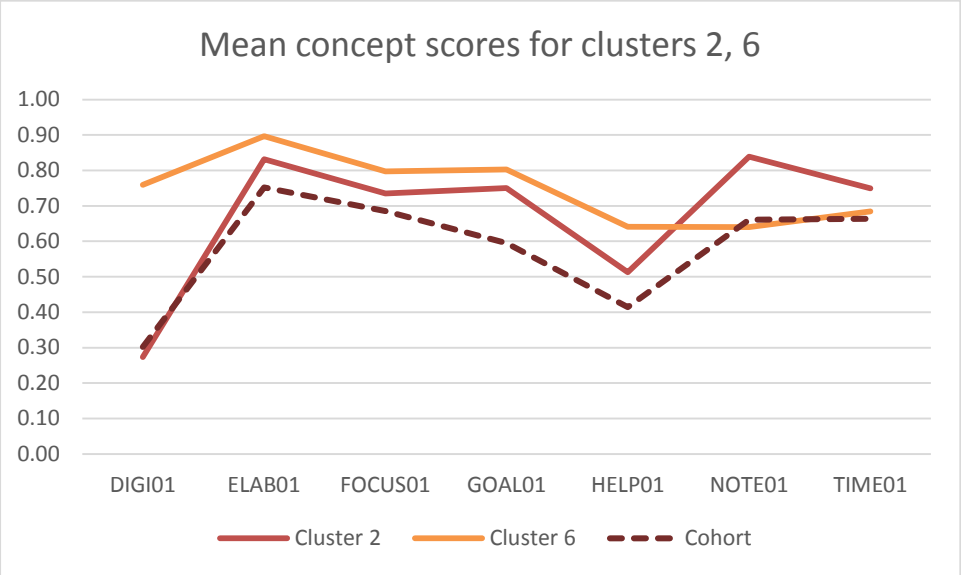
Cluster 4

Very high score:	
High score:	
Average score:	ELAB GOAL NOTE TIME
Low score:	
Very low score:	DIGI FOCUS HELP

Cluster 7

Very high score:	
High score:	
Average score:	HELP
Low score:	ELAB
Very low score:	DIGI FOCUS GOAL NOTE TIME

Chart 10c Clusters with concept scores higher than the mean for the cohort



Cluster 2

Very high score: GOAL HELP NOTE
High score: ELAB TIME
Average score: FOCUS
Low score: DIGI
Very low score:

Cluster 6

Very high score: DIGI GOAL HELP
High score: ELAB FOCUS
Average score: NOTE TIME
Low score:
Very low score:

Table 9a summarises the scores used to produce Charts 10a, 10b and 10c.

Table 9a

Mean score for each cluster	DIGI01	ELAB01	FOCUS01	GOAL01	HELP01	NOTE01	TIME01	N
Cluster 1	0.33	0.80	0.61	0.61	0.53	0.53	0.70	76
Cluster 2	0.27	0.83	0.73	0.75	0.51	0.84	0.75	135
Cluster 3	0.59	0.76	0.65	0.53	0.28	0.53	0.62	60
Cluster 4	0.13	0.56	0.68	0.43	0.31	0.63	0.67	108
Cluster 5	0.12	0.82	0.79	0.59	0.22	0.77	0.63	61
Cluster 6	0.76	0.90	0.80	0.80	0.64	0.64	0.68	46
Cluster 7	0.13	0.62	0.40	0.34	0.37	0.43	0.39	38
Whole cohort	0.30	0.75	0.69	0.60	0.41	0.66	0.66	524

Table 9b Key to concept score interpretation for Table 9a

Concept score (or mean score)	Responses contributing to this score
1	All responses ‘very true for me’
0.75 to 1	
0.75	All responses ‘true for me’
0.5 to 0.75	
0.5	All responses ‘quite true for me’
0.25 to 0.5	
0.25	All responses ‘sometimes true for me’
0 to 0.25	
0	All responses ‘not at all true for me’

In Chart 11, the higher the score, the more confident the student is in using digital technologies for the study tasks listed in the survey (see Section 2.5 for this list). The maximum possible score is 28, for a student responding ‘very confident’ for all seven statements. The minimum possible score is 7 for a student responding ‘not at all confident’ for all statements. Overall, the mean scores fall within the ‘confident’ range, with some in the ‘a little confident’ range. Cluster 4 has the lowest technological self-efficacy scores, Cluster 6 the highest. The mean score for the whole cohort is 21.0.

Chart 11

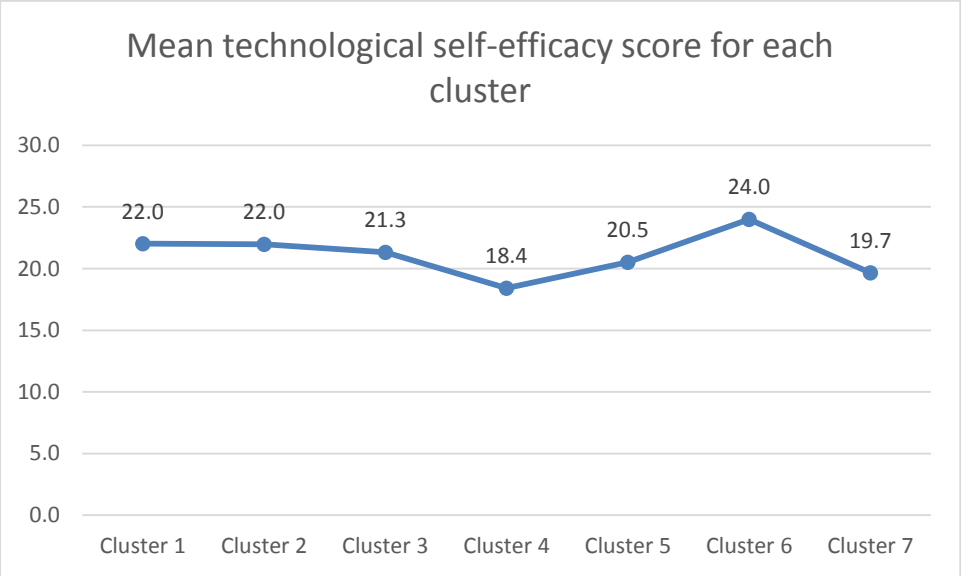


Table 10 Summary of learning behaviour concept and technological self-efficacy scores for each cluster

	Score compared with mean score for cohort				
	Very high score	**High score**	**Average score (near cohort mean)**	**Low score**	**Very low score**
Cluster 1	HELP		DIGI ELAB GOAL TIME TechSE	FOCUS NOTE	
Cluster 2	GOAL HELP NOTE	ELAB TIME	FOCUS TechSE	DIGI	
Cluster 3	DIGI		ELAB FOCUS TechSE	GOAL TIME	HELP NOTE
Cluster 4			ELAB GOAL NOTE TIME	TechSE	DIGI FOCUS HELP
Cluster 5		NOTE	ELAB GOAL TIME TechSE		DIGI FOCUS HELP
Cluster 6	DIGI HELP GOAL	ELAB FOCUS TechSE	NOTE TIME		
Cluster 7			HELP TechSE	ELAB	DIGI FOCUS GOAL NOTE TIME

5.2 Demographic patterns across clusters

This section summarises demographic patterns across clusters identified through the analysis. The clusters were determined only by differences in the pattern of learning behaviour concept scores. If students (strictly, survey respondents) show other similarities in a cluster that may imply an underlying pattern in a student's learning behaviour, attributes or preferences. The patterns described in this section are tendencies or indications rather than absolutes. Each cluster is compared with the cohort as a whole.

The percentages are calculated for each cluster, so for example, 15% of the students in Cluster 3 are aged 56 and over, compared with about 20% of the cohort as a whole. Most clusters have fewer than 100 students, so differences of less than 2 or 3 percentage points between values are not noteworthy, because they represent only 1 or 2 students.

Chart 12 shows the grouped age distribution. Cluster 1 has a distribution very similar to the overall cohort. Clusters 2, 3 and 7 have distributions skewed more towards younger age groups, under 46 years. Cluster 4 has the highest percentage aged 56 and over, and a generally higher age than for the cohort. Cluster 6 has a high percentage in the 36 to 45 year age group, and the lowest percentage over 56 years. Cluster 5 has a low percentage in middle age (46 to 55 years), but high percentages aged 36 to 45 years and over 56 years.

Chart 12

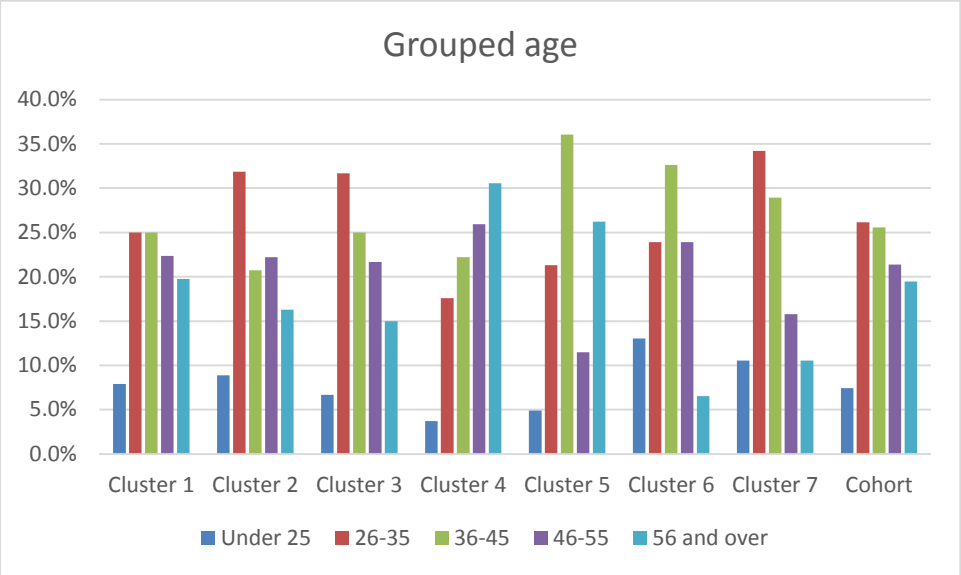


Chart 13 shows the split between male and female for each cluster. Broadly, most clusters show the same pattern as for the whole cohort. Clusters 1 and 3 are the exceptions, with higher percentages of males than in the whole cohort. Cluster 3 is the only cluster with more males than females.

Chart 13

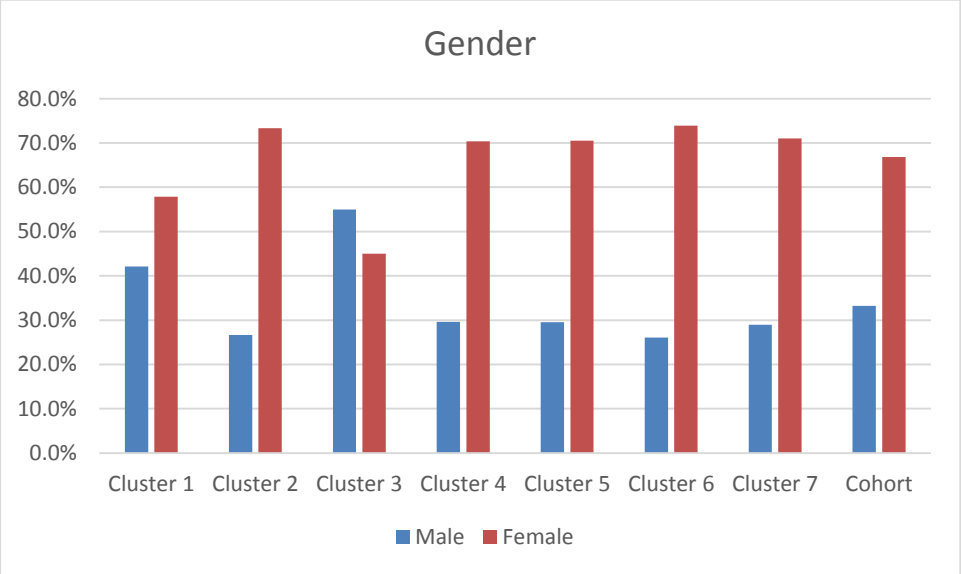


Chart 14 shows the percentages of new/continuing, undergraduate and postgraduate students. Although the intention was to have equal numbers of responses in each of these four categories, the sample had a lower percentage of new postgraduates, and this is reflected in the responses. Most clusters broadly follow the distribution for the whole cohort. Cluster 4 has a higher percentage of continuing undergraduates, and thus the highest percentage of continuing students out of all the clusters. Cluster 3 has approximately equal numbers in all four categories. Clusters 2 and 3 have the highest percentage of new postgraduates. Clusters 1, 6 and 7 have a high percentage of new undergraduates.

Chart 14

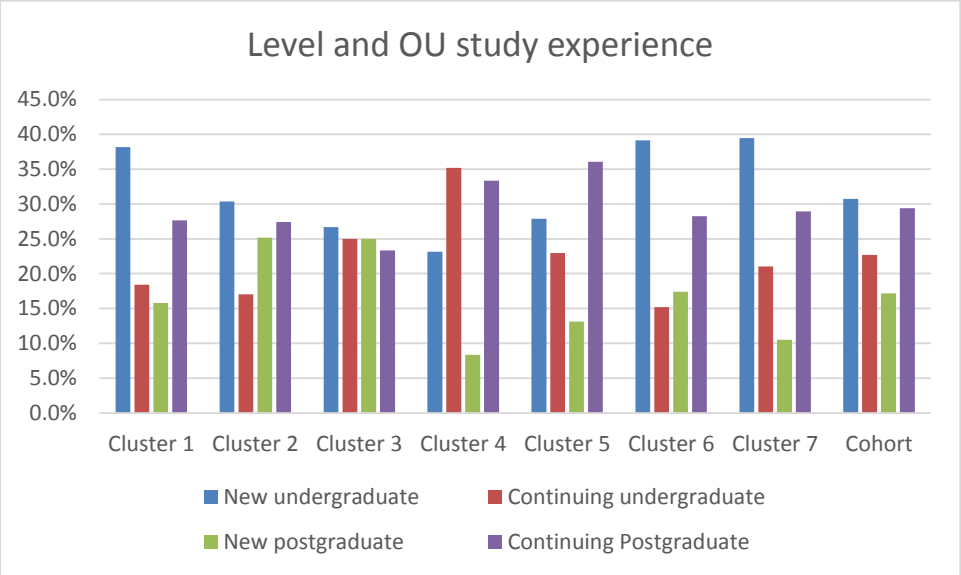


Chart 15 shows previous educational qualifications, where declared. The cohort has a high percentage of students with an HE qualification. Most clusters follow the same pattern. Cluster 7 has the lowest percentage with a PG qualification, which is consistent with the higher percentage of new undergraduates shown in Chart 14. Cluster 4 has the lowest percentage with a PG qualification, which is consistent with the high percentage of continuing students, at both undergraduate and postgraduate level. Cluster 4 also has the highest percentage with A-levels or equivalent, which is consistent with continuing undergraduates. Cluster 5 has the highest percentage with an HE or PG qualification.

Chart 15

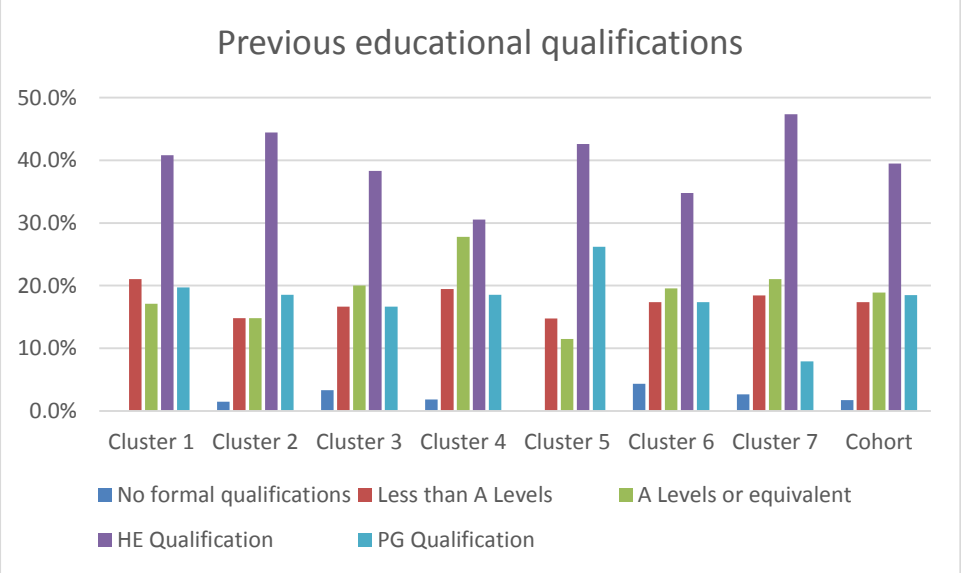


Chart 16 shows patterns in three of the occupational categories for which data are collected. These three categories are the only ones with double-digit counts within most clusters. Overall, the pattern is similar across clusters, although Cluster 3 has the highest percentage in full-time work. Cluster 5 has the highest percentage in part-time work or retired.

Chart 16

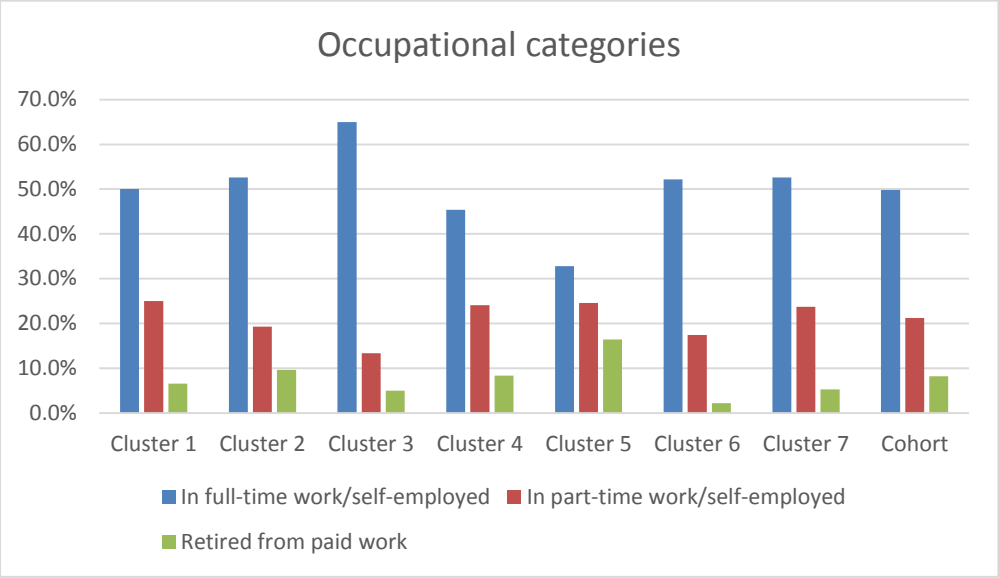


Chart 17 shows the study motivation, where stated. These percentages do not sum to 100%, due to missing data and responses such as 'don't know'. Clusters 2, 5 and 7 are similar to the overall cohort. Cluster 6 has the highest percentage mainly motivated by employment or career, which is consistent with the high percentage of new undergraduates and the mainly 36 to 45 year age profile. Clusters 1 and 4 have the highest percentage motivated mainly by personal development.

Chart 17

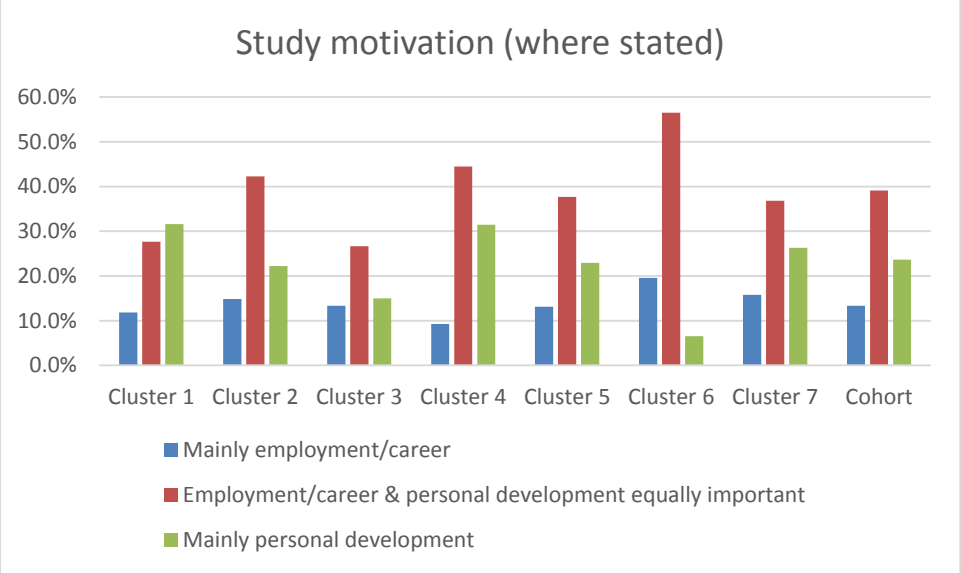


Chart 18 shows the split between non STEM and STEM (science, technology, mathematics, and engineering) subjects. This was determined by the module code at the time of sampling. Modules with the prefix M, S or T were classed as STEM. There is little variation between clusters. Also note the relatively low numbers of STEM students. Cluster 2 has the lowest percentage of STEM students, Clusters 4 and 7 the highest.

Chart 18

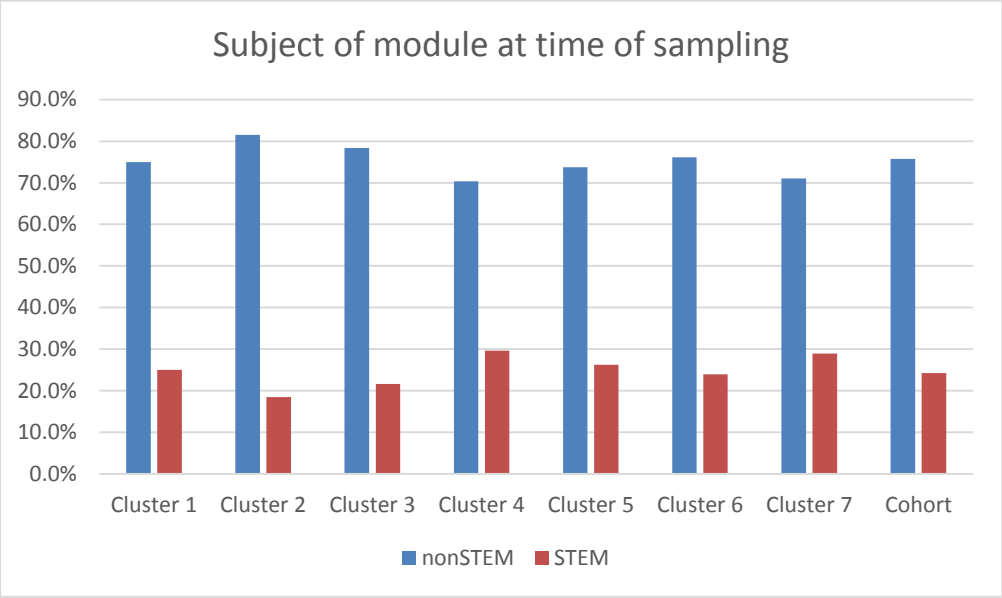
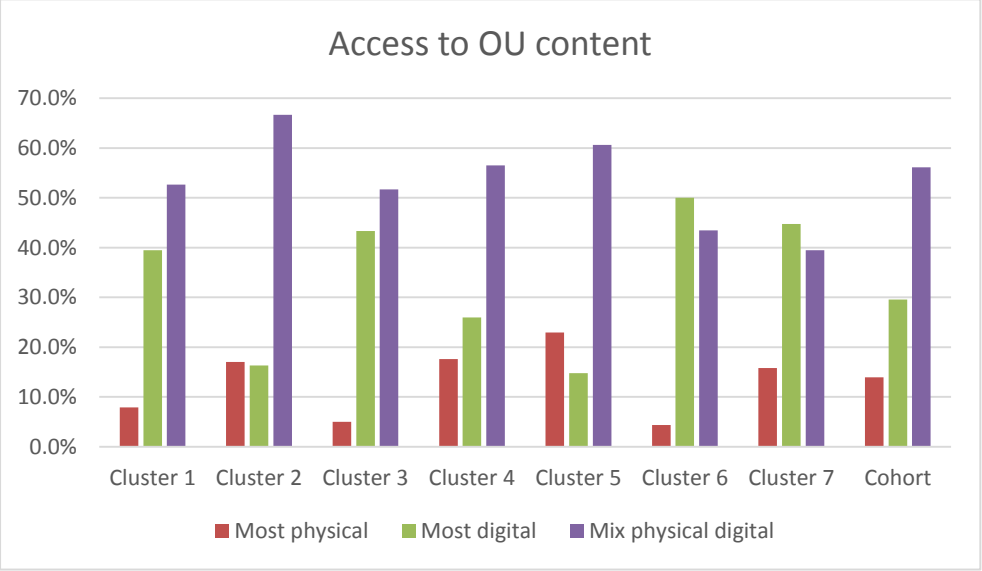


Chart 19 shows whether students accessed OU content mainly digitally, mainly physically or a mixture of the two. Module design has a strong influence on this, although students may have a choice of media on some modules. The survey did not distinguish between design and student choice. Clusters 1, 3, 6 and 7 have a high percentage of mostly digital access. Cluster 5 has the highest percentage with mostly physical access. Cluster 2 has the highest percentage with a mixture of media.

Chart 19



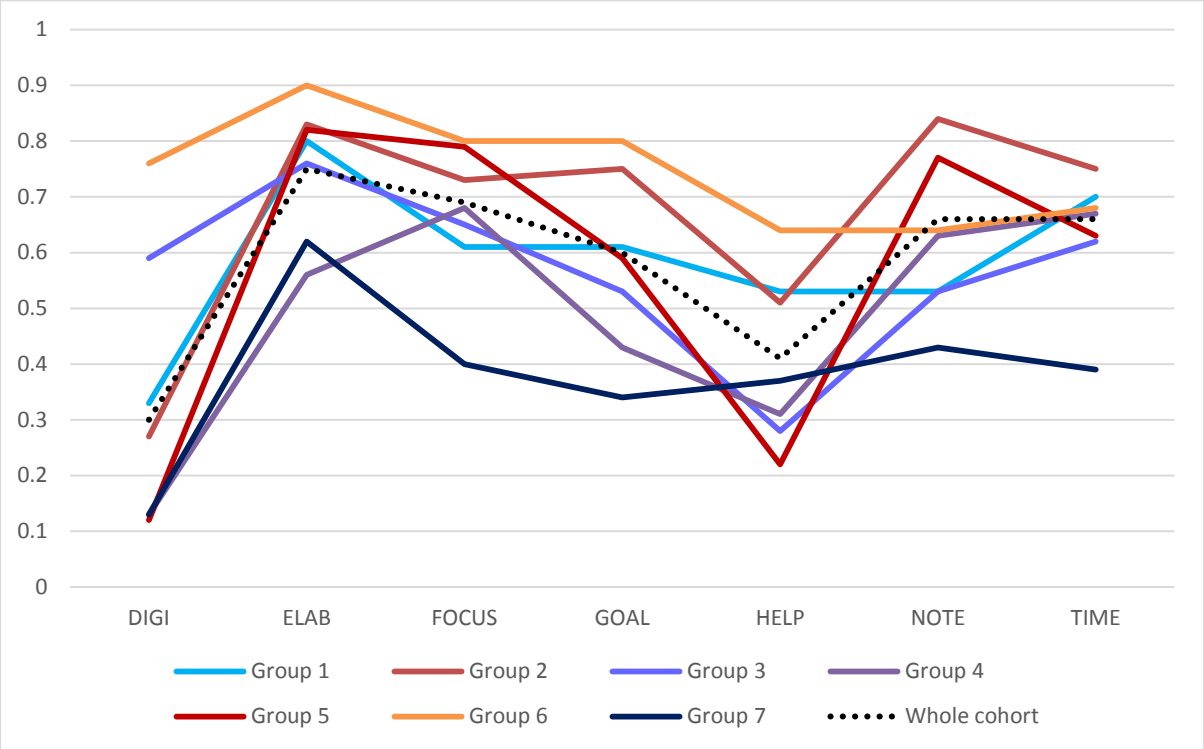
5.3 Seven groups: summary descriptions of each cluster

This section summarises features of each of the groups identified through the cluster analysis, including demographic and other factors[8]. Each cluster can be thought of as a portrait or 'group' of

[8] Details are available in Appendix 10

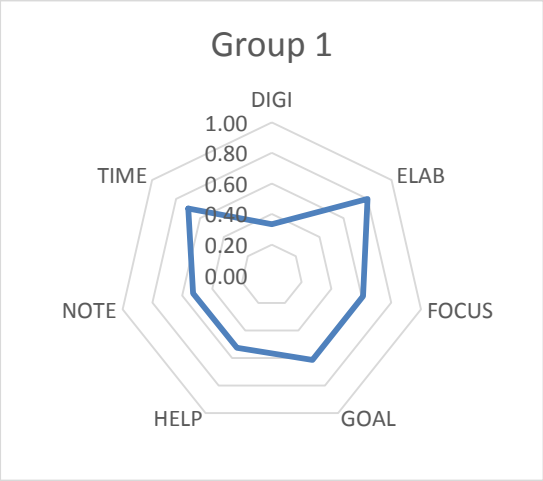
students with similar characteristics. The descriptions in Section 5.1 focused on differences between the clusters. To some extent, these are caricatures, because they describe general patterns, not absolutes. For example, Cluster (now Group) 1 has the lowest percentage aged over 56. Still, 6.3% of the students in this cluster are aged over 56. They were allocated to this group because their responses were similar to other younger students in the same group.

Chart 20 Summary of groups with concept scores compared with mean of the cohort



Description of Group 1 (N=76)

Chart 21a



This group does not have many attributes that differ from the cohort average. It is best described in contrast with the other groups.

Learning behaviour concept scores are average, except for a very high HELP, and low FOCUS and NOTE scores. These students have a strong tendency to make connections with other people to help

with their studies. They tend not to make many notes and have a low focus, for example tending not to have a regular place to work, or tending not to easily avoid distractions.

This group show average DIGI and technological self-efficacy scores, although a high percentage of these respondents are accessing content mainly digitally.

The age profile is similar is to the cohort, but it has a higher percentage male than the cohort.

There is a higher percentage of new undergraduate students present. A higher percentage of respondents are motivated mainly by personal development.

Brief description of Group 2 (N=135)

Chart 21b

Overall, the learning behaviour concept scores for this group are high. In particular, members of this group have very high scores for GOAL, HELP, NOTE and high scores for ELAB and TIME. These students appear to be goal-oriented, help-seeking and generally tend to be on schedule with their studies. They make many notes and link new information to ideas already known. They tend to seek extra information.

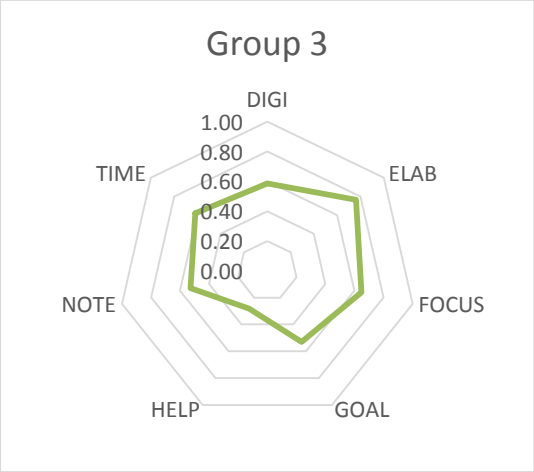
These students have low DIGI scores, and have average technological self-efficacy. This group has the highest percentage accessing content using a mix of media, with a low percentage of students who mainly access content digitally.

The age profile of this group is younger than the cohort, with a high percentage in the 26 to 35 year age group. There is a higher percentage of females than in the cohort. This is the largest group, comprising 26% of the cohort.

There is a higher percentage of new postgraduate students than in the cohort, with the lowest percentage of STEM students of all the groups. Motivation is similar to that of the whole cohort.

Brief description of Group 3 (N=60)

Chart 21c



This group has overall average to low learning behaviour concept scores. In particular, students in this group have very low scores for HELP and NOTE, and low scores for GOAL and TIME. These students do not tend to seek help from others. They do not tend to set goals, and struggle to find time for their studies. They do not make many notes.

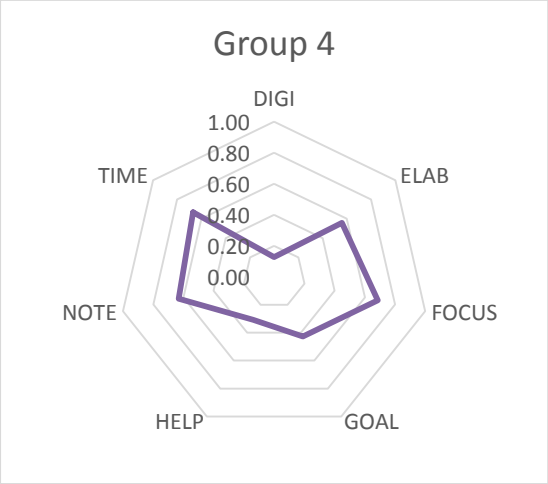
This group does have a very high DIGI score, with average technological self-efficacy. It has a high percentage of participants who mostly access content digitally, and a low percentage who mainly access content physically. These students tend to use digital technologies in their studies.

The age profile is younger than the cohort, with a high percentage aged less than 46 years. This is the only group with a higher percentage of males than females.

This group has approximately equal numbers of new/continuing and undergraduate/postgraduate students. This group has the highest percentage of students in full-time work. Their motivation pattern in terms of career or personal development as primary motivation for study is broadly similar to the cohort.

Brief description of Group 4 (N=108)

Chart 21d



This is the second largest group, comprising 21% of the cohort.

Participants in this group have overall low learning behaviour concept scores. In particular, they very low FOCUS and HELP scores. Students in this group do not tend to seek help from others, nor do they focus on their studies, for example, by removing distractions or having a regular place to study.

Students in this group had very low DIGI scores, and showed a low technological self-efficacy score. These students have low confidence in using digital technologies for study and tend not to use them for study tasks such as making notes. Using digital access for OU content scored similarly to the rest of the cohort.

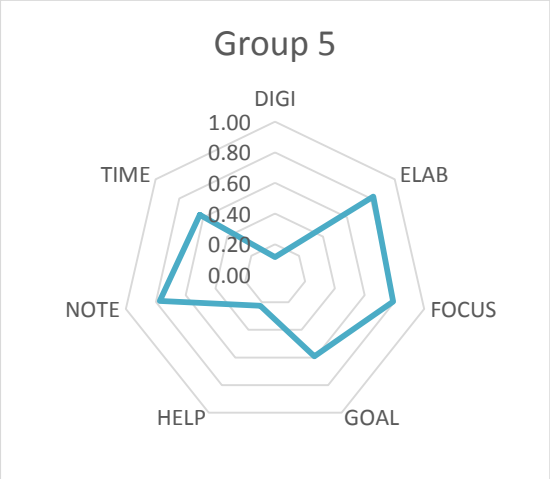
Generally, this group showed higher age distribution than cohort, with the highest percentage over 56 years. The demographic make-up showed a male/female distribution similar to cohort.

This group had the highest percentage of continuing students, both undergraduate and postgraduate. Group 4 has the lowest percentage with a postgraduate qualification, which is consistent with the high percentage of continuing students, at both undergraduate and postgraduate level. Group 4 also has the highest percentage with A-levels or equivalent, which is consistent with continuing undergraduates. There was a higher percentage of STEM students in this group than the cohort.

A higher percentage of participants from this group said they were motivated mainly by personal development than the rest of the cohort.

Brief description of Group 5 (N=61)

Chart 21e



Participants in this group showed high NOTE score, and very low FOCUS and HELP scores. These students tend to make many notes, but do not tend to seek help from others, nor do they focus on their studies, for example, by removing distractions or having a regular place to study.

Students in this group had a very low DIGI score, with only an average score for technological self-efficacy. These students tend not to use digital technologies for study tasks such as note-making, although they state that they have average confidence in their use. This group therefore has the highest percentage of students who mainly access OU content physically (although this is still a low proportion of the overall sample).

The age profile is distinctive for this group. It has the lowest percentage aged 46 to 55 years, the highest aged 36 to 45 years and a high percentage aged 56 and over. The male/female split is similar to the cohort. This group showed the highest percentage of students in part-time employment or retired.

The percentage of new/continuing and undergraduate/postgraduate students is broadly similar to cohort, but with a higher proportion of continuing postgraduates. This group has the highest percentage of students with a previous higher education or postgraduate qualification out of all the groups.

Brief description of Group 6 (N=46)

Chart 21f

This is a small group, comprising less than 10% of the cohort.

Overall, this group has very high learning behaviour concept scores. HELP and GOAL have very high scores, ELAB and FOCUS have high scores. NOTE and TIME have average scores. These students tend to seek help from others and set goals. They seek information and link new ideas to ones they already know.

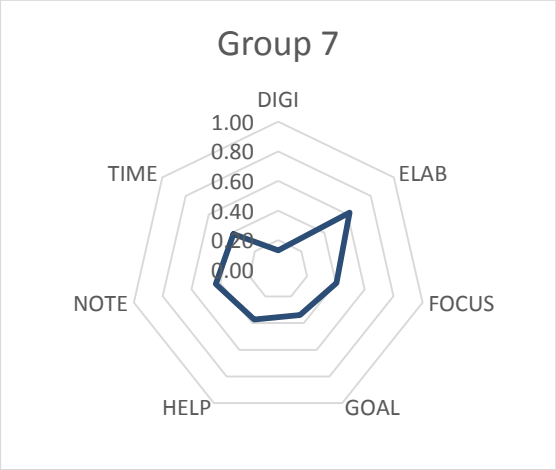
Students in this group have very high DIGI score, and score highly for technological self-efficacy. They have a high confidence in using digital technologies for study and a tendency to use them for study tasks such as making notes. This group has a high percentage of students who mostly digitally access OU materials.

This group shows the highest percentage in the 36 to 45 year age group, and the lowest percentage aged 56 and over. The male/female split for this group is broadly similar to cohort.

The group has a high percentage of new undergraduates, and the percentage of those with previous educational qualifications broadly similar to cohort. This groups shows the highest percentage of participants motivated by both career/employment and personal development.

Brief description of Group 7 (N=38)

Chart 21g



This is a small group, comprising less than 10% of the cohort.

Overall, participants in this group have low learning behaviour concept scores. In particular, they have very low scores for FOCUS, GOAL, NOTE and TIME, and a low score for ELAB. This cluster has the lowest TIME score, indicating a lack of time for study. This is consistent with low levels of note-making, lack of focus and a tendency not to set goals.

The group also has a very low DIGI score, with average technological self-efficacy. These students tend not to use digital technologies for study tasks such as note-making, although they state that they have average confidence in their use. However, they have a higher percentage of participants who mainly access digital content than the cohort.

The age profile is younger than the cohort, with a high percentage aged less than 46 years and the highest percentage aged 26 to 35 years, although this is an extremely small number of participants overall. The male/female split in participants is similar to the rest of the cohort.

This group has a high percentage of new undergraduates, and has the lowest percentage of students with a postgraduate qualification.

6. Conclusions

6.1 Summary

This survey aimed to gain a deeper insight into the underlying study habits and learning behaviour of OU students, beyond current debates around digital and online learning, to inform the future development of systems, tools and platforms.

The survey has validated the original themes identified through the previous study (Ellis et al., 2017), which have now been subsumed within the seven learning behaviour concepts that were identified through the PCA of responses to this survey.

These seven learning behaviour concepts describe student learning behaviours and preferences. Tests of significance did not find any large significant differences between concept scores across the main demographic groups (age, study experience, study motivation, level, and subject).

PCA on the new undergraduate and continuing postgraduate subsamples has identified interesting differences in the concepts, which may be due to differing experiences at various stages in the student lifetime.

Cluster analysis has identified seven groups, which are groups of students with similar learning behaviour concept profiles. The fact that there are the same number of groups as concepts is a coincidence, rather than a fundamental feature of the data.

6.2 Some notes of caution

The valid response rate of 11% is low, so there is a risk that this data is not representative of the overall OU cohort. There were differences between the sample demographics and the overall OU student population. Compared with the general OU population, the survey data has:

- a higher percentage of women
- a higher percentage of students over 45 and over 55
- a higher percentage of students with previous educational qualifications at HE or higher
- a higher percentage of students who are retired
- a higher percentage of students with motivation 'mainly for personal development'
- a lower percentage of students under 25
- a lower percentage of students with previous educational qualifications at A-level or lower
- a lower percentage of students in low Social Economic Segment.

To mitigate for this sample bias, various analyses were carried out on subsamples:

- The tests of significance reported in Section 3.2 showed no significantly large differences in concept scores between various demographic subgroups
- Subsamples new/continuing, undergraduate/postgraduate were compared in Section 4. Some differences were found in the pattern of DIGI and technological self-efficacy scores and in the concepts that best matched the data. These results may be helpful in implementing the results of this survey for students at various stages in their studies.
- The subsample with previous educational qualifications at A-level or lower was investigated in Section 4.2. The concepts were found to be very similar to the overall cohort.

Also, it should be noted that hierarchical cluster analysis (used to identify the groups) explores patterns within the data. Although the learning behaviour concept scores were used to produce the clusters, it is interesting that some clusters (groups) have a higher proportion of older students or new undergraduates, for example. Even though the sample has an inherent bias, these patterns are still valid.

6.3 Interpreting the results

Both the PCA and Cluster Analysis presented in this report are grounded upon the 38 statements in the survey. Some of these statements were about behaviour 'I try to apply my previous experience',

some were about technologies ‘I make handwritten notes’, ‘I make digital notes’, and some were about experiences ‘I rarely find time to review my notes or readings.’

These statements were not directly linked or weighted to being a successful student, and instead focused on deriving information about behaviour and preference. Therefore, the seven learning behaviour concepts derived from the statements have been interpreted in this light. Many other factors contribute to the student experience.

6.4 Student use of digital technologies

When considering student use of digital technologies, several dimensions were explored through this survey:

1. Whether the content was mainly accessed digitally or physically.
2. Whether the student accessed the web at home, or had to travel elsewhere.
3. Problems accessing OU systems with desktop, laptop or mobile computers.
4. The student’s confidence in carrying out study tasks with digital technology (technological self-efficacy).
5. Whether the student used digital technologies for study tasks, such as making notes or organizing study time (DIGI score).

Considering the students who mainly access content digitally, there were a total of 32 students who sometimes or always had to travel beyond their home to access the web. This is 5% of the sample, or 1 in 20 students (of 606 responses). Although this is a small proportion, the impact of environmental and infrastructural issues relating to connectivity on their study experience is not negligible (see Section 2.4).

In responses about difficulties with OU systems and computers available to the students, there were more difficulties reported for mobile devices than laptops or desktops. For students mainly accessing digital content, these counts are 33 for desktop/laptop and 43 for mobile devices, which is 5% to 7% of students in this sample.

The technological self-efficacy statements were selected from a list of Level 1 digital skills used by the OU. In Chart 23, the higher the score, the more confident the student in using digital technologies for the study tasks listed in the survey. The maximum possible score is 7, for a student responding ‘very confident’ for all statements. The minimum possible score is 28 for a student responding ‘not at all confident’ for all statements. Overall, the mean scores fall within the ‘confident’ range, with some in the ‘a little confident’ range (see Section 2.5)

Students’ choices around the use of digital tools is complex. Insight from students suggests the chosen mix of media is often made according to the learning need rather than a particular preference for one medium over another, and the blending of media is common and expected.

Digital confidence appears to be comprised of two key elements: digital preference and technological self-efficacy. That is, the willingness to use digital formats and tools, and the sophisticated skills needed to effectively use digital tools for learning.

The data for digital preference (DIGI) and technological self-efficacy have been analysed across four key sub-groups: new undergraduates, continuing undergraduates, new postgraduates and continuing postgraduates. The distribution of responses can be seen in the Charts 22 and 23 below:

Chart 22

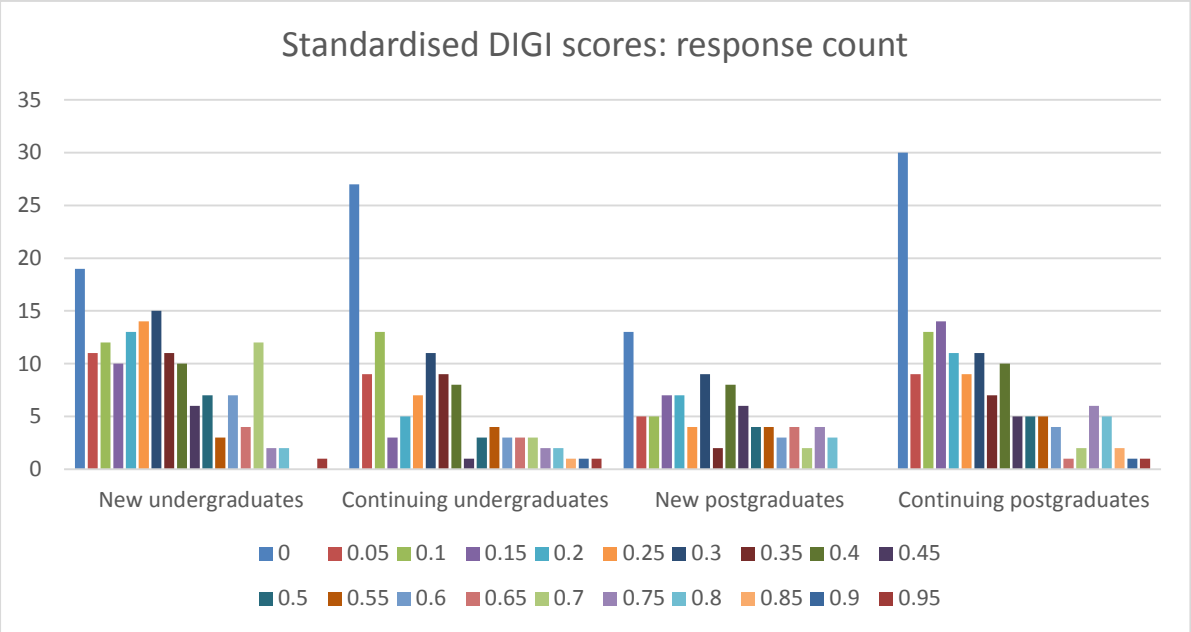
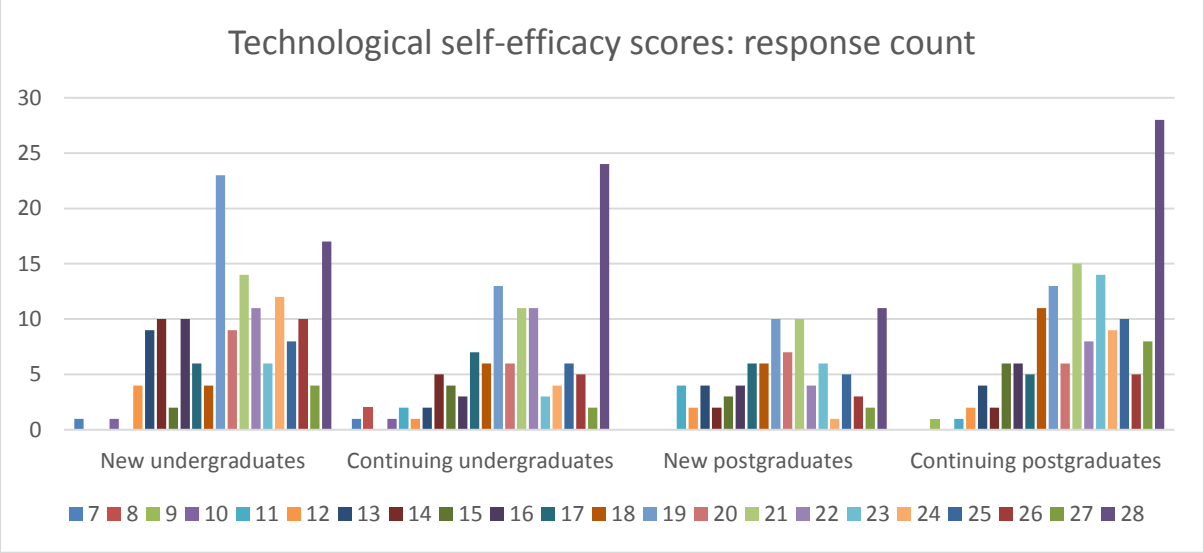


Chart 23



The shapes of the distributions differ. For all four subsamples, there's a peak at 28, showing high confidence. There's also a peak lower down, at 19 for new undergraduates, 19 to 22 for continuing undergraduates. There are more technological self-efficacy scores below 16 in new undergraduates than continuing undergraduates, indicating a lack of digital skills for study among students who are new the OU, new to higher education, or both. Differences between new and continuing postgraduates less obvious. It should be noted that these are counts of student numbers, so lower totals for postgraduates are due to lower numbers of postgraduates in the sample. For example, out of 90 new postgraduates in sample, 11 scored 28 for technological self-efficacy.

One interpretation of these findings is that students new to the OU, and possibly HE, are more willing to try digital approaches to learning, although don't necessarily have the specific digital skills needed for effective HE-level study. Some of the OU's more experienced students have the necessary skills, but may be making a deliberate choice not to use the digital formats currently on offer.

A key part of future technology development at the OU should be how the university can harness the willingness of new students to use digital methods and provide them with improved tools to scaffold their digital skill development.

References

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Appendices

Available from the Scholarship Exchange: https://intranet9.open.ac.uk/collaboration/Scholarship-Exchange/Wiki/Project.aspx?ProjectID=338 (for internal use only)

Appendix 1	Survey statements and abbreviations
Appendix 2	Response demographics
Appendix 3	Principal component analysis: whole cohort
Appendix 4	Summary of survey results for 524 responses: mean concept scores
Appendix 5	Comparing concept scores: T-tests
Appendix 6	Principal component analysis: new undergraduates and continuing postgraduates
Appendix 7	DIGI and technological self-efficacy scores by level and OU experience
Appendix 8	Principal component analysis: previous qualifications A-level or lower
Appendix 9	Hierarchical Cluster Analysis: whole cohort
Appendix 10	Cluster demographics