Study behaviours in an increasingly digital world: Learning habits, top tips and 'study hacks' questionnaire survey

Other

Study behaviours in an increasingly digital world

Learning habits, top tips and 'study hacks' questionnaire survey

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Learning Innovation, Technology Enhanced Learning

I always highlight the textbook and make notes in a notebook, including mind maps etc. if needed. I always have a laptop available in order to look up information in more detail if needed or to go onto the OU website. I think I use a mixture of strategies.

I use a laptop to study the online material but write notes in a paper notebook. I find this to be a succinct way to review previous sessions and to note key theories/ideas for easy referencing. I also write useful quotes in there too.

Abstract

In response to recent changes in the higher education market, student performance and competitor activity, The Open University has developed strategic objectives around a shift to developing ‘digital by design’ modules and the development of new digital tools to improve student success rates. In order to design effective tools, this initial piece of research was designed to understand more about students’ current study behaviours. The survey was built on a framework with student success at the centre, and generated a great deal of rich, qualitative data about how current distance learning students approach their study.

The data was analysed using a thematic analysis, and produced a number of interesting themes. These included a variety of digital personas; priorities when organising study sessions; note-taking methods and reasons for making notes; and boundaries. The practical applications of these findings are some embryonic concepts for new tools and digital spaces for students that encourage the development of successful study behaviours. These concepts are being developed in conjunction with a rigorous research plan.

Contents

Introduction

Since the governmental changes to fee structures introduced in 2012 and significant moves in the qualification framework, The Open University (OU) has experienced difficulties recruiting and retaining students at the level they used to (The Open University, 2017). The reasons for this are complex in nature, but the response is a comprehensive redesign process under the umbrella of the Students First Transformation strategy, which includes a commitment to more students qualifying and leadership in digital innovation. Part of this process will include a move to 'digital by design' modules (The Open University, 2017). In order to achieve this, it is essential that we understand how OU students currently study, why they adopt the study behaviours they do, and the provision that will enable them to be more successful in the future.

Since 2014 the Analytics4Action (A4A) project has sought to draw together the strands of module data and analytics collection and analysis work from across the university into a more user-friendly interface, and embed data analysis into mainstream module development processes. The impact of this has been positive (Barker, 2016), encouraging a culture of evidence-based decision making and rapid response to student engagement levels during presentation among module teams, staff from Technology Enhanced Learning, and production staff. However, in some cases the available data is limited or incomplete, and the process of analysing and implementing solely quantitative data brings with it a level of interpretation. The quantitative data demonstrates *what* students are doing, but not *why* they are doing it. Part of the intention of the 'Study Habits, Hacks and Top Tips' research was to collect a wider range of qualitative data to supplement the A4A data and help build a picture of the kinds of study behaviours students are engaging in and the reasons behind them. The Higher Education Academy in the selection criteria for the National Teaching Fellowship defined personal excellence as 'evidence of enhancing and transforming the student learning experience' (HEA, 2015), and it is essential that we really understand the current experience of OU students in order to define what an excellent student learning experience would look like.

The 'Study Habits, Hacks and Top Tips' research aimed to understand what successful study behaviours are in an increasingly digital world to ensure that our direction of travel as a university supports not only our current students' needs, but also adequately provides for the needs of our future students. Essential to this decision-making process is the inclusion of the student voice. Several work-streams in different areas of the OU have been striving towards a greater inclusion of the student voice earlier on in the decision-making process. Examples of this include consultations by the Open University Students Association (OUSA) and the setting up of a student panel by the OU Library to test ideas and be genuinely responsive to student feedback. All of these approaches align with the notion of 'students as partners' and 'students as change agents'.

> **Students as partners** is characterised by active student engagement and collaboration '[…] in which all involved – students, academics, professional services staff, senior managers, students' unions and so on – are actively engaged in and stand to gain from the process of learning and working together. Partnership is essentially a process of engagement, not a product. It is a way of doing things, rather than an outcome in itself.' (Healey et al., 2014)

> **Students as change agents** sees students being actively involved in the change process. In 2015, JISC launched the 'Change Agents' Network' which is a 'highly-active community of staff and students working in partnership to support curriculum enhancement and innovation'. (JISC, 2015)

In January 2016 the Learning Innovation team in Technology Enhanced Learning ran a staff and student Hack Day:

> Hacking is collaboratively tackling a design challenge or solving a problem by stimulating innovative, creative thinking, and using the process to identify issues or opportunities. It encourages non-standard solutions, and the process is as important as its outputs. (Vince and Ellis, 2016).

The outcome of the day was very positive and participants expressed a desire to be more involved in 'student community-building and more in-depth involvement with the OU beyond that of the module level'.

A significant outcome of the Hack Day and other student voice activities is the vocalisation from students of their desire to be engaged, and contribute to the development of their university and learning materials. Many areas of the university, include the Learning Innovation team, rely on student input to develop innovative solutions, but student input is not always readily available. Despite the success of the Hack Day, the format was not scalable or entirely representative of the study body, so a need emerged to form a new channel within the Learning Innovation portfolio to mimic the interaction between teachers and students in face to face classroom settings.

In July 2016 the Curriculum Design Student Panel was formed as a partnership approach to student engagement in the development of learning and teaching activities, tools and services. The 2016/17 panel consisted of 461 students from across a range of faculties who have volunteered to take part in up to four activities a year. Students can volunteer to take part in activities such as workshops, surveys, and various kinds of usability and experience testing. Activities are run face-to-face, through OU Live (Blackboard Collaborate), and via the panel's We Learn VLE workspace. The 'Study Habits, Hacks and Top Tips' survey was the first activity of this panel.

Aims and objectives

The OU primarily uses surveys to canvas input and feedback from our students. At the end of every module a Student Experience on a Module survey (SEaM) is sent out. The SEaM Survey seeks feedback from all students on all modules two to three weeks before the end of the presentation. There are three themed sets of questions in the SEaM survey, which cover: teaching, learning and assessment; feedback on the tutor; and the module overall (The Open University, 2017). The focus of the SEaM survey is very much about what students have liked and disliked about the module they have just studied. In addition to the SEaM survey we have asked students for their input to many other ad hoc surveys. Examples include the LEAP project (Jones and Healing, 2011), e-pedagogy of handheld devices (Cross et al. 2014), and Module Delivery Research (Print and Online/Onscreen) (OUSA, 2016).

A limitation to some of our current student surveys is the lack of future direction. By asking students what they like and don't like about what they already have, we can get trapped in a circular thought process in which we keep looking back to what worked well about legacy print models that don't free us up enough to design for the future.

The approach of the 'Study Habits, Hacks and Top Tips' survey built very much on the principles of human centred design and user requirements gathering. However, it was important that the lack of correlation between student satisfaction and student outcomes was borne in mind (Toetenel and Rienties, 2016). Asking students what they like, or would like to see in the future was not enough. The survey sought to elicit information about student behaviours in their approach to digital study, and the underlying learning processes behind those behaviours.

Methodology

The ‘Study Habits, Hacks and Top Tips’ survey was designed to elicit anecdotal and situational data from our students. The balance of quantitative and qualitative questions aims to provide information on not just the kinds of technology and tools our students use, and how often, but to capture their self-described behaviour while using them, how they adapt university-provided systems to suit their own needs, and what their suggestions would be for a future system.

The survey was designed on a research framework (Figure 1) that put student success at its centre. The drivers for student success were identified as:

- Participative learning (students contributing to their own learning in non-assessment ways)
- Learning to learn
- Collaborative learning (group working)
- Deeper engagement with learning materials.

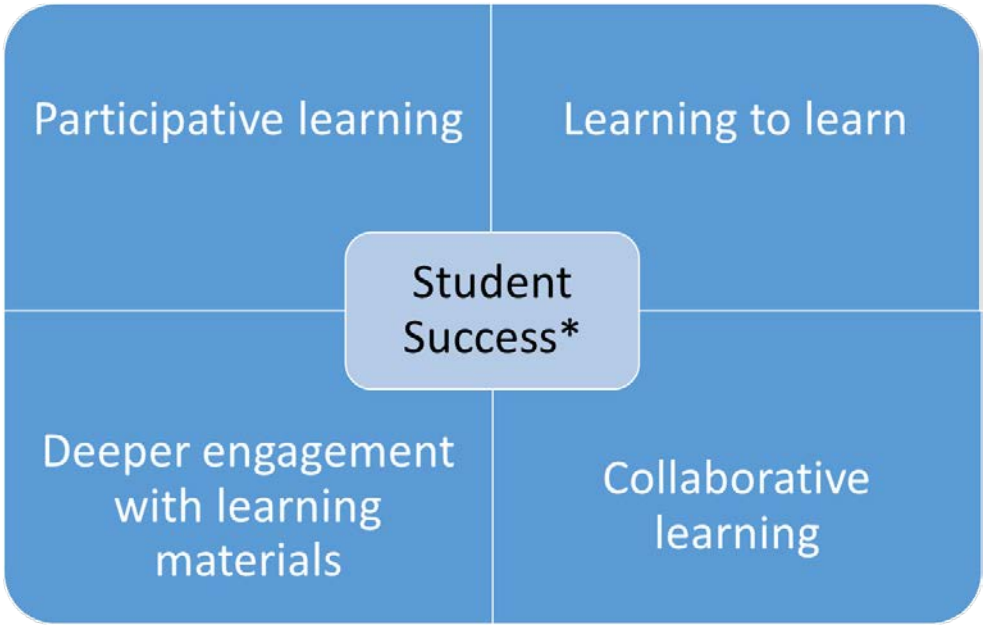

*Figure 1 *Student success is defined as improved progression, improved attainment, and improved retention.*

The survey posed 15 questions (Appendix A), mapped to these drivers. Each quantitative question was followed up by a qualitative question to allow students to respond through free text. It followed a linear design, moving from two subjective ‘embedding’ questions on digital confidence and experience of digital learning to date (questions 1-2), to questions about physical locations of study, digital locations of study, physical tools, digital tools, behaviours around using these tools (questions 3-9), preference for delivery of particular types of content (questions 10-11), and the kinds of workarounds/hacks students employ when using our virtual learning environment (questions 12-15).

Most questions gave a Likert scale, while the workaround/hacks questions provided a visual prompt.

Questions 10 and 11 were sampled with permission from the ‘Module Delivery Research

(Print and Online/Onscreen)' 2016 survey from the Open University Students Association on students' preferences for digital delivery of learning materials, in order to provide further context to the results. Students were also asked if they would be willing to be followed up with an interview.

The 'Study Habits, Hacks and Top Tips' survey was distributed to 199 students by email on 11 July 2016. The survey remained open until August 1st, during that time 141 students responded, of which 11 responses were incomplete, a 71% response rate. Students received one reminder to complete the survey. Respondents were mainly continuing students (students who on a qualification pathway) on Arts, Social Science and Mathematics modules that use both offline and online delivery of learning.

Results

The data obtained from the survey has been analysed using a three stage process.

1. Descriptive statistics

The raw data was analysed by SSST Survey Office Team in August 2016. The report has been produced using the Qualtrics system and a full version can be found in Appendix B.

The key findings were grouped as follows:

1.1 Comparison of reliance on physical and digital tools when studying

'Studying' for the purposes of this survey analysis is defined in the research framework as 'deeper engagement with learning materials' and 'learning to learn', primarily through highlighting and annotation. When asked if they highlighted and annotated as part of their process, student responses show that only 49% highlight quite a bit or a tremendous amount, and only 43% annotate quite a bit or a tremendous amount. Students responding to the kinds of tools used indicated a moderate preference for physical highlighting (21% use highlighters quite a bit, and 27% a tremendous amount) (Figure 2). Although digital annotation tools are not in significant evidence, the comparison between physical highlighting and the use of digital annotation and highlighting on a tablet shows evidence that students with access to these tools do incorporate them into their study process (Figure 3).

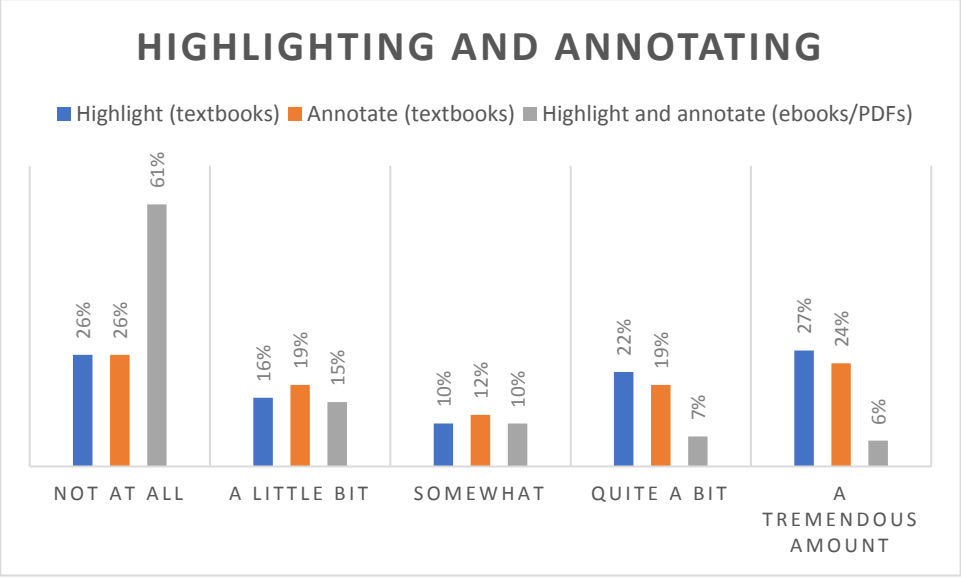

Figure 2

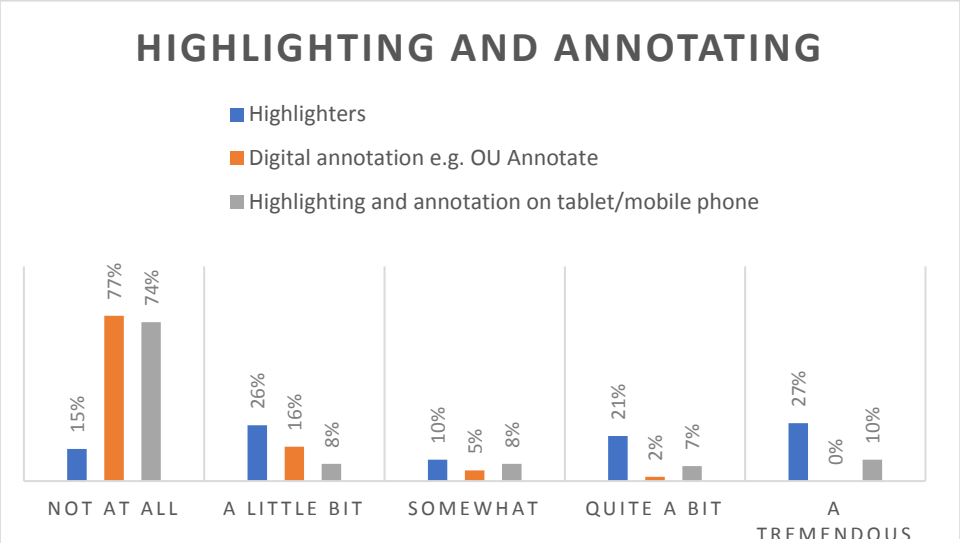

Figure 3

1.2 Comparison of how students create artefacts in physical vs. digital spaces

The creation of artefacts in this survey analysis is defined in the research framework as 'deeper engagement with learning materials' and 'learning to learn'. A very high proportion of students continue to use notetaking as part of their study process. 59% of students indicated that they prefer to use pen for note taking, although 44% indicate that they use desktop and laptop computers for this task (Figure 4).

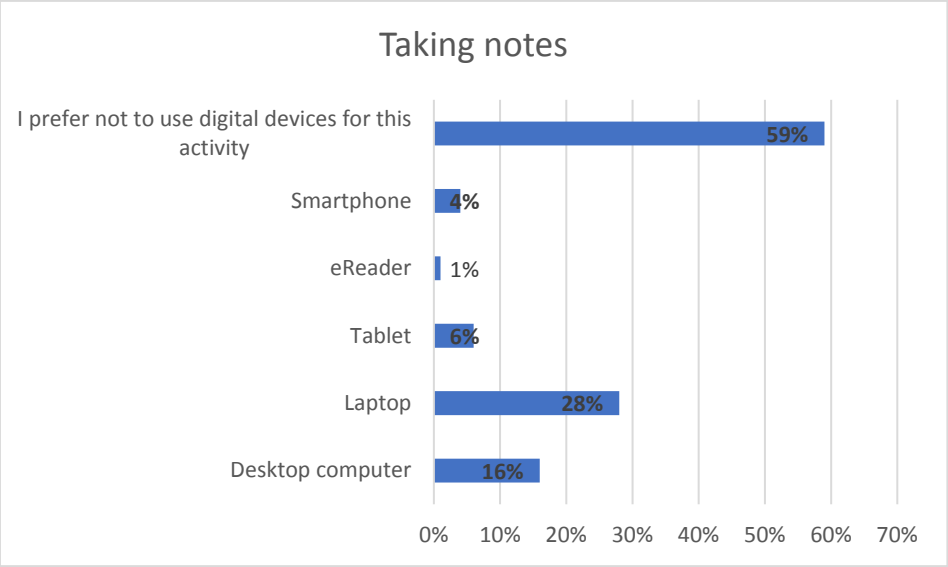

Figure 4

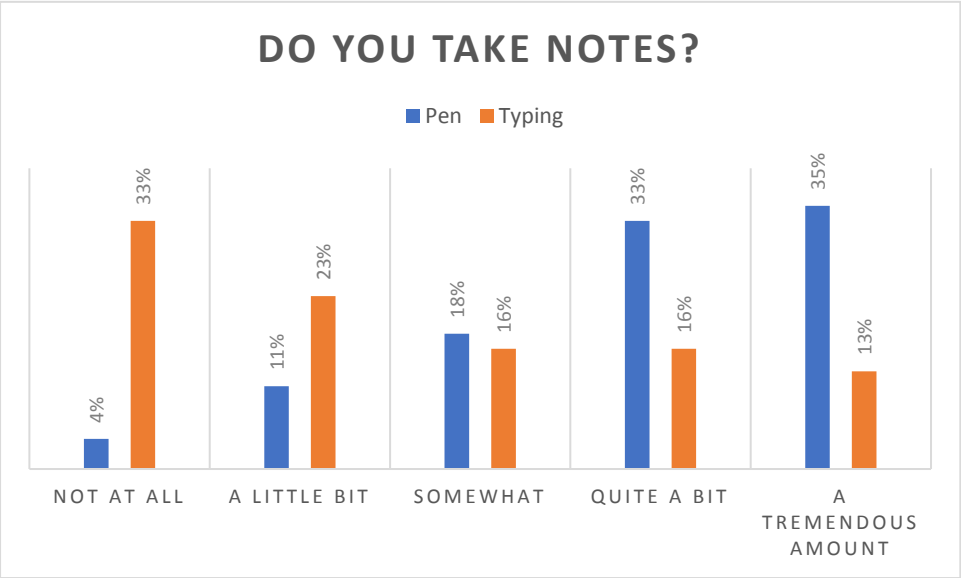

Figure 5

The participants in this survey indicated a preference for notetaking over the creation of other artefacts such as mindmaps or diagrams, with only 4% of students not taking any physical notes and 33% not taking any digitally (Figure 5). This is compared with 29% of students not creating any physical mindmaps or diagrams, and 69% not creating any digitally (Figure 6).

The purpose of notetaking was assumed to be revision, as part of the learning process, and students indicated that they did refresh themselves using their notes before a study session or exam quite a bit, both physically and digitally (Figure 7).

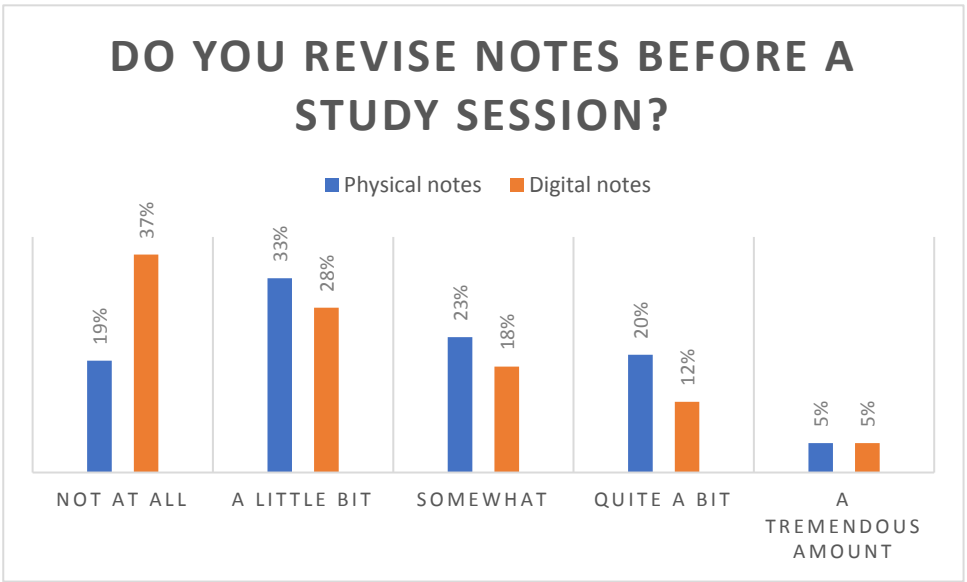

Figure 6

1.3 Comparing the effectiveness of highlighting and annotating online/onscreen material and print material

The comparisons in Sections 1.3 and 1.4 were both analysed from Questions 10 and 11, which were sampled with permission from the 'Module Delivery Research (Print and Online/Onscreen)' 2016 survey from the Open University Students Association on students' preferences for digital delivery of learning materials. The results from these questions offer useful context for other responses, which is discussed in more detail in Section 2. In terms of effectiveness of highlighting/annotating in print and online, 35% of students deemed highlighting/annotating print as extremely effective, and 30% indicated that highlighting/annotating digitally is not at all effective. However, 31% deemed it moderately effective, and 22% slightly effective, demonstrating an engagement with these approaches, with room for improvement (Figure 8).

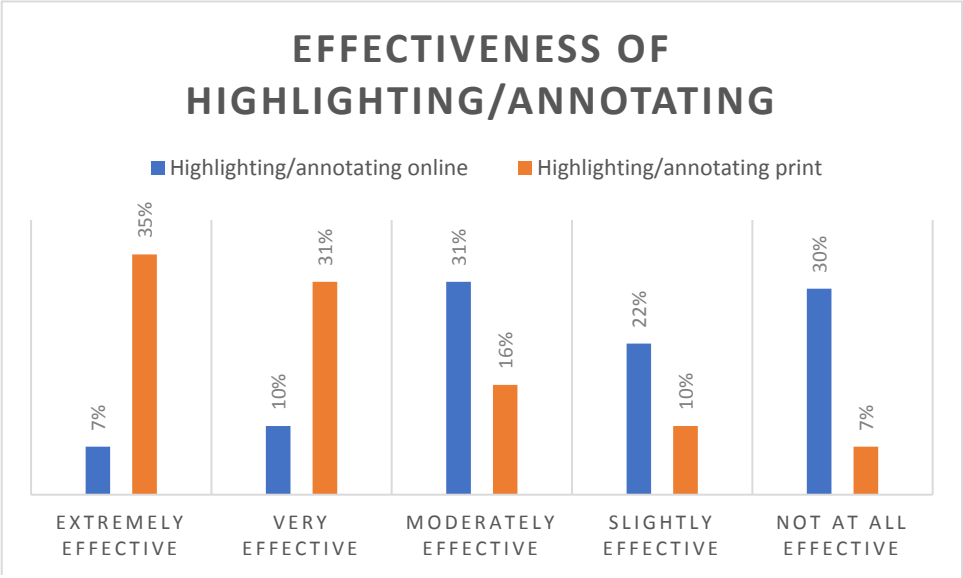

Figure 7

1.4 Comparing the effectiveness of revising with online and print material

Within the research framework, effectiveness of revision online or in print is defined as 'learning to learn'. Although 43% indicate that they prefer not to use a digital device for revision, 41% of respondents use a laptop for revision, 25% use a desktop computer, and 16% use a tablet (Figure 9).

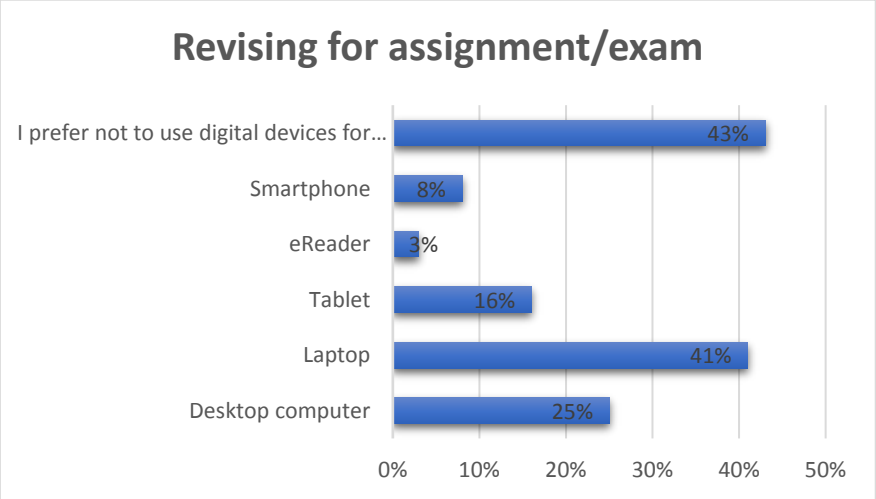

Figure 8

In terms of effectiveness, 32% of respondents deemed online revision as moderately effective, and 26% as very effective. Most students deemed revising print materials as extremely effective (51%), but this again indicates that participants have attempted digital revision as part of their learning process (Figure 10).

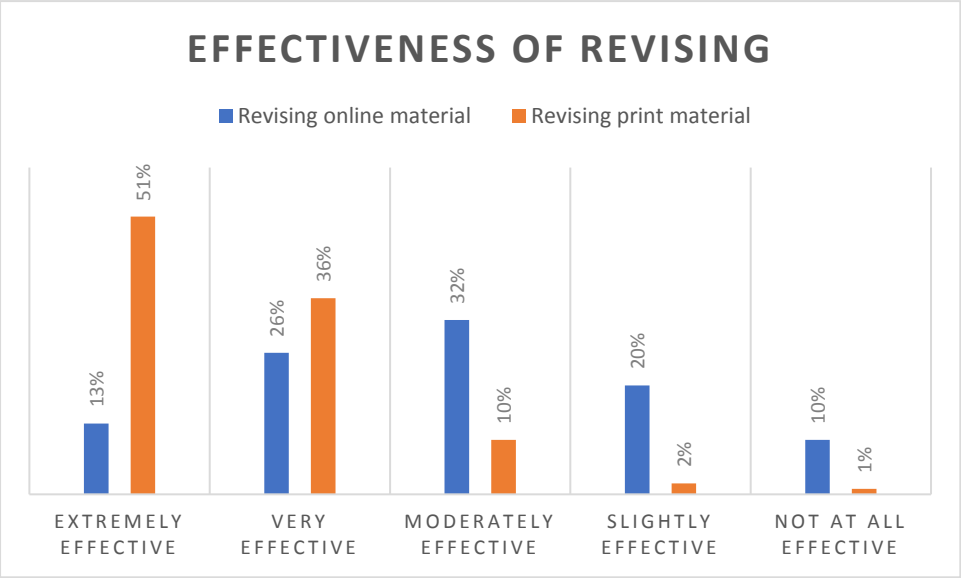

Figure 9

2. Content analysis

The survey yielded a huge quantity of rich qualitative data through student responses to free text commentary. In order to engage and familiarise ourselves with it, the Learning Innovation team held an initial workshop in which we reviewed each student profile and gathered high level snippet 'insights'. These were clustered against the research framework. This process generated a large number of insights, which underscored the need for an in-depth thematic analysis.

3. Thematic analysis, supported by descriptive statistics

The thematic analysis report draws together descriptive statistics from the numerical responses and qualitative analysis of the textual responses. An inductive approach to thematic analysis was applied to the free text. The focus was upon statements about study preferences and behaviours. All responses to all survey questions were analysed, although not all were coded. Codes were allocated according to cues within the text (these are listed next to the codes in the report). For example, the code 'structured time' was allocated to respondents who mentioned cues such as:

- planned time chunks
- regular time routine
- limited study time is a priority.

Due to the brevity of the responses, codes were allocated at the respondent level, rather than within the text, thus each respondent has a list indicating whether or not their answers contain each code. Also, during the analysis, it became clear that the initial codes could be relabelled as sub-themes and clustered into themes. Thus 'structured time' is a sub-theme within 'priority when organising study sessions'. Once sub-themes (codes) had been allocated, Excel formulae were used to interrogate the data for co-occurrences of sub-themes.

Table 1 Study Habits analysis: coding frequencies

N=142	Frequency	Percentage
avoid distraction	8	6.2
clear desk	11	8.5
essentials handy	12	9.2
structured time	15	11.5
structured tasks/goals	8	6.2
structured around assessment requirements	15	11.5
digital as distraction	7	5.4
digital as clutter	10	7.7
digital seeker	12	9.2
digital connector	48	36.9

3.1 Digital behaviours and preferences

The free text responses indicate four main sub-themes, listed below with typical cues found in the data. Figure 11 shows the number of respondents who have at least one instance of each sub-theme. There are relatively few respondents who identify with more than one of these sub-themes. 60 respondents have been coded for only one of these, which suggests that these sub-themes may be useful categories for digital behaviours and preferences. (A further 7 respondents coded for two or more of them, 1 respondent coded for three of them and 62 responses did not have any of these codes.)

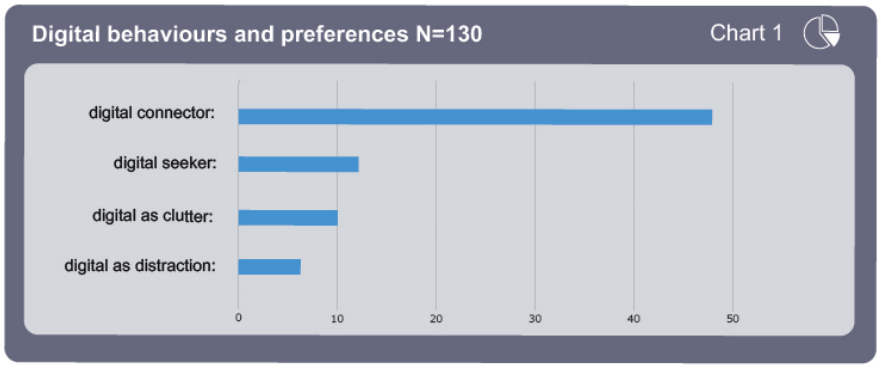

Figure 10

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

There is a fifth sub-theme identifiable from the data. Although only two respondents indicated this, it needs to be considered, because it could adversely affect some students.

digitally limited:	can't access internet when required; connectivity issues affect studies

Some typical comments: digital behaviours and preferences

> *Remove all distractions from study area and systems (eg: close tabs that are not related to study, such as Facebook)*
>
> Digital as distraction, Participant 2, q12a

I am not very interested in interacting as I find it distracts from study, the module website can be useful but varies from course to course.

Digital as distraction, Participant 65, q14

I use big posters A1 format and do mind maps to put all notes into one mind maps and drafting links between certain theories. At the same time I am searching online for another ideas and reading more from the topic. Gradually I add more information i.e. I learn more into details.

Digital seeker, Participant 48, q12a

I go online for extra tuition in areas I'm having difficulty with like The Khan Academy for example. I also use e-Text Books I have downloaded. I use very old school methods, reproducing key notes in, non-digital, mind map form.

Digital seeker, Participant 48, q12a

Better broadband for rural areas! Impossible to do online stuff if access poor and nearest library 20 miles away that is open after 5.00

Digitally limited, Participant 4, q14

I cannot yet work at home because of neighbours. I have a tablet but no internet in the library. The OU must start to provide [Eduroam] access as in Oxford Brookes Library I have no computing services as yet. I have to go to Starbucks for Wifi or a public library.

Digitally limited, Participant 100, q12a

3.2 Priority when organising study sessions

The free text responses indicate three main sub-themes, listed below with typical cues found in the data. Figure 12 shows the number of respondents who have at least one instance of each sub-theme.

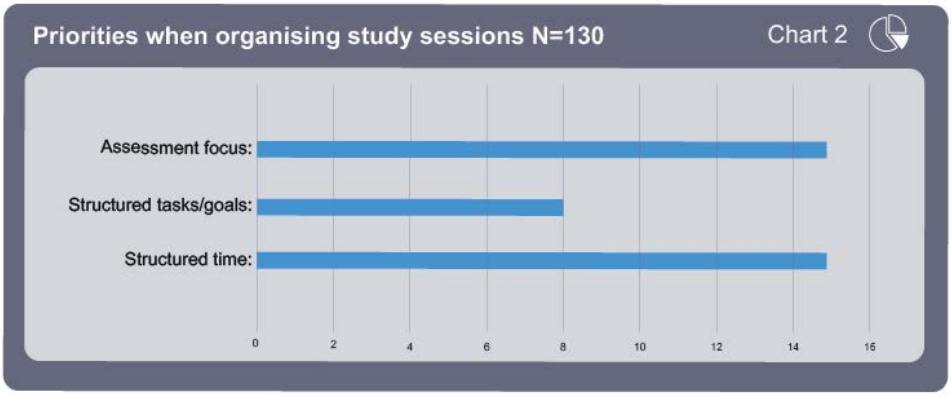

Figure 11

assessment focus:	organises study around assignment requirements from the start
structured time:	planned time chunks; regular time routine; limited study time is a priority
structured tasks/goals:	sets goals; lists tasks; studies a chapter, unit

There is a further sub-theme emerging:

Unstructured:	fits study in whenever possible; does whatever needs doing at that time

Only a few respondents noted this, although those with limited control over their daily routine or ability to study (perhaps for health reasons) may be more likely to adopt this approach.

Typical quotes: priority when organising study sessions

I try to study with the TMA's and exam questions at my side, I find it gives focus to the notes I make and allows me to prepare from the outset for the exam at the end.

Assessment focus, Participant 78, q12b

Ensure all notes and annotations are related to the questions in the TMA/EMA and file or organise them, online or in a note book.

Assessment focus, Participant 20, q12a

As a language student I try to break down my study into appropriate chunks of time. For example there are some aspects I can undertake when I only have a small amount of time available - e.g. on the daily commute to work. That's when I do tasks like learning vocabulary (from a notebook I keep) or listening to downloads of the module audio materials on my Ipod. I also use a French verb practice app on my smartphone. That way I'm always able to do something constructive with what would otherwise be dead time. / / For areas of study that require more thought, note taking, composition etc, I know I'm going to need more time and try to allocate periods where I know I won't be disturbed and can give the work my full attention. / / I am always on the look out for pockets of time I can use to enhance my study such as listening to foreign language news programmes or podcasts whilst doing housework. I try to integrate my study as much as possible into my daily life in order to maximise my learning opportunities as much as possible, I find this really important when working and studying.

Structured time, Participant 57, q212a

My learning system is based on a very detailed plan of study, where is scheduled what I have to do every day (I do not have days off, I study every day throughout the academic year), for when I need to make another part of the TMA or iCMA and so on. There's no shortcut. Work, work and work again. Only hard work. Studying is not fun.

Structured tasks/goals, Participant 102, q12a

No. I grab any opportunity I can to study, sit down and get to it.

Unstructured, Participant 129, q5b

3.3 Study habits and content production

Questions 8 and 9 asked about the creation of physical and/or digital content during study. Notetaking is one aspect of this, which will be considered in more detail in section 3.4. Here in Section 3.3, a wider range of physical and digital content production is considered. Section 3.3.1 summarises the multi-choice survey responses and Section 3.3.2 considers the free text responses.

3.3.1 The study process, digital and physical content: response scales

For all charts in Section 3.3.1, N=133 (absent data are indicated). The rows are the responses to Question 8 'how do you create physical content' and the columns are for Question 9 'how do you create content digitally'. Note that the physical content rows are colour-coded by response (see key below chart). The same response codes also apply to the columns, so column 5 indicates 'a tremendous amount' of digital content and column 1 is 'not at all'. Zeros indicate 'no data'.

There is a brief interpretation below each chart.

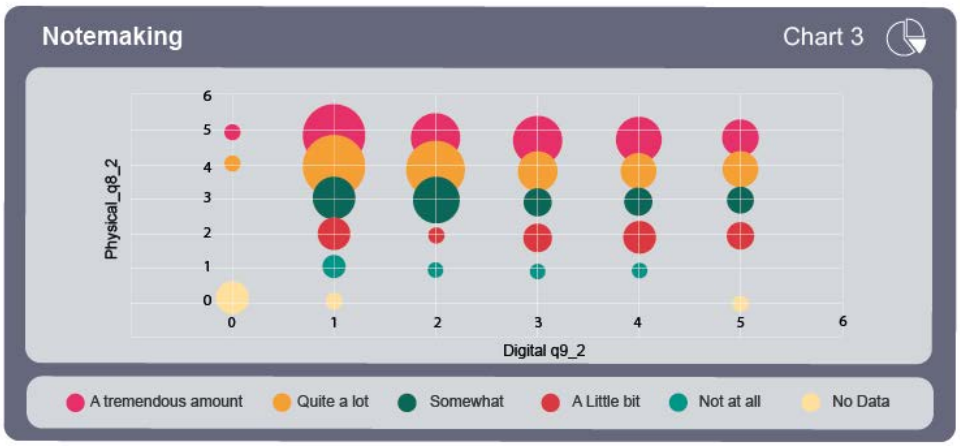

Figure 13

Figure 13 shows that most students make a tremendous amount or quite a lot of physical notes. There is a spread into both physical and digital note-making. A few make digital notes without physical notes.

Column 1 of Figure 14 shows two clusters in physical highlighting: a tremendous amount or none at all. There is relatively little digital highlighting, even for those who do a tremendous amount of physical highlighting.

Figure 14

Figure 15 shows a similar pattern to Chart 4, but note the orange circle in lower right corner: a few students who do a tremendous amount of digital annotation with no physical annotation. (Q9 asked about digital highlighting or annotation, so the same data were used.)

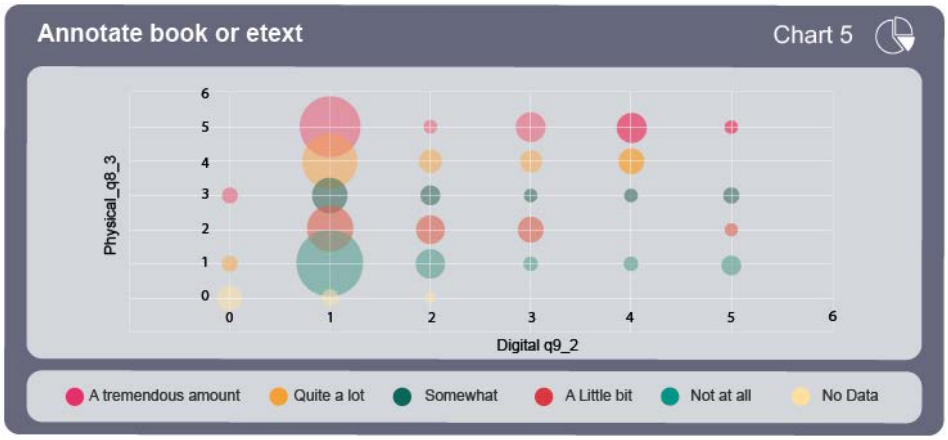

Figure 15

Figure 16

Figure 16 shows a spread in column 1, from those who organise their physical notes a tremendous amount, to those who do not organise at all. The spread across row 1 indicates those who do not organise their physical notes, but do organise their digital notes. The green circle at the top right corner represents those who organise both physical and digital notes a tremendous amount.

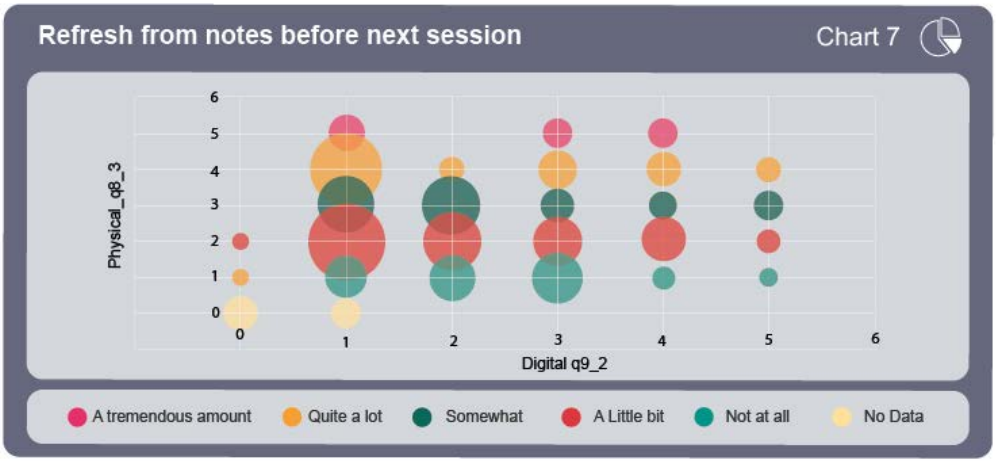

Figure 17

As shown in Figure 17, few students report that they refresh themselves a tremendous amount from notes before the next study session. There is more of a bulge in the 2 to 4 range, indicating ‘a little bit’ to ‘quite a bit’. There are substantial numbers in column 1 and row 1 who do not refresh themselves from notes at all. Note the middle to right end of row 2, showing those who refresh more from digital notes than from physical notes.

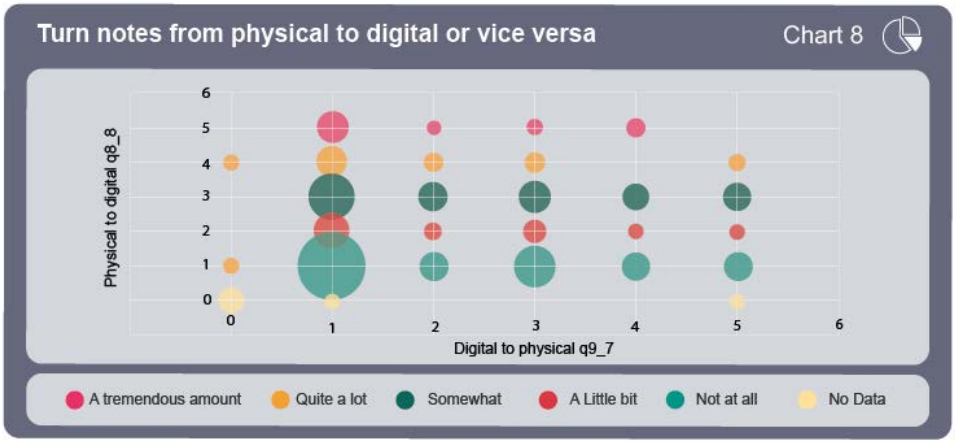

Figure 18

As shown in Figure 18, many students do not convert notes between physical and digital forms at all: see the large orange circle lower left. Column 1 and row 1 predominate, indicating that those who do convert notes have a preference for either ‘digital to physical’ or ‘physical to digital’. Hardly any do both. This may indicate a process where the ‘end point’ is either digital or physical. This is discussed further in Section 3.4.

Chart 9 uses data about making physical notes on notes, including on printouts from digital notes (Figure 19). Row 1 predominates, indicating that many people do not make notes on physical notes at all, although there is a spread into other rows. Looking across row 1, the numbers are consistently high, indicating a substantial number of students who make some notes on printouts of digital notes, even though they do not make notes on previously handwritten notes.

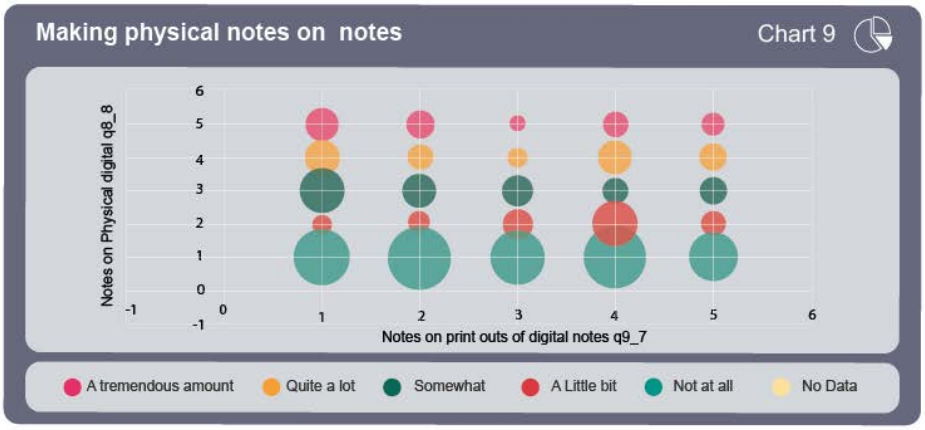

Figure 19

3.3.2 The study process, digital and physical content: descriptive data

This section looks in more detail at the free text responses relevant to the previous charts.

The study process and ways in which students organise and use their notes

Most respondents make notes on paper as they study, to help their learning. Some work directly digitally, but they are a small distinct group. Some scan or type up paper notes to store digitally. Some print out to work on paper by adding further handwritten notes. So, there is a flux between physical and digital as students use notes to make sense of the material or to prepare for assessment. Some work with digital and physical notes at the same time, and may use different methods at different times. The following examples illustrate a range of approaches.

Participant 56 reads either digital or paper content when travelling, and makes physical notes at first. A laptop is used to type up summary notes when at a desk. These digital notes are refined to form an overview of the module content, so the 'end point' of the content production is digital. There is an iterative process of reading and rereading whilst the summary is produced:

> *I study at home at the weekend, at work in my lunch hour, and on the way to and from work (on public transport). I have organised my study so that on public transport I read and annotate my paper copy of the text books or read and organise information on my laptop (no typing on the bus). At work and at home I do my typing (type up notes or TMAs). My main problem is memory (or lack thereof). I understand things fairly easily but have trouble retaining information so repetition is key for me. I read the printed text book making sure I understand it. I underline key sentences and terms as I go. I then re-read the material, summarising main points in the book margins. In a separate session on the same day, I type up the notes from the margins of the book to my laptop. At the end of the chapter I re-read everything again (book and laptop notes) to make sure I have a good overview of how the different parts of a chapter interconnect and come together. I might tweak my notes if necessary. I don't make copious notes (more like a summary to trigger my memory of what I have read). If I read related extra material (such as an online library article I will keep a copy on my laptop and highlight key sentences. I keep all digital notes, articles etc related to a chapter in the same folder on my laptop as well as a digital copy of the book's chapter.*

Participant 56, q12a

In contrast, Participant 80 makes handwritten notes and prints out onscreen content. This participant also produces a summary, in the form of key points and a mind map. The 'end point' of the process is a folder of paper content, organised to relate to the module sections.

> *I make hand written notes and file them in a lever arch file in order with tabs to divide each block or section. / I re skim read with the block book to re read notes, I wrote on the book and highlighted bits. / I read the onscreen sections and print each section out and file it in the lever arch file. / My file may be a mixture of printing each page and section off the screen and my hand written notes. / I used different coloured highlighter pens. / I attend the tutorials. / I keep the PowerPoint slides (and file) from a tutorial and use as revise key points to look at before an assignment. They help me a lot. […] / I create a mind map of each block to help me revise the key points.*

Participant 80, q12b

Organising notes to fit an assignment plan, essay argument or topics for exam revision is an important driver. Some students do this entirely on paper, shuffling notes on the desk. Others type up their notes, then use the word processor to rearrange them, then 'fix' by printing. Some people work on paper first, then type up notes to produce a neat copy. For some, this is done during their studies, for others it only happens when actually preparing an assignment.

> *I break the question down first and then find the information I need to write about, make the necessary notes separately, and then merge them together by typing out on the laptop.*

Participant 35, q12b

Participant 113 makes physical notes in a notebook, adds more handwritten notes while thinking about the topic, then produces the assignment directly in digital format. The digital format seems to allow easy editing.

> *I find the relevant section in module materials or other study materials and flip through my notebook to the heading which is the same in the notebook [sic: may mean module?]. I rewrite, in my own words, what I think or understand from the study material with the aid of my impressions and arguments explored in my notebook, or challenge those notes to explore the other side of an argument or discover new insights. I write directly onto the laptop, save that version, then incorporate it into the TMA to answer all of the guidelines required of that assignment.*

Participant 113, q12b

Participant 13 also produces handwritten notes while studying the materials and picking out relevant points. When preparing for assessment, notes are typed up to show themes. There is a sense here that once a document has been printed, it is ‘fixed’ and will not be revisited digitally.

> *Usually, I will start with an extensive amount of notes, compiled throughout the module. I will always read through these notes and take more notes with less detail and paring down the notes I have written constantly. For TMAs I will pare down the notes and then compile another A4 sheet with headings and points that I will use before typing up the assignment. For exams, I have found that grouping each past exam paper questions into themes ensures that I am able to identify trends and choose study material wisely. I will employ the same methods used for my TMAs at the beginning and then draft word documents with key points for each theme. All are printed as I go along for ease of reference and so that I don't have to constantly switch through word documents. Once a document is finished and printed, it will generally not be accessed electronically again.*

Participant 13, q12b

Highlighting text

Highlighting seems to split students into two groups. Either students don't do it much at all, or they do it frequently, mostly on paper, though a few use software to highlight etext.

> *Use of ipad for nearly all material. Sometimes have to use laptop or desk top as an intermediary when down loading material from for example OU library. Need to use software that allows on screen highlighting, could be ibooks, adobe reader, kindle. often depends on the platform the OU library subscribes to for the particular material I want*

Participant 71, q12a

> *I always highlight the textbook and make notes in a notebook, including mind maps etc. if needed. I always have a laptop available in order to look up information in more detail if needed or to go onto the OU website. I think I use a mixture of both above strategies.*

Participant 83, q21a

Quoting, referencing, bookmarking and re-finding information

Another popular habit is book-marking or collecting useful sections of the materials, with references, so they can be revisited for assignments or revision. This is done in many different ways, from sticky notes in books through to cutting and pasting digital screencaps. (See Section 5 for specific suggestions for digital tools). Participant 29 uses notes to navigate through the module. This is a useful metaphor, which echoes other participants who organise their notes according to the module content.

> *When preparing for an exam I read through my notes and revisit anything that I think will be relevant for the assignment online. I use my notes to navigate through the module which saves time when trying to look something up as my notes are clearly labelled and dated.*

Participant 29, q12b

> *I use loads of highlighter and underline. One tip I have found useful is to be ruthlessly disciplined about annotating references in the margin of my notes i.e. texts and page numbers so I can go back to the original, as there is nothing worse than scrabbling round for refs at the end of TMAs.*

Participant 61, q12a

Different types of notes

Not all notes are linear text that fits neatly onto an A4 page. Some use diagrams, including mindmaps, to link ideas. Others make posters or wall charts of key points, or simply attach sticky notes to the wall.

> *I had no set preparation. I would normally need around four solid hours without distraction to get two hours of useful study time. As a result, my study would normally be when I was most likely to get peace at home, so that I could pace, talk to myself, and scribble post-it notes and stick them to my wall.*

Participant 119, q5a

I created a mind maps [sic] of the main points and things to include in my IT Project as there was a lot of start up documents to read, just too much text to read and no crib lists. I have saved the documents in folders neatly but this saves me time not having to re read them so much. I will only refer to them near the end to final check.

Participant 80, q6a

3.4 Physical/digital notes and reasons for making notes

3.4.1 Physical and/or digital notes?

From Question 8 and Question 9, the numbers of people making physical and digital notes can be determined. Out of 133 respondents, 2 do not make notes. Most students make physical notes, except for 3 people who make only digital notes. About two thirds of students make digital notes in addition to physical notes. Chart 10 illustrates this and the quotes that follow give some examples of the ways in which students make physical and digital notes.

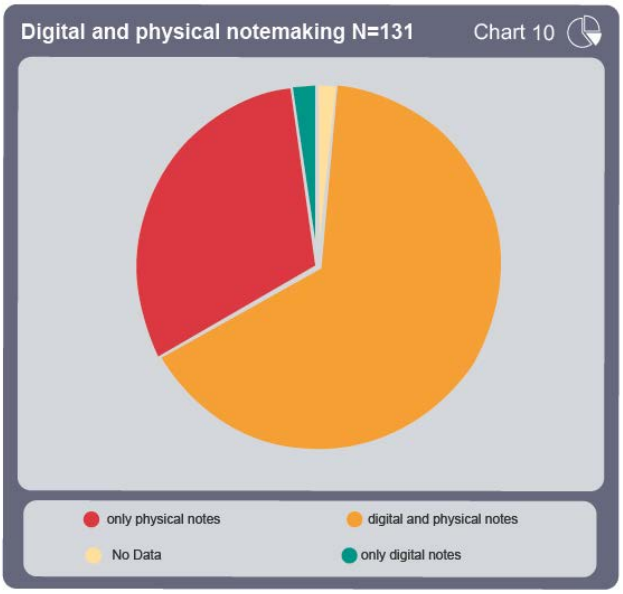

Figure 20

Some find the process of handwriting notes more effective than making digital notes when they want to make sense of the material or remember it.

Hand written notes. Far better for memory retention than typing out notes. I found this worked better for me personally but since I have heard about a Harvard study where this has been proven to be more effective

Participant 53, q12b

Physically writing leads to better retention of data, this is a process I have found useful.

Participant 112, q12b

I have found writing things down is the safest option when I study and especially in time of stress (for example when revising for an exam or having a deadline), this helps me to relax. Also things become a lot more [clear] when I write them down.

Participant 99, q12a

Many respondents study digital materials and produce handwritten notes.

I use a laptop to study the online material but write notes in a paper notebook. I find this to be a succinct way to review previous sessions and to note key theories/ideas for easy referencing. I also write useful quotes in there too.

Participant 29, q12a

A few respondents are 'digital first' when making notes.

For each chapter, I prepare electronic notes of key things as a first read through of the material. I send these to my ipad partly so I always have them to hand. I then straight away make my revision notes from the electronic ones, as well as doing all the available exercises, as this firms up what I have learned.

Participant 22, q12a

3.4.2 Reasons for making notes

The free text responses indicate seven main sub-themes, listed below with typical cues found in the data. The two most frequent reasons are 'to make sense' and 'to index material or refer back'. Figure 21 shows the number of instances for each sub-theme.

notes to index material or to refer back:	references; bookmarks; note section or quote
notes to help focus and learn while reading:	focus; helps concentration
notes to condense:	condense; summarise; reduce
notes to pick out key points:	key points; important points; relevant
notes to make sense or put ideas differently:	help learning; make sense; understand
notes for memory:	retain; remember
notes for revision:	revise; use for exam

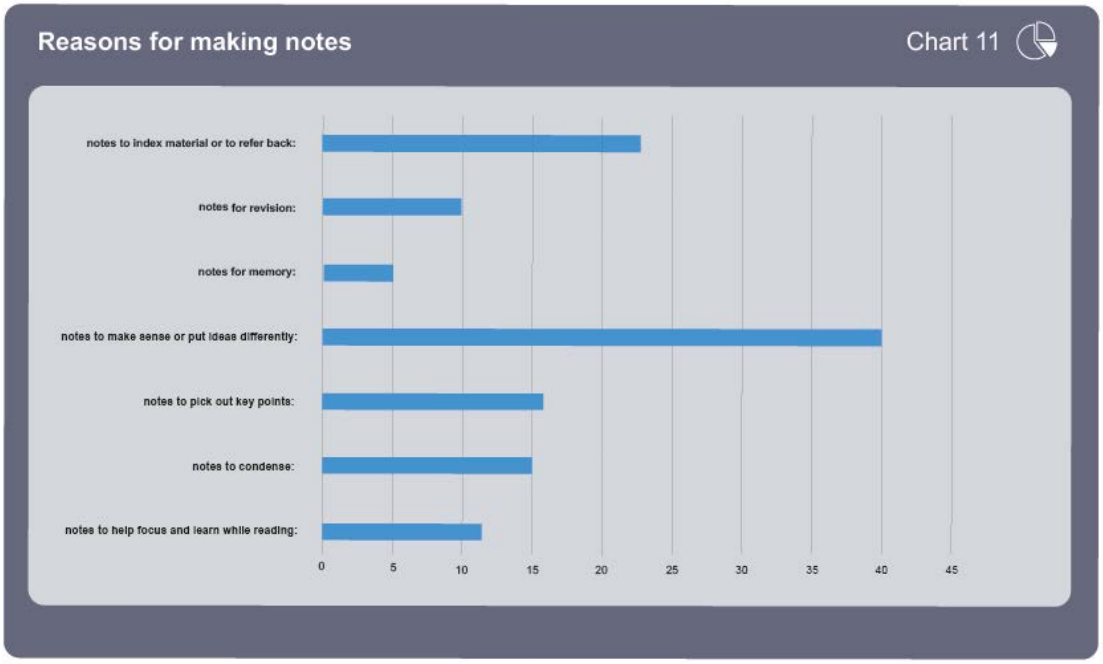

Figure 21

3.4.3 Reasons for making notes: variations between subjects

Looking in more detail at the free text responses about notetaking, there is some tentative evidence for different preferences depending upon subject. Subject codes are the first letter of the module code, ignoring other faculty attributions.

Figures 22 and 23 are based upon the coding of reasons for notetaking (responses to q12a and q12b). Some caution is required, because there are low numbers in some subjects. The left side of Figure 22 shows the number of respondents for each subject. Note the small numbers of students except for A, D, M. The rest of Figure 22 shows the subject profile for each reason.

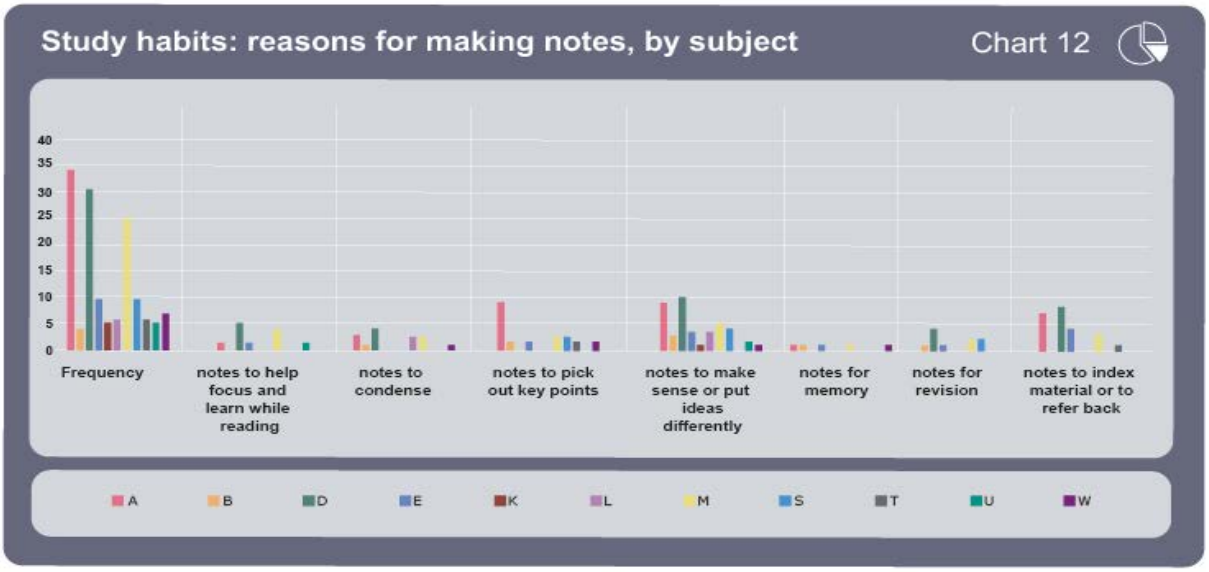

Figure 22

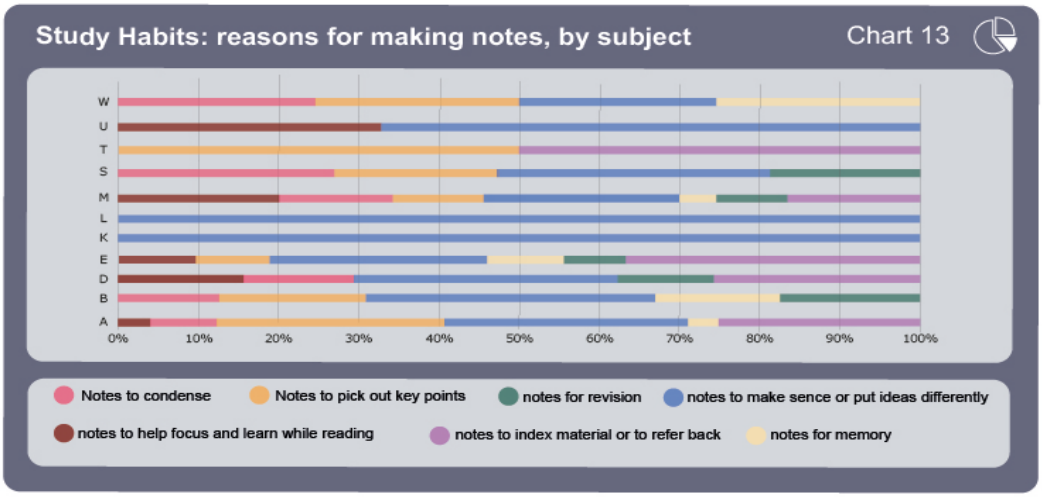

Figure 23

Figure 23 shows the reason profile for each subject, adjusted to show the proportions of students in each subject who state that reason for making notes. A, D, and M show a wider range of reasons than other subjects. This is tricky to interpret. Is this due to the nature of these subjects, or is it simply that there are more participants in these subjects, hence a wider range of preferences? One clear conclusion is that students in all three of these subjects use notes for several different purposes.

Looking at the free text itself, there are other clues.

- A, D, E students do a large amount of notetaking to make sense and refer back to materials for essays.
- T students use colours and diagrams to a greater extent (perhaps because they are taught this on some T modules?)
- The K and L students in the sample only use notes to make sense of what they are learning (caution: small numbers).
- Some of the mathematics modules are more analytical than others. Some students on the more analytical modules state that they make few notes, because they mainly study by doing exercises.

3.5 Quoting, referencing, bookmarking and re-finding information

As reported in Section 3.3, many students make notes to index material or refer back. Particularly for assignments, students need to refer accurately to content from the module, or elsewhere, by returning to a specific point in the material. Correct Harvard referencing is a concern for some students. So, there is a need to store this information carefully where it can easily be retrieved. Offline, this involves bookmarks, annotations and notes. Some students use digital tools to do this. Suggestions for improvements to the website include:

- “Have a personalised place to bookmark all websites used and have that information automatically and instantly put into the exact correct OU Harvard format for intext references and bibliographies.” Participant 113
- “A smarter version of the checkboxes already present. i.e. to show what has been studied, learned, missed, postponed etc. With the ability to have student customise and weight based on their understanding of the module. This could then be used in one to one online interactions with the tutor to help understand actual progress and address issues etc.” Participant 17
- “Pool all the resources I need from my modules for the current week on one page, instead of having to visit them separately.” Participant 43
- “a reminder button that you can click on and saves a quick link in your student section reminding you when you accessed it.” Participant 44
- “Digitally organise my study” Participant 82
- “Copy and paste storage space for important notes that can be printed.” Participant 105

3.6 Study location

3.6.1 Physical study location

Analysis of the multi-choice survey responses to q3 indicates two types of student in terms of study location:

Traveller studies whilst travelling (e.g. participant 56) 23% of respondents

Public studies in café or library 28% of respondents

> *I do the bulk of my studying on a train. I have an iPad Mini and use spiral bound A5 notebooks so that I can review content and take notes in the small space available.*
>
> Traveller, Participant 6, q12a

> *I cannot yet work at home because of neighbours. I have a tablet but no internet in the library. The OU must start to provide [Eduroam] access as in Oxford Brookes Library I have no computing services as yet. I have to go to Starbucks for Wifi or a public library.*
>
> Public, Participant 100, q12a

> *Travel to a public location to study with a friend.*
>
> Public, Participant 84, q5a

From the free text responses, it is clear that some students have a dedicated study space. This may identify a third group.

Students also have priorities when preparing to study, illustrated in Figure 24:

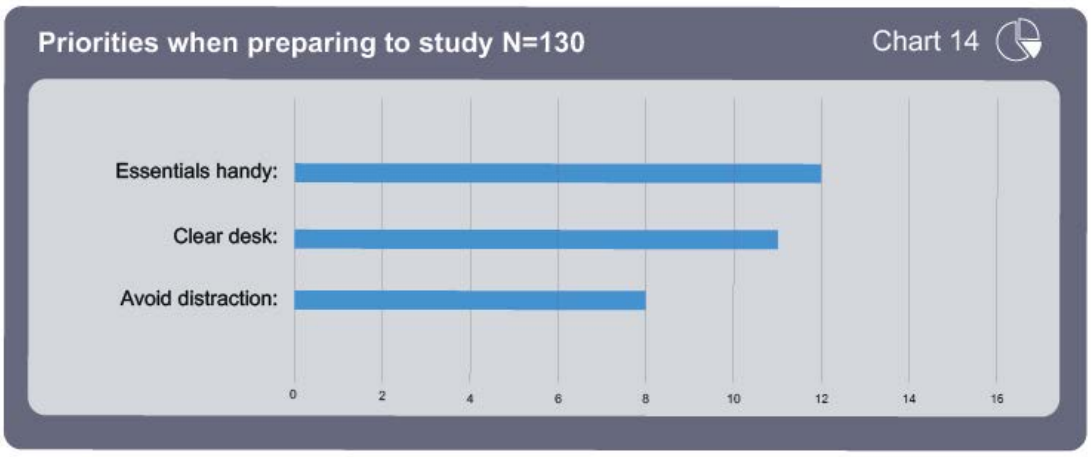

Figure 24

avoid distraction: avoid distraction; shut door; study when others away; no pets/music

clear desk: clear desk; tidy desk

essentials handy: essentials nearby; what I need at hand; carry my study materials with me

I will always have the relevant textbooks next to my laptop and an A4 note pad to write down things that come into my head. On my laptop, I will always have my OU student homepage open in a tab for ease of access and Microsoft Word, along with the relevant module folder open in another window.

Participant 13, q12a

3.6.2 Online study environment

Chart 15 is a Venn diagram, showing how many individual students reported using each combination of features of the OU online environment, from Question 4. Note the use of the OU module forums.

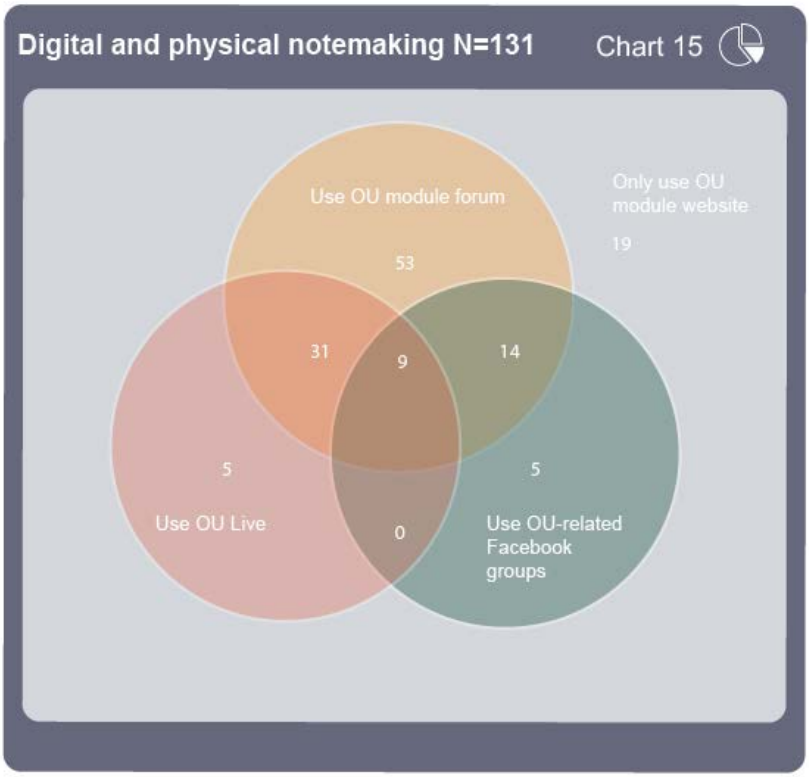

Figure 25

3.7 Boundaries

Boundaries are an emerging theme, although it is not yet clear how this would relate to digital tools:

- Student's own ideas vs ideas of others
- Essential vs other useful content
- Personal space vs others' spaces
- Digital vs physical study space
- Thinking about studies vs distractions
- Module homepage on web vs other online and digital content
- Content needs for that study session vs all other content

There are three points about boundaries that seem to recur.

The first is that students feel the need to establish boundaries in order to study effectively. They need to define a space (physical, digital, mental) in which they can work. This often involves removing distractions, completing other tasks, waiting until others are elsewhere, relaxing and focusing on the work. One driver here appears to be the need to fit studying into their lives, with many competing tasks.

> *Finish everything else I need to do, to prevent any distractions. Study best when I have a clear mind so don't want to think of work.*

Participant 24, q5a

The second is that students need to define boundaries in what they produce. For example, they need to distinguish between their ideas and others'. They need to decide what is relevant to an assignment and what is not. This often involves defining boundaries in what content they use, for instance, they may only use the materials provided in print or on the module website, they may only use that specific unit or block of content. One driver here appears to be the needs of the assessment.

> *I use a printout of digital materials to work with. I highlight, annotate and write notes continuously when reading and thinking. Even though I can do this online I prefer hard copy and a pen in my hand to think. I use an A4 wire-bound notebook. On the right hand page I write notes (including important quotes), referencing the source. On the opposite page I write my own thoughts and questions on those notes. In that way, I distinguish between my own ideas and those of others, helping to avoid plagiarising.*

Participant 129, q12a

The third is that students sometimes want to go beyond boundaries. For instance, they seek information beyond OU materials or they want to discuss their studies with other students. One driver here seems to be curiosity and a need for understanding. The social aspects of connecting with other students are also important.

> *I'm happy to help others on the regular forum but I also want to engage in more challenging and balanced conversation. I tend to find those that haven't been able to keep pace or speak with tutors are instead a bit more biased and one sided in their discussion and it means you find yourself giving advice rather than be able to just have a discussion.*

Participant 53 q14

Conclusion

Although the findings of the thematic analysis are grounded within the data, and indicate some interesting patterns, some notes of caution need to be sounded. This is a preliminary study, based upon a limited and self-selected group of students. Further work is required to establish whether these patterns are typical of the wider student population. There is also the question of whether the themes represent the whole sample analysed. Out of 142 responses, only 60 had codes allocated. Thus there are 82 respondents whose data does not fit these themes or sub-themes. This is due to insufficient data and/or responses that do not fit clearly into the sub-themes identified elsewhere. The implication for any profiling work is that there may be other profiles, as yet undetermined, or that these preliminary themes may change with further investigation.

Further research

In order to validate the five digital personas identified, a further survey will be designed to interrogate these groups of attitudes and preferences in more detail. Particular areas of interest for follow-up include whether there is overlap between the categories, whether students adopt a different approach in different situations and whether there are other categories we are yet to identify. This validation work is essential before the digital personas become too embedded in the practical applications of the research.

A series of follow-up semi-structured interviews with student participants is also being planned to delve deeper into the information they initially shared as part of the survey. The outputs of these interviews will be coded against the same criteria as the survey data.

Practical application of findings

Work is now underway to apply the findings of this research to the concept development of new tools and digital spaces for online distance learning students. This work is at an embryonic stage, and will benefit from digital persona validation work, as well as the semi-structured interviews.

Research will also play an important role in testing new tools and refining their design. This research will include focus group sessions, testing of prototypes in lab environments, along with further surveys and interviews. The research focus of this work will be very much about testing behavioural hypotheses and observing student behaviour. The tools and spaces with be developed using agile sprints informed by evidence from this research.

References

Barker, N. (2016) *A105: Using the Analytics for Action Active Presentation Process Phases to reflect on the 15J Presentation* [Online] Available at: https://intranet9.open.ac.uk/collaboration/Scholarship-Exchange/Wiki/Document.aspx?DocumentID=2016 (Accessed 24 May 2017).

Cross, S., Healing, G. and Sharples, M. (2014) *E-Pedagogy of Handheld Devices Survey 2014 Summary Report*, The Open University.

Healey, M., Flint, A. and Harrington, K. (2014) Engagement through partnership: students as partners in learning and teaching in higher education, York, Higher Education Academy [online]. Available at https://www.heacademy.ac.uk/engagement-through-partnership-students-partners-learning-and-teaching-higher-education (Accessed 11 August 2015).

Higher Education Academy (2015) National Teaching Fellowship: Selection Criteria [online]. Available at: https://www.heacademy.ac.uk/professional-recognition/awards/national-teaching-fellowship-scheme-ntfs/guide-process/assessment (Accessed 10 May 2017).

JISC (2015) Change Agents' Network [online]. Available at https://www.jisc.ac.uk/events/change-agents-network (Accessed 10 May 2017).

Jones, C. and Healing, G. (2011) Learner Experience Advancement Programme (LEAP) phase2 stage 2: Final Report, The Open University.

McGill, L., Beetham, H. and Gray, T. (2016) What makes a successful online learner?: Findings of the Digital Student Online learners' expectations and experiences of the digital environment, JISC.

Rienties, B., Edwards, C., Gaved, M., Marsh, V., Herodotou, C., Clow, D., Cross, S., Coughlan, T., Jones, J. and Ullmann, T. (2016) Scholarly insight 2016: a Data wrangler perspective, The Open University.

The Open University Students' Association (OUSA) (2016) Module Delivery Research (Print and Online/Onscreen).

The Open University (2017) Open University announces radical reinvention [Online]. Available at http://ounews.co/around-ou/university-news/ou-reinvention/ (Accessed 17 August 2017)

The Open University (2012) *Digital and information literacy framework* [Online]. Available at http://www.open.ac.uk/libraryservices/subsites/dilframework/. Attribution-NonCommercial-ShareAlike 3.0 Unported (CC BY-NC-SA 3.0).

The Open University (2017) ISES survey [Online]. Available at http://intranet6.open.ac.uk/mgt-info/iet-stats/student-survey-results/ises-survey (Accessed 22 February 2017).

Toetenel, L. and Rienties, B. (2016) 'Analysing 157 Learning Designs Using Learning Analytic Approaches as a Means to Evaluate the Impact of Pedagogical Decision Making', *British Journal of Educational Technology,* vol. 47, no. 5, pp. 981-992.

Van Ameijde, J., Weller, M. and Cross, S. (2016) *Designing for Student Retention*, The Open University.

Vince, D. and Ellis, E. (2016) *Students enabling TEL innovation: a pilot*, The Open University.