

Survey on student experiences with Jupyter Notebooks on TM351: Detailed analysis

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Executive summary

This study was to investigate the suitability of Jupyter notebooks (Kluyver, T. et al., 2016) for teaching. 301 students from three cohorts were invited to complete the survey. There was a total of 55 responses, 45% of which gave some response to open questions.

The analysis highlights that the majority of students who responded had a good experience and used the tool as we would expect. The views of the students surveyed was diverse with some finding Jupyter notebooks a good experience, and others finding them inappropriate as the following quotes illustrate:

“Jupyter notebooks are in development and not ready for students as a primary learning tool. You are paying a lot of money to be supplied with Beta software.”

“Use of these notebooks was probably my best learning experience with OU to date.”

Typically, students reported that they were able to successfully integrate their understanding of the module materials between the VLE website and Jupyter notebooks. The most important factor in making use of the notebooks was confidence in using the notebooks themselves. Whilst there were some occasional issues in setting up the notebooks most used them without problems, but there were some who found them hard to access, and hard to search. The use of notebooks limited some students’ ability to study when and where they wanted to as a full computer is required, and there were concerns about if the notebooks should be used to teach theory and as well as the practical work. This suggests that notebooks may not be suitable for all learning needs or preferences.

This analysis supersedes our earlier analyses (Dawes 2019, 2020) as we identified some errors in our earlier presentation of the data. We have noted in the analysis where there are differences.

Introduction

This study was to investigate the suitability of Jupyter notebooks (Kluyver, T. et al., 2016) for teaching. The research was undertaken in the Open University a UK based distance learning institution. The students were in their final year of undergraduate study (level 6) studying a module that accounted for a quarter of the overall teaching for that year. Undergraduate study at the Open University consists of three full time years (levels 4 to 6), however many students at the Open University study part time and take longer to complete their degree.

Data management and analysis (TM351) is a 30-credit final year (level 6) undergraduate module comprising a notional 300 hours of study including assessment. For the students surveyed this would have been their introduction to using notebooks. However, most students will have already completed a previous module that covers Python at level 4 *Introduction to computing and*

information technology 2 (TM112) and level 5 *Data Structures and Algorithms* (M269), this module develops the students' understanding by focusing on data analysis using Pandas (McKinney 2010, The Pandas development team 2020). Learning material is delivered to students via a Moodle based VLE and via Jupyter notebooks. The notebooks are provided as part of a virtual machine at the time of this study for students to run on their own equipment, whereas the VLE is hosted on university servers. The material on the VLE is focused on theoretical concepts, whereas the material in the notebooks is focused on practical examples.

We identified five research questions to investigate:

R1 Does the use of notebooks effectively support students in their studies of the module learning outcomes?

R2 Do notebooks allow the students to integrate theory and practice?

R3 Do students have technological problems in using notebooks?

R4 Does the use of notebooks dictate when and where students are able to study?

R5 Is the use of notebooks restricted by accessibility constraints?

The focus of this paper is a questionnaire that was issued to three cohorts of learners, 2 that had finished their study and one that was in progress, at about the 2/3rds point of the module at the time the survey was issued.

In response to R1 we found that students used Jupyter notebooks as we expected within the learning design of the module. This included the order of study (R2) overall and how study was completed within a single session, where theory was studied first, followed by practice, and then assessment. Students reported that the notebooks mostly installed without problems (R3) but that the contents could be hard to search, so rediscovery during revision may be hindered. Students reported studying in a variety of locations, and with a variety of devices. However, they primarily used a desktop or laptop computer (R4). Some accessibility problems were reported, but the majority of students had no problems (R5). This suggests that notebooks may not be suitable for all learning needs or preferences. Students' opinion was divided as to whether more use of notebooks could be made on the module to present theoretical material, which is currently on the VLE website.

Design and Method

Three cohorts of students from three consecutive academic years (2017J: 420, 2018J: 372, 2019J: 365) were surveyed. Cohorts 2017J and 2018J had completed the module; cohort 2019J were midway through the module. Following university procedures to avoid over surveying students, 301 students (who had completed or were completing the module) were randomly selected to be invited to complete the survey. The survey was administered through JISC Online surveys (JISC 2022). There was a total of 55 responses (2017J: 19, 2018J: 14, 2019J: 22). Of these, 29 respondents opted in to be interviewed, and we interviewed 10 of them. The results of the interviews are covered in Dawes, Thomson, Rice, and Bowles (2022).

As this was novel research, we did not find any existing questions on which to base our research. The questions were framed based on our experience of supporting the students. We felt that the students' approach and experience to study would be more significant than descriptive demographics, so we did not capture them separately given the anticipated number of responses. A full list of the questions is in the appendix.

Questions were selected to identify when the student studied the module, familiarity with the technology, problems they had, and how they structured their study. We asked what might improve the teaching of the module in general, as well as suggesting that the taught material and notebook exercises could be combined.

We used a mixture of closed demographic questions, Likert scales for agreement and open questions. 45% of respondents included some comments to open questions.

Single-item Likert measurements were used. Whilst less accurate than a multiple item scale, we wanted to minimise survey length to have some data due to the relatively small population and expected response. We intended to uncover additional dimensions via the interviews. We selected a commonly used 5-point response option for agreement [Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree].

For free text answers (as noted in the appendix) we followed the process of thematic coding as described by Braun and Clarke (2006). As there were relatively few responses (55), and in each question most responses were 1 to 2 sentences in length, the coding applied was simplistic in nature. The goal was to identify the unique explanations (themes) in each answer in order to get a feel for how many students had similar experiences.

The number of times a theme is mentioned cannot be treated in a qualitative way, but for illustration they are shown in graph format. The sample is not necessarily representative of students studying the module nor were the respondents focused on these issues, which may or may not have resonated with more respondents had we asked them about them directly. What this does allow us to do is group unique themes and gain some insight into how widespread those themes are in the wider population. Further quotes are provided in the analysis to add context to the discussion.

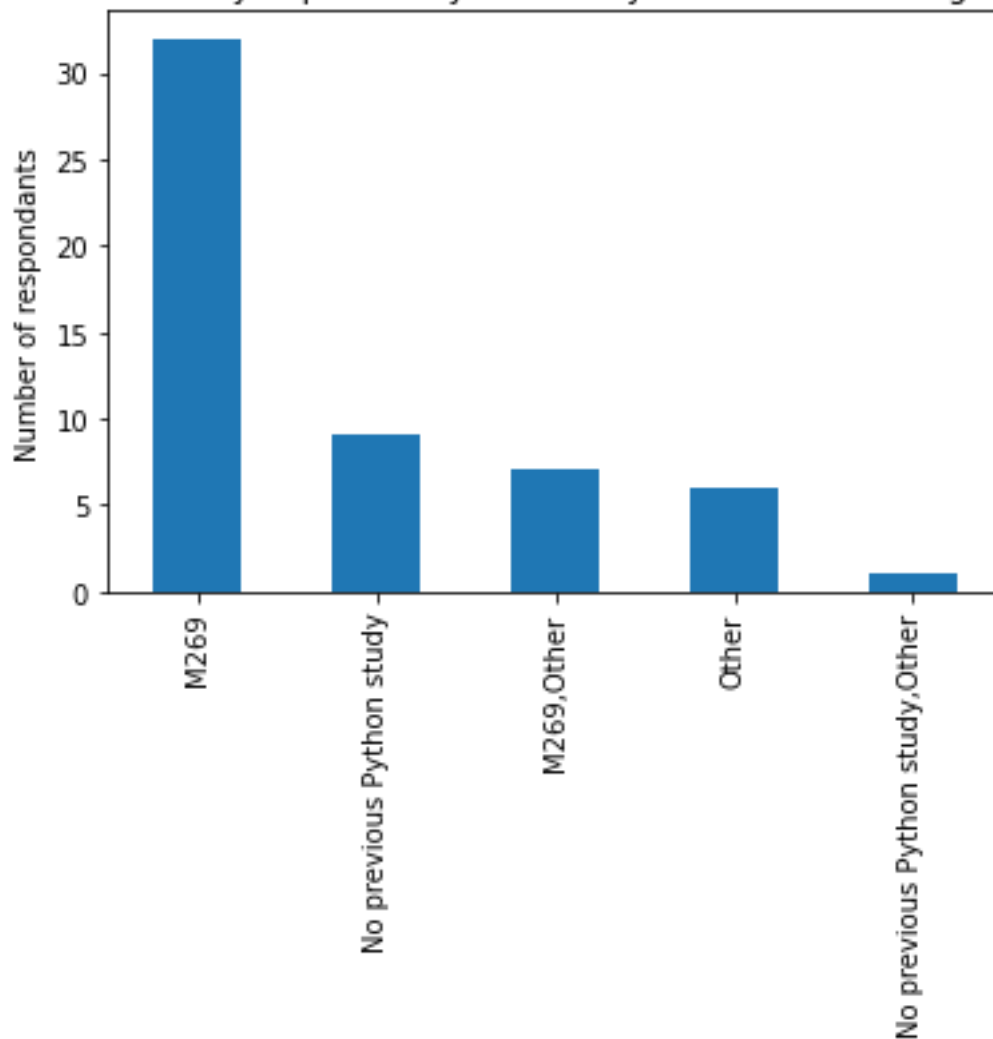
Analysis

In the following analysis we have discussed the questions out of numerical order in order to group them by research question.

Demographics

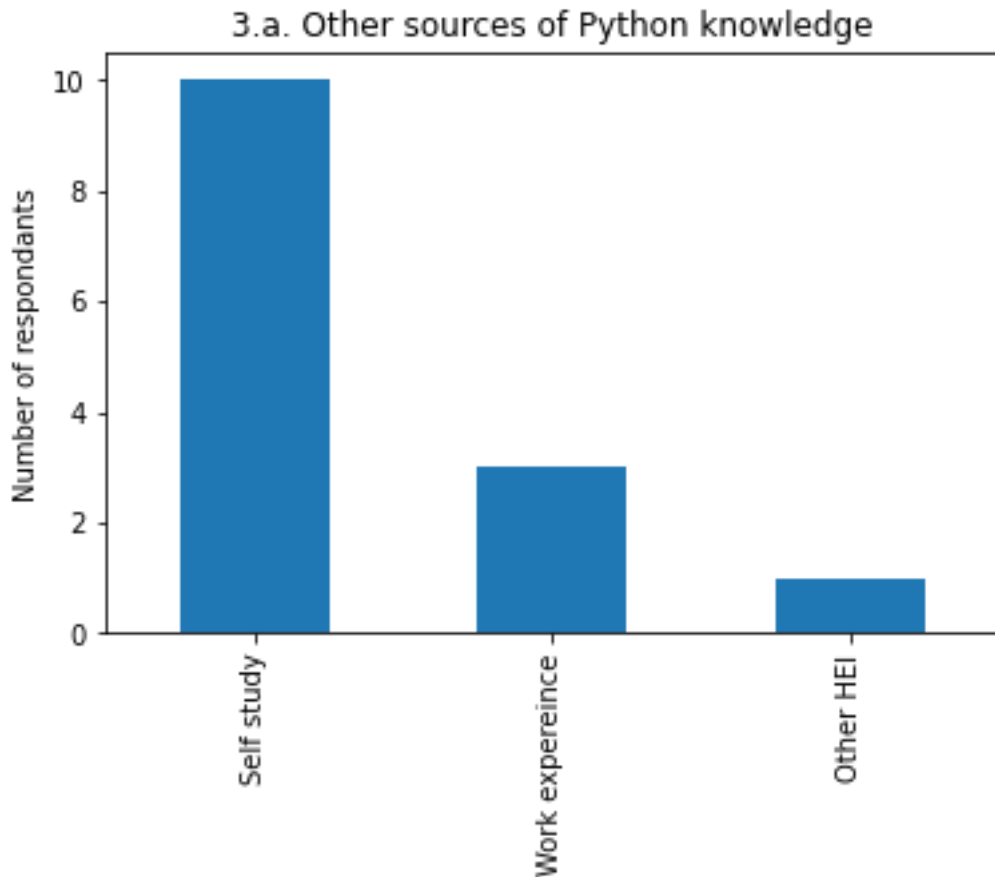
We reasoned that programming experience and experience of Python in particular would be useful as it would be once less thing to learn at the start of the module. The responses to question 3 showed that of the students who responded, the majority had studied the prerequisite module M269, which uses Python as the teaching language, and had no other experience of Python outside of study. M269 at the time did not use Jupyter notebooks so the students had to learn how to use notebooks early in the module. Since the survey was completed M269 and a first-year module *Technologies in practice* (TM129) now make use of the notebooks so learners are using them more systematically through their studies and experiences will have changed as a result. A significant minority had no previous experience of Python coming into the module and would have experienced a steep learning curve.

3. Where had you previously studied Python before starting TM351?



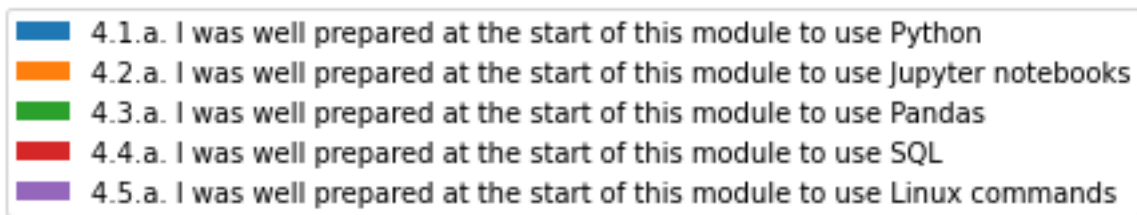
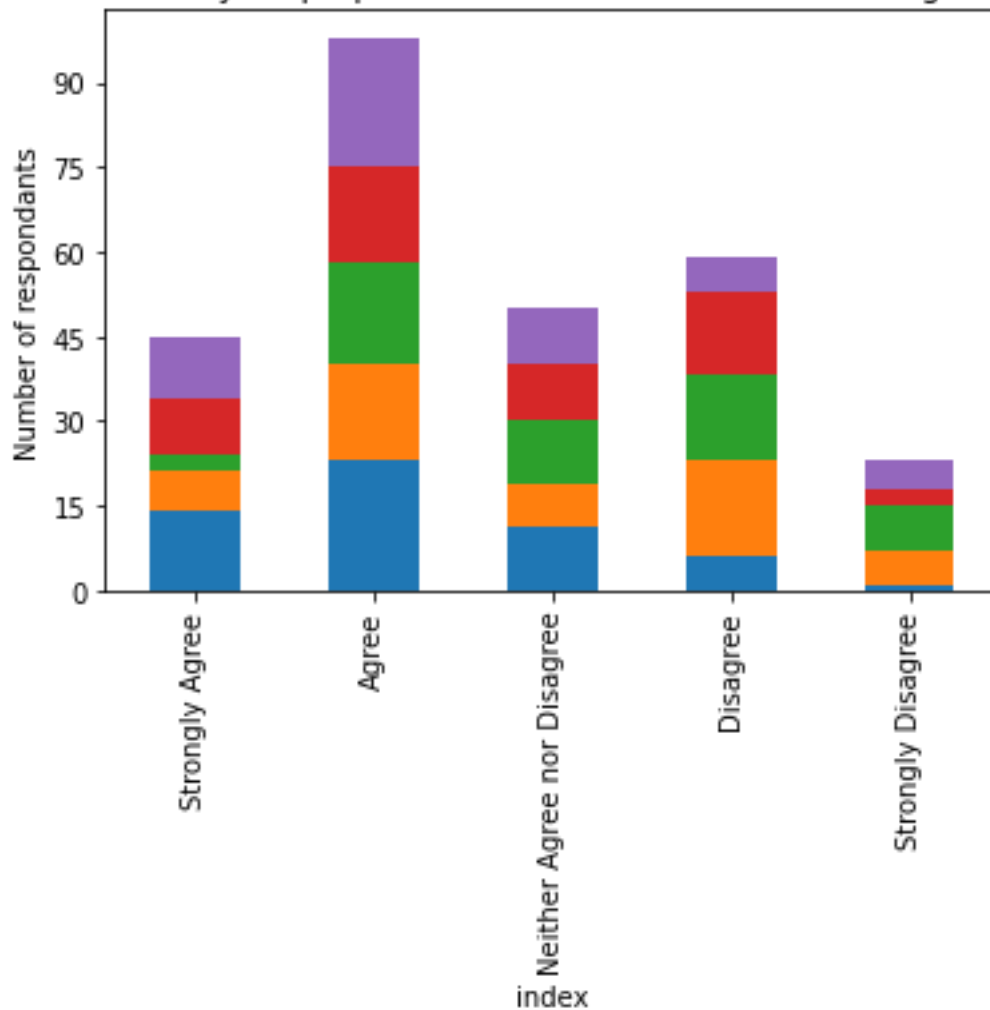
Where students had other sources of Python knowledge it was primarily from self-study. This suggests that for most learners their understanding of Python would be somewhat insecure and underdeveloped as M269 focuses on core programming concepts. TM351 by contrast works with complex data manipulation which should during the course of the module help to secure their understanding. The following quote illustrates how one student perceived this focus:

“There was a big jump from M269 to this course particularly in areas like python dictionary and list comprehensions. Areas that were new. A little more time to explain these would be beneficial.”



In question 4 using a Likert scale, we asked the students to self-evaluate how prepared they felt they were in hindsight to study the technical elements of the module. Generally, students felt they were prepared in the use of Linux and Python, suggesting the entry level of TM351 is about right. As anticipated, many students felt less prepared to use Pandas and Jupyter notebooks, although some did feel prepared. SQL sat in the middle, with many learners having encountered it on their previous module M269, as well as another module: *Managing IT: the why, the what and the how* (TM254), which we did not ask about.

4. To what extent do you agree with the following statements about your preparedness for this module in hindsight?



In question 5 we asked about previous and concurrent study with other relevant modules. For many students this was their first module in the final year of their degree in the same discipline area (of software development and data analytics). A notable number of students were co-studying with another module, none of which used Python. Thus, students will have experienced context switching between modules when covering related topics.

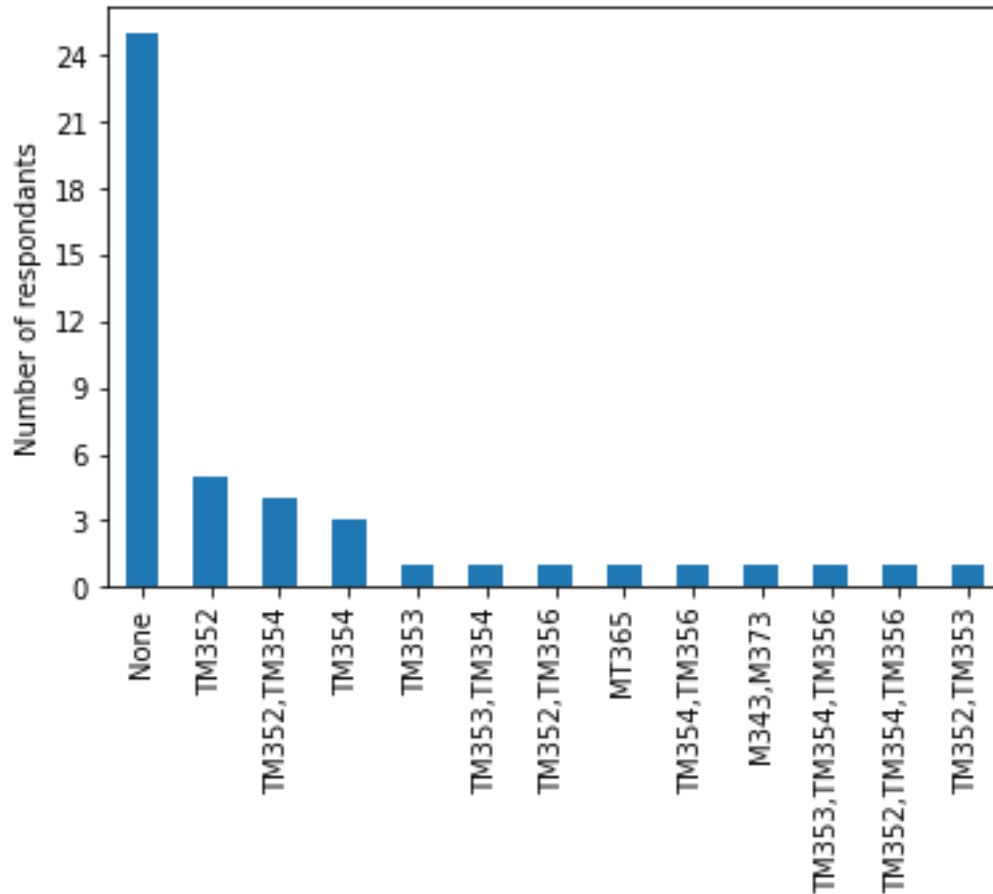
“The introduction to Jupyter notebooks provided in the module materials was sufficient to get up to speed with using them. It is helpful to combine explanatory notes, code examples, and working code in one continuous view.”

“A basic understanding of them [notebooks] before starting the module [would be useful]. The module is not impossible without this understanding though.”

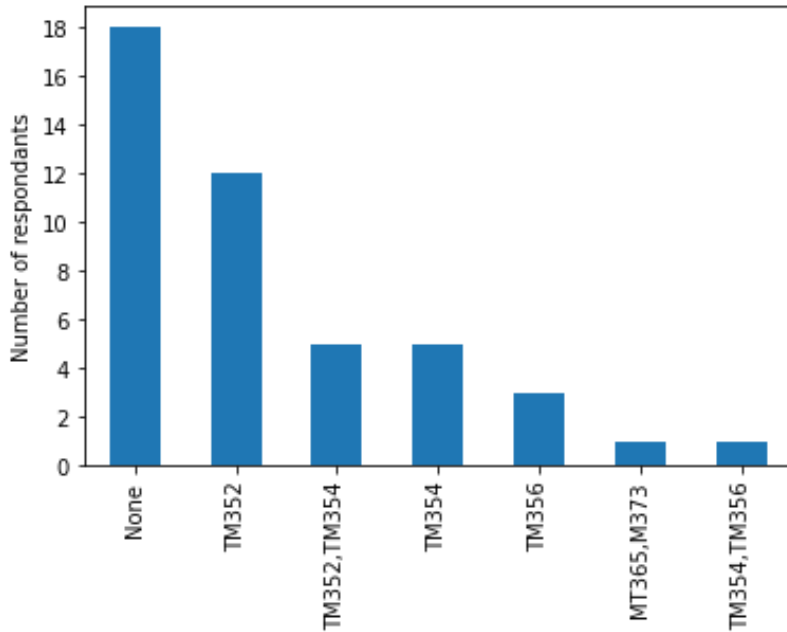
We did not ask the students about their prior NoSQL database experience; however, an additional comment gives us some insight that this was less well taught and may have left some students feeling underprepared.

“Mongo DB preparation is not as strong as the other languages”

5.1.a. Did you study any of these modules in a previous year to TM351?



5.2.a. Did you study (or are you studying) any of these modules at the same time as TM351

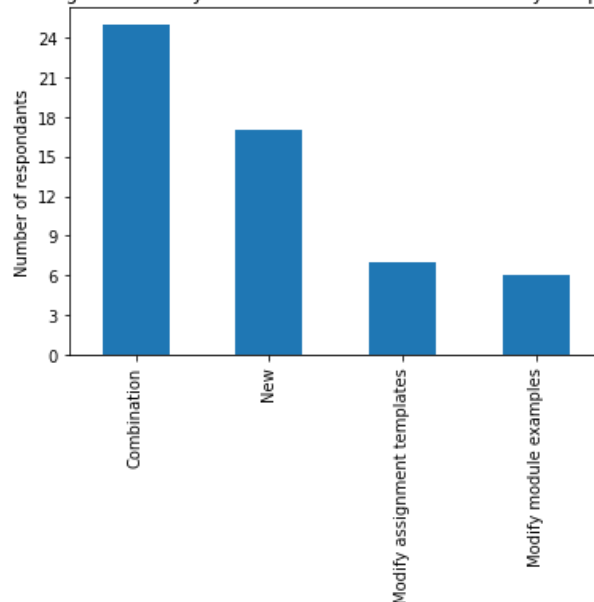


Research Questions

R1 Does the use of notebooks effectively support students in their studies of the module learning outcomes?

The responses to Q10 showed that most students either created new notebooks (31%) to attempt assignment questions or used new notebooks in combination with those provided (45%). This suggests that they developed an appropriate level of competence and confidence to attempt the assignment questions and therefore met the learning outcomes of the module.

10. When you attempted the assignments did you create new notebooks or modify the provided ones in the first instance?



One respondent noted that the notebooks got in the way of using the tools to solve the problems. It's notable that an aim of the module was to encourage students to investigate and report on

findings in a structured way, so this response, whilst negative, shows the learning outcomes were being met.

“The Jupyter notebooks are a good way to represent small code blocks but for practical activities they are very frustrating to complete simple tasks in and make simple commands on a command line take much longer than normal. Simple data investigation possible in 1 command become a nuisance to execute and information on multiple command execution is suppressed from the end user. A script file for the practical activities would be much better.”

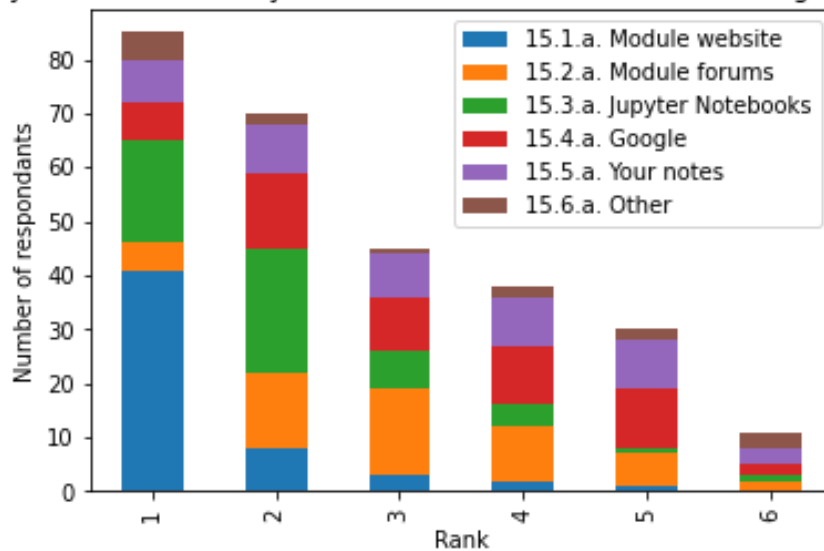
Other comments indicated that students, regardless of being experienced or inexperienced in programming in Python, could get frustrated by the notebooks, perhaps suggesting that prior experience was not an important factor.

“They are great for users with no python or database experience, but this would be rare by the point of stage 3 and the notebooks are very frustrating to complete simple tasks in.”

“Useful if you know what you are doing, not good for learning in this fashion.”

Question 15 showed that to support their study most students started by looking at the module website first, then notebooks and then module forms.

15. Please rank the following in order of 1 (most likely) to 6 (least likely) for where you were most likely to look for information to answer assignment questions?



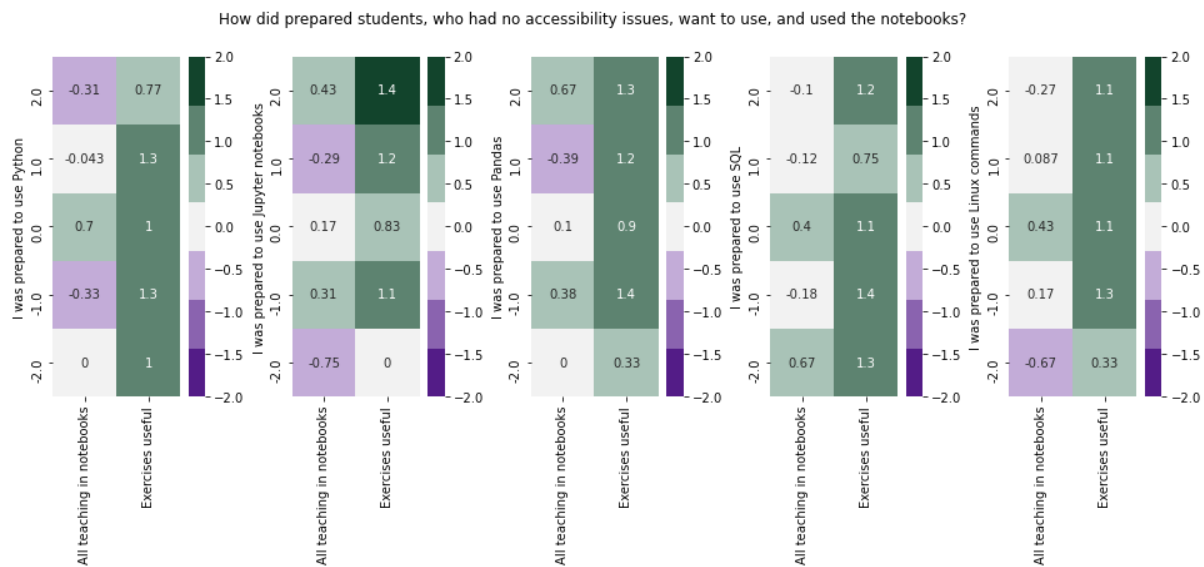
In terms of other materials used, four students mentioned books, and YouTube, Pluralsight and Udemy were mentioned once. A common problem cited by respondents was that it could be hard to find material in the notebooks when attempting questions; more technically minded students created their own indexes.

“I extracted all of the epub files for the module so that I could read them offline in a web browser and search them using grep. I also converted the notebooks to html so that I could do same for them without starting up the virtual machine. I probably spent most of my time using these files.”

“There was no guide or appendix for the notebooks. This meant that I had to open up and search through multiple notebooks anytime I needed to find anything. This scenario was repeated multiple times.”

If the responses from question 4 and question 16 are compared, we can see that that when students felt prepared to use notebooks, they found the exercise useful (as they had a high average response to the Likert questions when they were scored from -2 to +2). This suggests that preparation is important in making use of the teaching resources provided within the tool. The effect of preparation was pronounced in the other comparisons, suggesting that these topics were learnt over the course of the module. It is notable that being prepared to use Python, Pandas, SQL and Linux did not show a similar relationship with more even distributions observed.

Note that the scales on this graph have been improved compared to our previous publication (Dawes 2020) but the data is the same.



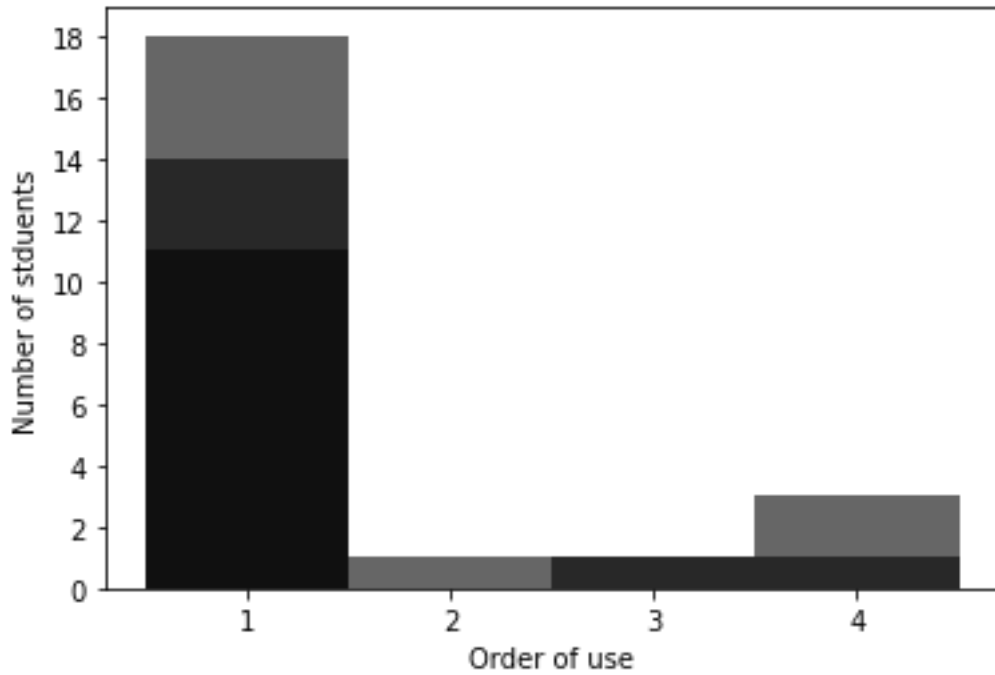
R2 Do notebooks allow the students to integrate theory and practice?

The responses to question 9 showed students used the learning materials provided roughly in the order we would expect: the theoretical content on the module website, followed by the practical work in the notebooks, followed by the computer marked assignments (iCMAs) and tutor marked assignments (TMAs). In the graphs below, the responses for the three charts are overlapped, with solid black showing responses from all three cohorts, mid grey and light grey one cohort. This shows that all three cohorts followed the same strategy over time.

Almost all students started with the module website as the primary learning resource, but a few more experienced students started with the notebooks first.

These graphs have been updated for clarity compared to our previous publication (Dawes 2020,2021) but the data is the same. We allowed students to select more than one usage point for each resource but only three students did, so this data was excluded from the analysis and any order points greater than 4 were placed in the 4th position (affecting 4 responses).

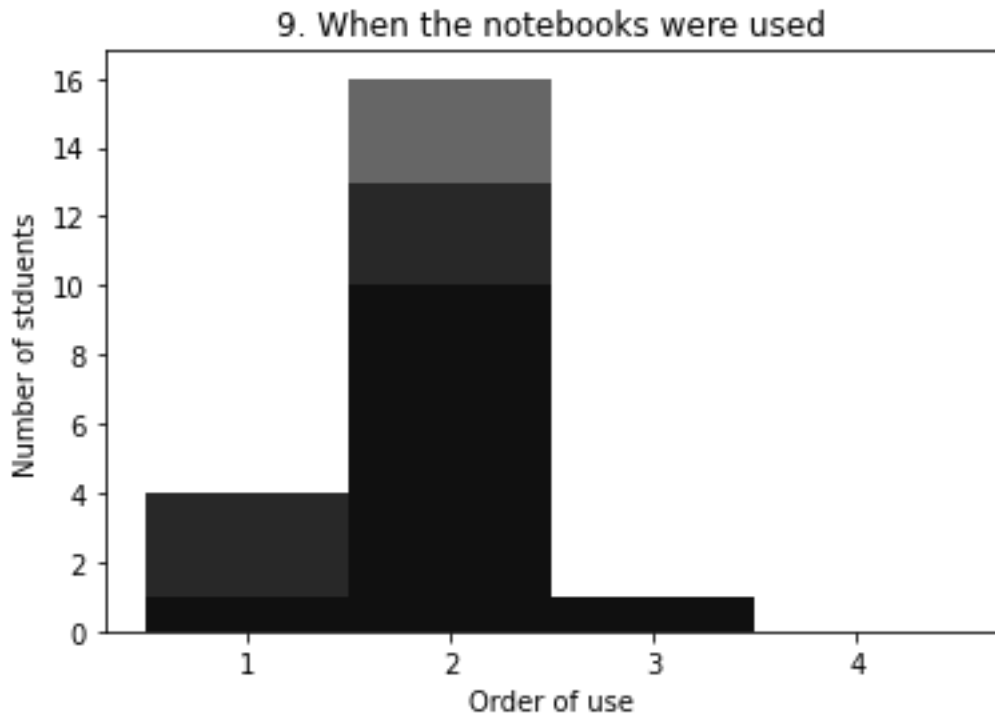
9. When the module website was used



"I only used the content on the module website for my first pass through the materials. After that I found it more convenient to unzip the epub files to search and read them offline."

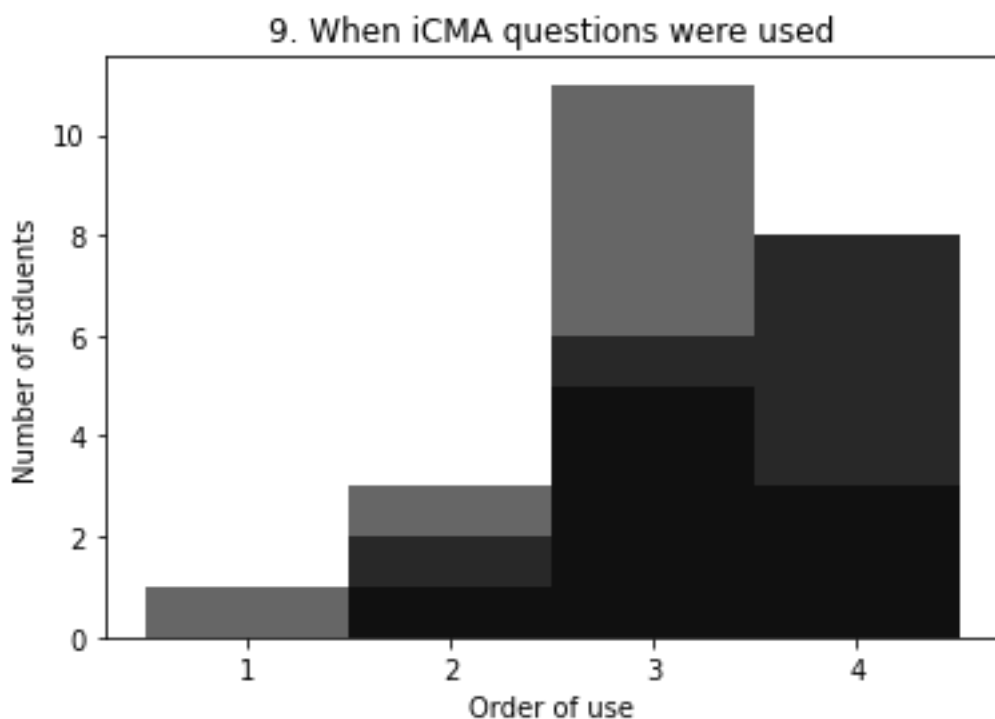
"I'm fairly familiar with the concepts of programming, so I tend to go through the notebooks first, then attempts the iCMA questions the first time around then do some more studying. If I have time I will go back and do the ICMA again."

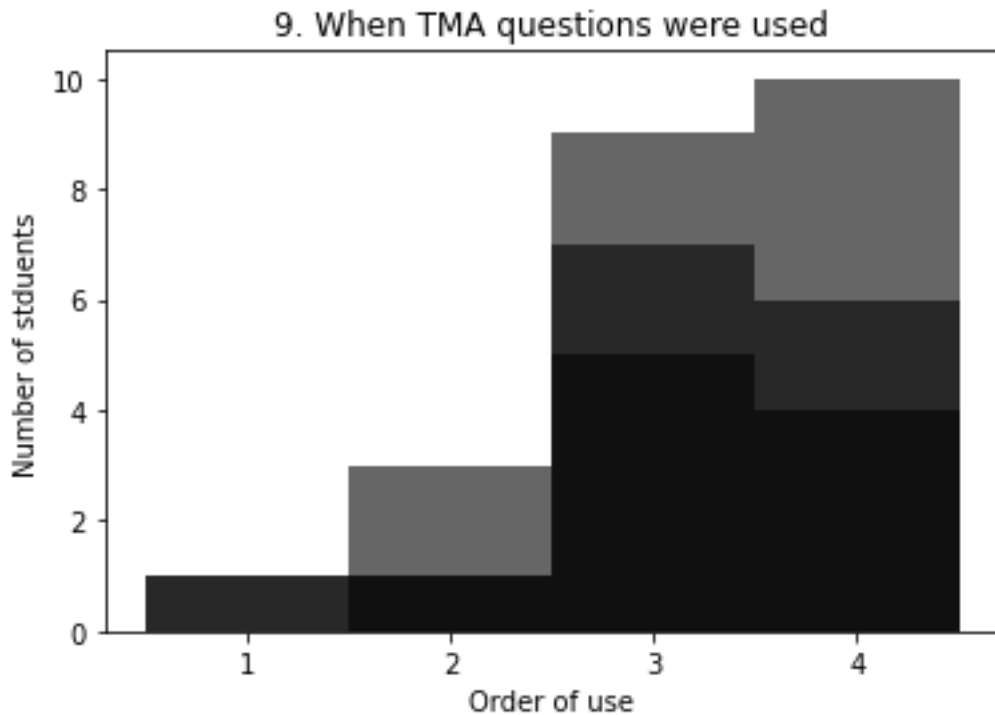
"Sometimes I would go to the notebooks first, if I felt that I had enough understanding of the topic already from my previous study. I also felt that some of the theoretical content was repeated in the notebooks and found it useful to study it alongside practical examples."



“That they [notebooks] are and absolutely fantastic way of learning and interacting on the practical stuff, provided that is they are as well written as the TM351's are”

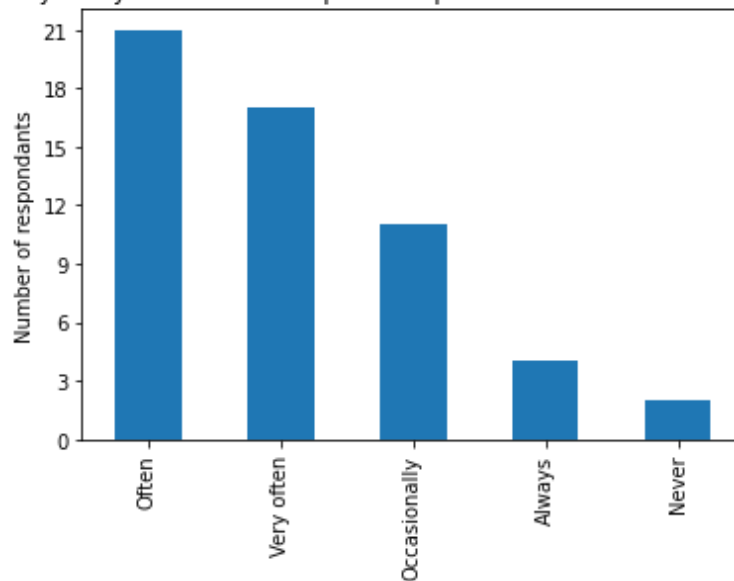
An interesting observation is that a surprisingly large number of students reported attempting the iCMAs after the TMAs. The iCMAs contained discussion and solutions that were released once they were completed therefore these students’ missed advice that may have helped with the TMAs. Module teams should consider signposting the learning aims of the iCMAs if this is not already made clear to students.





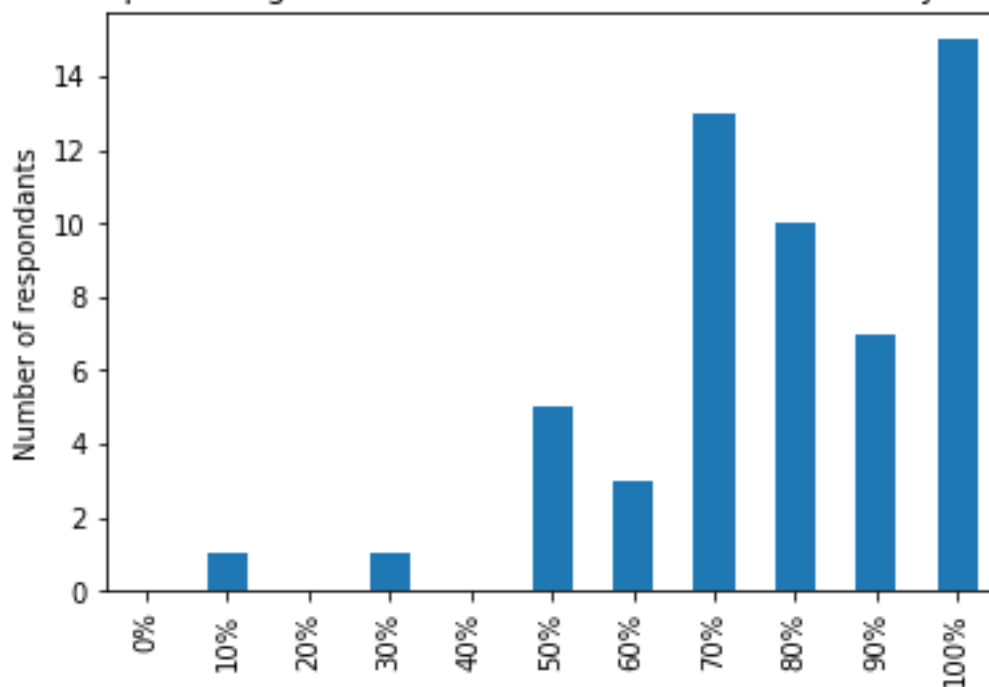
The majority of students used the materials in an interleaved way in each study session.

11. Did you usually study theoretical and practical parts of the module in the same study session?



The majority of respondents attempted the majority of the exercises in the notebooks, and students praised the presentation of the material. However several respondents found the exercises long and tedious to work through. The module materials may benefit from sign posting of examples that explore key concepts and techniques and then longer worked examples so students can manage their time more effectively.

17. What percentage of the exercises in the notebooks did you attempt?



“I feel like the notebooks and iCMAs were most useful in terms of learning theoretical concepts in a practical way. However, I found some of them a bit long-winded.”

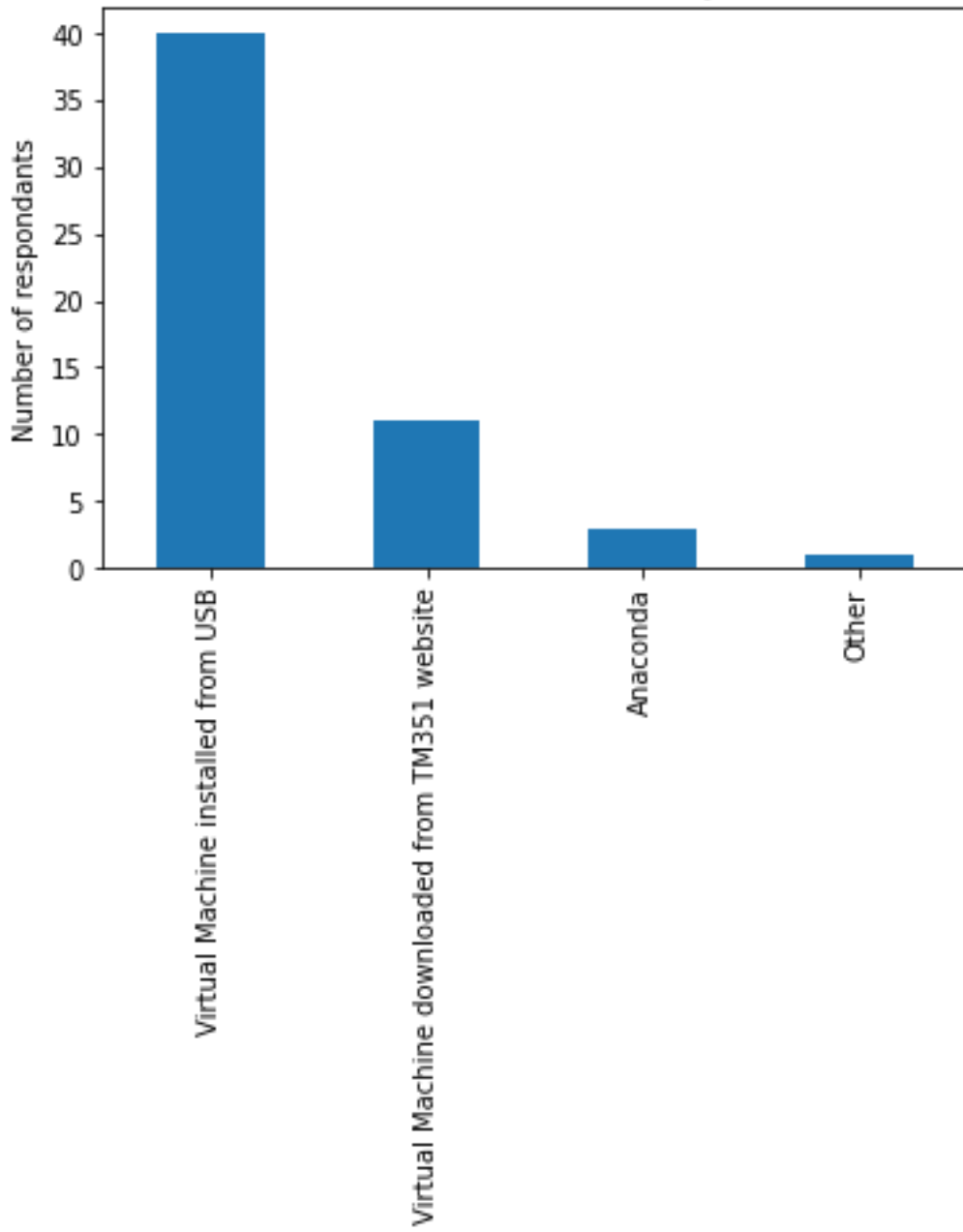
“On TM351 there is a lot of data manipulation to learn. Practice is essential to embed these into medium/long term memory. It would be immensely helpful to have more, simple questions to work through in Notebook form (not dissimilar to iCMAs) to help embed the volume of techniques in the reading.”

“I found the Jupiter notebooks long and tedious. I worked through the first couple but now I just click run on all the cells and skim the notes to get a gist of the main points, then I'd print to PDF and save the notes. I find it easier and more efficient to refer back to the Jupiter notebooks when answering the TMA (tutor marked assignments) questions. I tried to work through them, but they were so tedious my mind would wander and nothing would sink in.”

R3 Do students have technological problems in using notebooks?

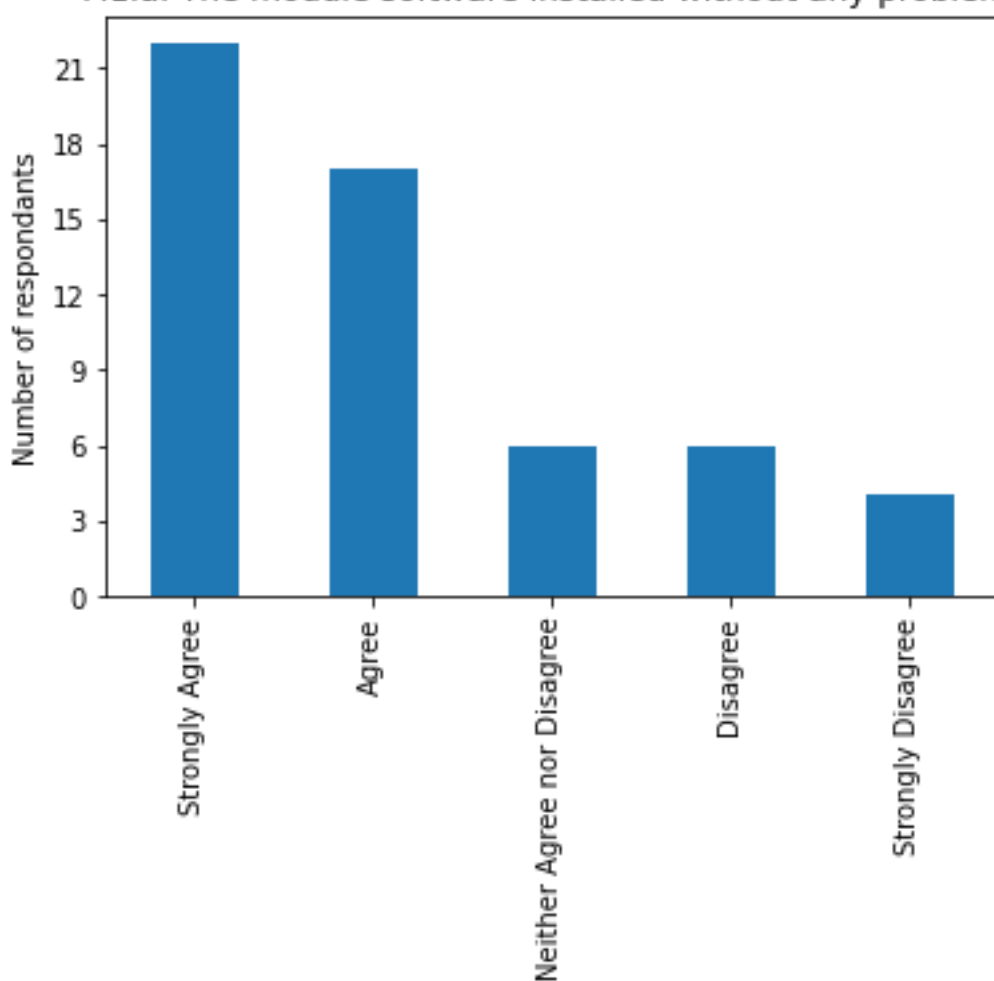
In Question 6 we checked how students were accessing the Jupyter Notebooks. Students were provided with a USB stick containing the module software and most installed from there or an image provided on the module website. A small number self-installed using Anaconda and one student reported not using the software at all.

6. Which module software did you use?



In question 7 the vast majority of students did not encounter significant problems installing the software but there were some issues reported.

7.1.a. The module software installed without any problems



Two students reported that they had to rely on the forums to install the software onto Linux as they were not using Windows. Two students reported that updates during the lifetime of the module caused the software to stop working. The PC requirement was identified as not being clear as virtualisation is required by the software, but this was not clearly explained according to two students. One student reported that they did not have access to the download option. Four students reported issues with the install and configuration, which were resolved by repeatedly installing, utilising forum help. One student had issues specifically with PostgreSQL that were hard to resolve.

The following comments highlight other problems related to the limitations and benefits of the Jupyter notebooks that students reported in the free text answers:

“I would prefer all theory in the module epub files and just save Jupyter for practicing practical work and assignments. However, after converting the notebooks to html it was quick and easy to search and read them.”

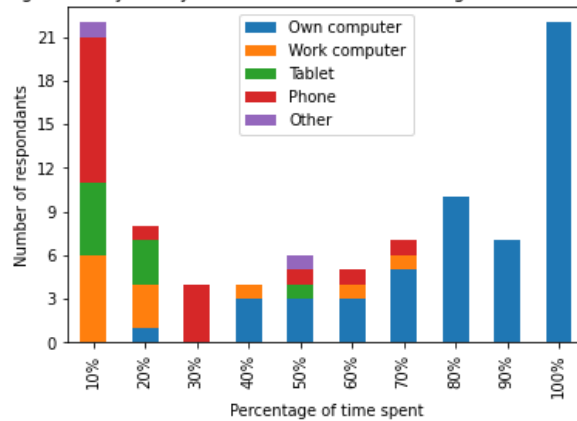
“The Jupyter notebooks have limited formatting capability in comparison to web pages (I have found) so I think the theoretical materials are probably much better presented on web pages rather than Jupyter notebooks.”

"I think a lot can be achieved with using a notebook. Only late in the module did I begin to notice the potential of some UI potential. Adding links etc. As you also get to learn some UNIX commands I quite like their use."

R4 Does the use of notebooks dictate when and where students are able to study?

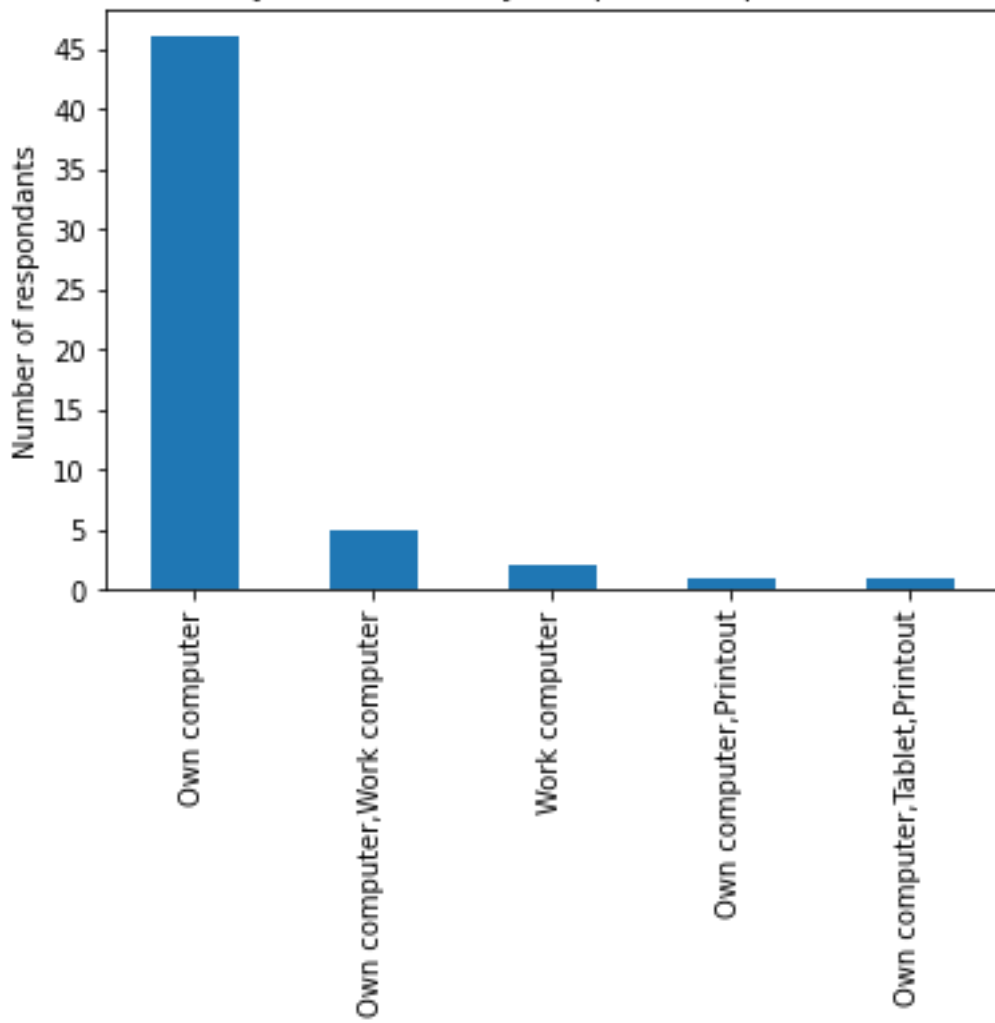
In question 8 most students reported that they study on their own computer, this is not a surprise as the Jupyter notebooks require installation on a computer. It is notable that there are a significant minority who use tablets and phones.

8. Please tell us what percentage of study time you used each of the following resources for (answers should add up to 100%).

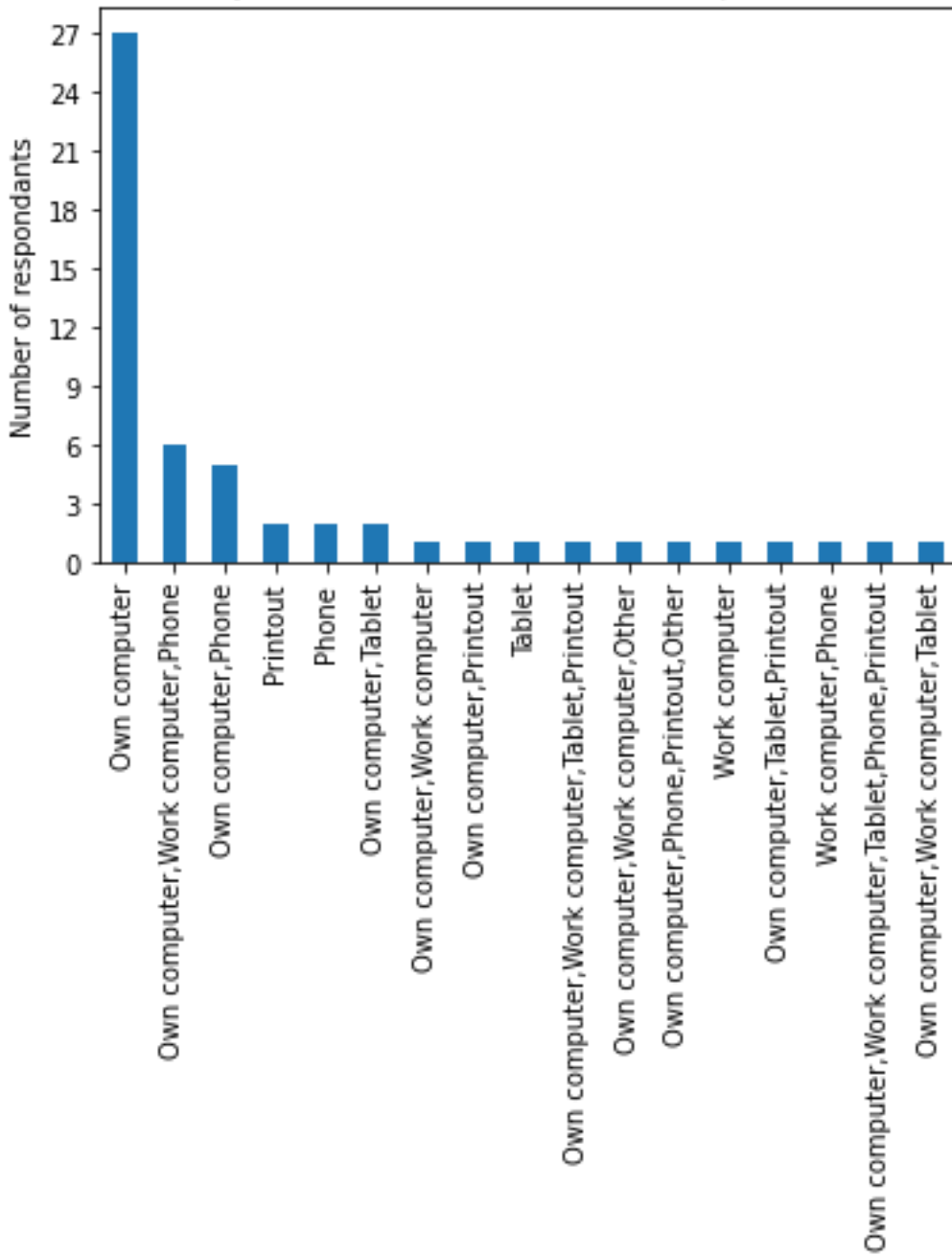


This is reflected in how students attempted the practical parts of the module, where students used their own or employer's computer. However, phones and print outs were used more frequently for looking at the theoretical module material on the website.

12a What did you use to study the practical parts of the module?

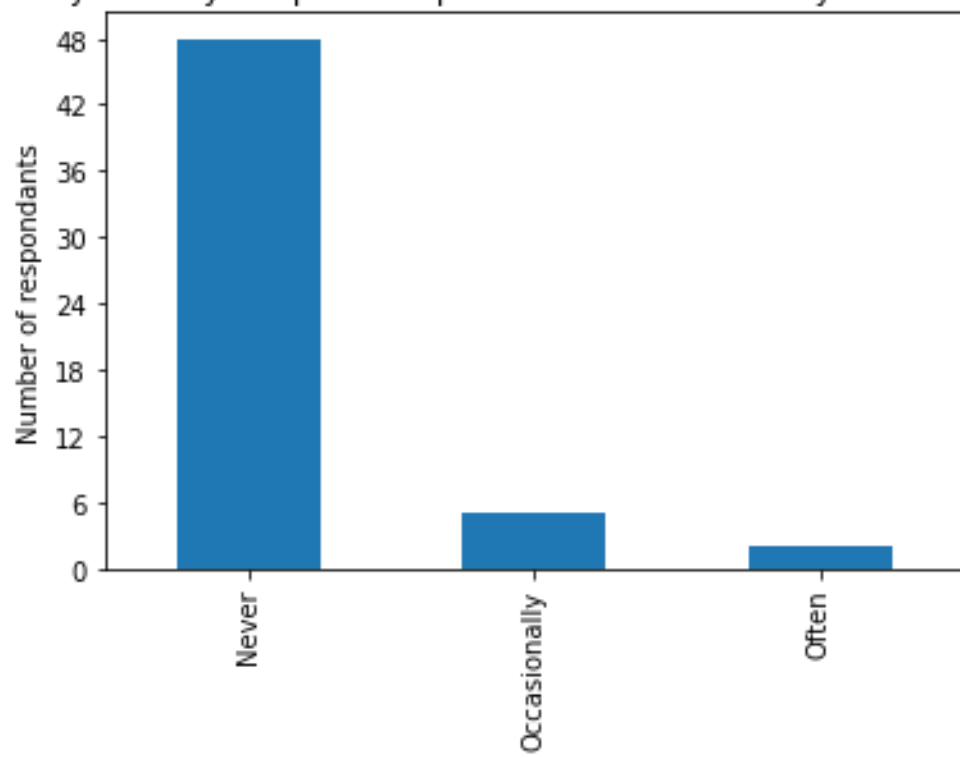


12b What did you use to read the theoretical parts of the module?

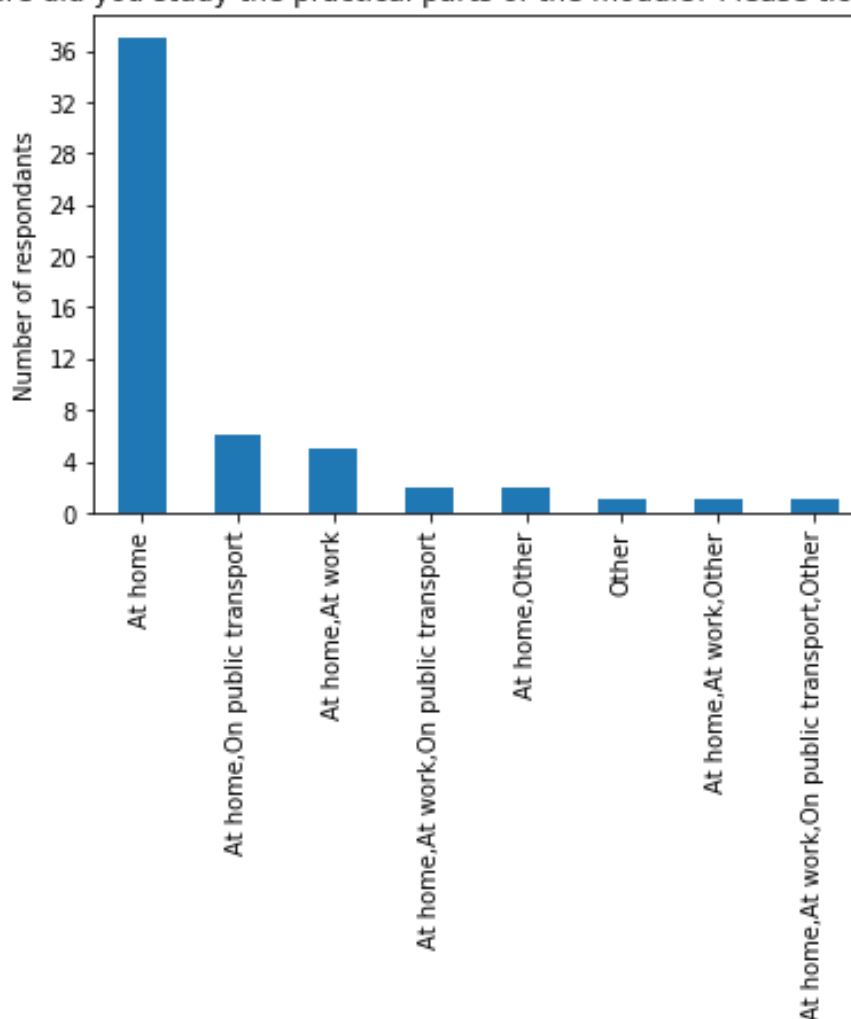


Almost all students studied on a computer, although they did study outside of their home with public transport being a common choice.

13. Did you study the practical parts of the module away from a computer?



14. Where did you study the practical parts of the module? Please tick all that apply.



Other study locations include hotels, coffee shops, on holiday and at the library. This indicates that students may study in other locations if they are able to. Therefore, as we restrict practical study to the students using a computer we are limiting the study options for students.

“The problem with Jupyter notebooks is that you have to have it installed on a computer. Where I work everything is locked down so I was only able to do that part of the course at home on my own computer, however in my break I can use work computer to read materials on the OU website in my break, this greatly helps me keep up with study, putting everything on Jupyter notes would have made it harder for me to keep up as I would then have had to do everything at home and I do have to work to pay for this.”

R5 Is the use of notebooks restricted by accessibility constraints?

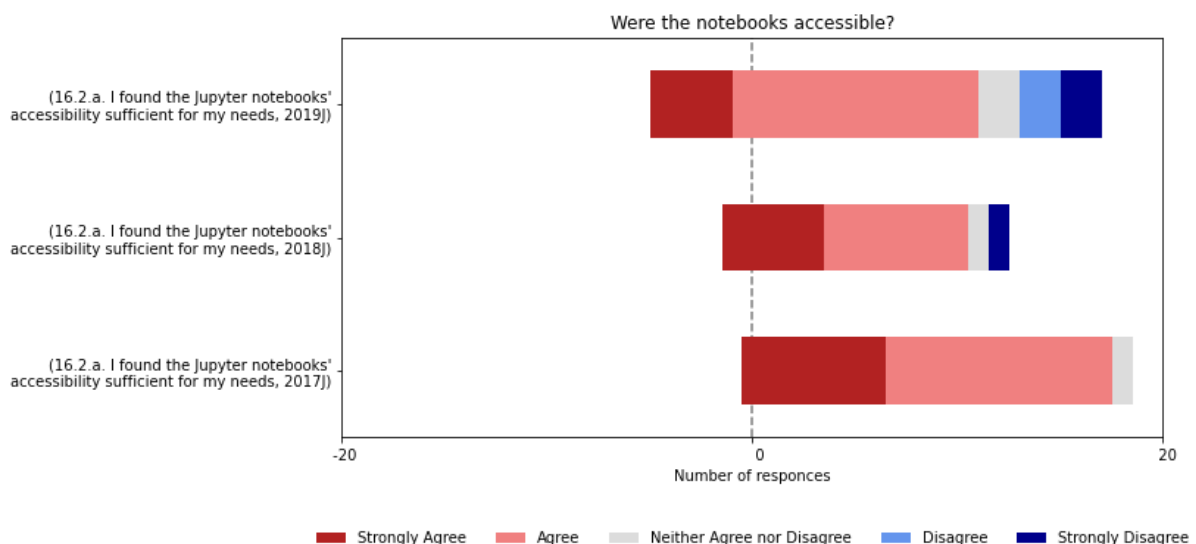
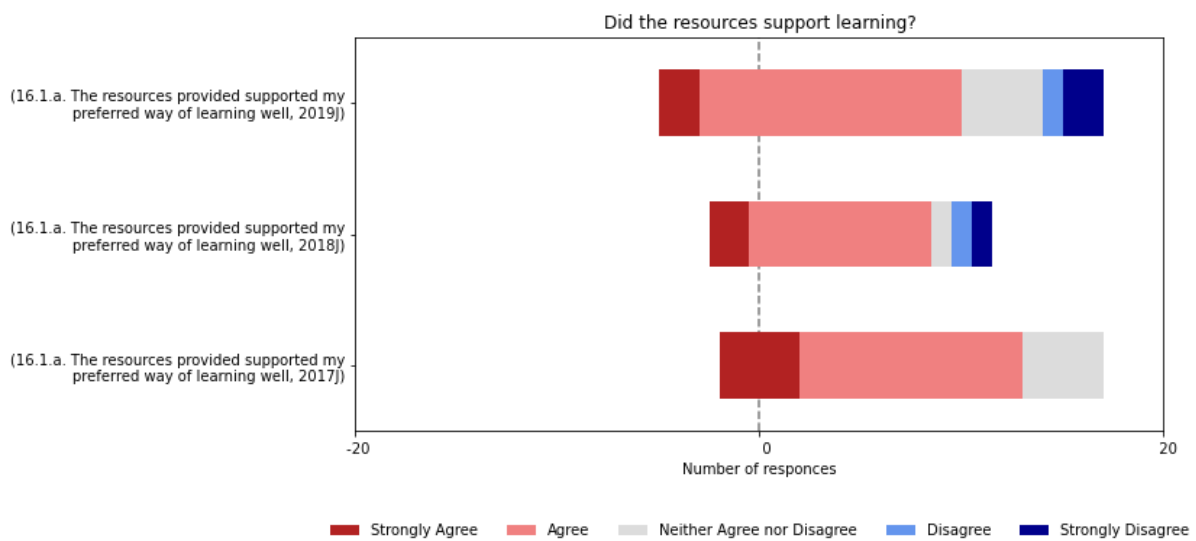
The responses in this section based in question 16 have been broken down by cohort as the materials given to the learners have evolved over time. However, the responses are broadly consistent over the cohorts. Respondents found the resources supported their learning, that the notebooks were accessible, and exercises developed understanding. Opinions were split over whether the notebooks or use of the module website was the best way to learn, and maybe this was reflective of individual learning needs. A small number of respondents did not find the notebooks

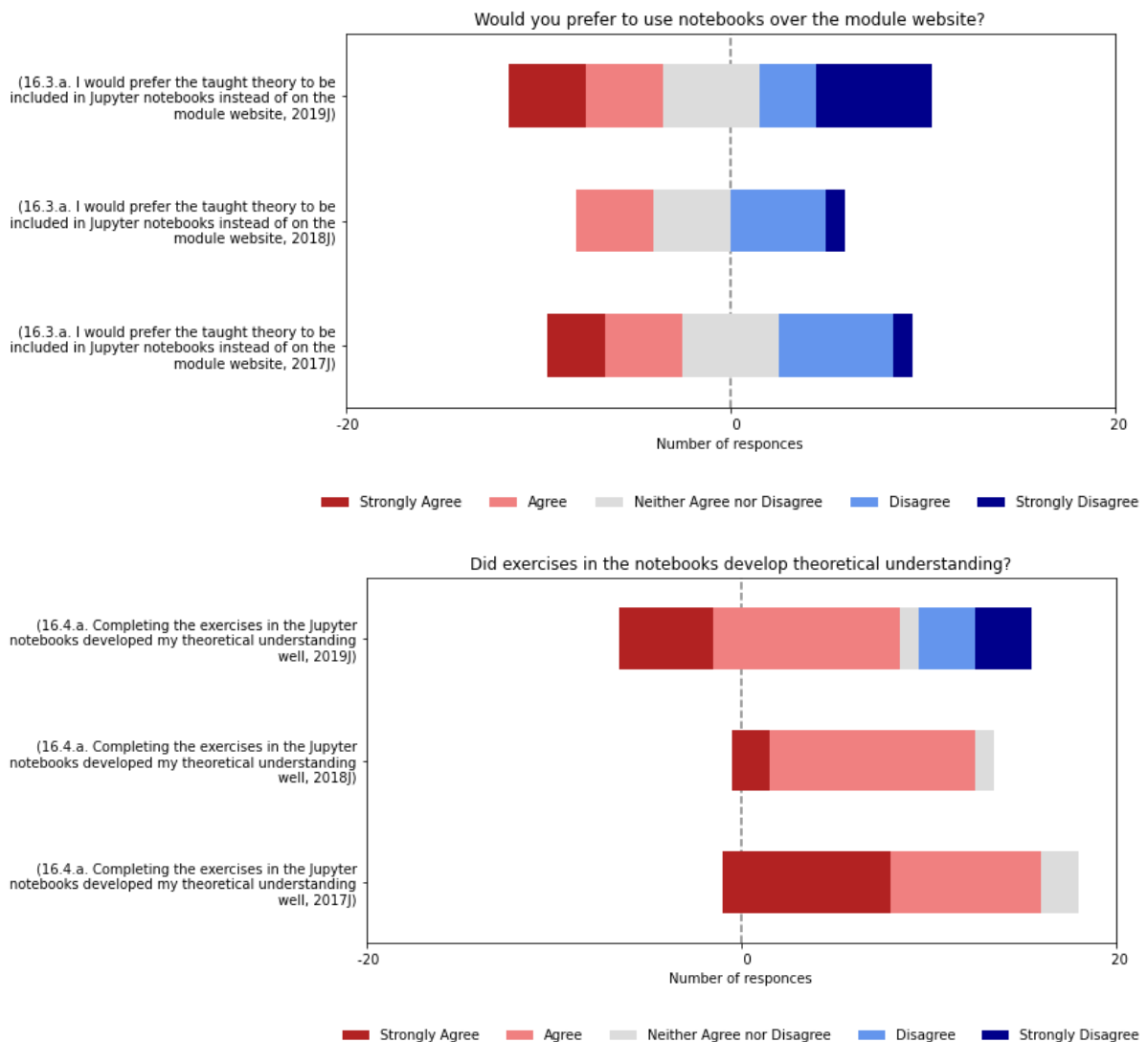
accessible; they mentioned that information was hard to find in the notebooks and that the notebooks were slow as illustrated by the comments below.

“The biggest single issue with notebooks is the difficult of searching and the lack of detailed indexing of information. One student produced a summary list of techniques which has proved very helpful.”

“I found the notebooks to be slow and frustrating at times. Would be better as a standalone programme like Thonny.”

The graphs in this section have been updated compared to our previous publications (Dawes 2020,2021) were we previously only included the agree and disagree categories. This version is therefore more complete.





Other comments indicated that printed materials remain valued.

“I would like to have printed material too”

“Personally, I prefer to work with printed materials rather than online resources.”

“Books, books, books. This is the first time my preferred style of learning has been mentioned in years. Books are the optimum study resource for a great many people: indexed and easily searched. Jupyter notebooks are not the answer to everything, however much you might like them to be.”

Advice to future students

Outside the scope of our research questions the respondents provided the following advice to future students that module teams may be able to take account of in advice provided.

“They will run faster if installed locally rather than in the VM that the OU supplies. This wasn't an issue during the module, but I used Jupyter notebooks in my final project to use with TensorFlow and found performance was an issue when running in the VM due to the VM configuration.”

“Remember to back them up!”

“Make sure that if code doesn’t work but you want to show your working that you put it in a format other than code. Tutors run the whole notebook when marking and if non-working code exists (even that deliberately there to show your working) in code form then the notebook won’t run.”

“The notebooks should be placed inside folders such as MySQL, Pandas, Mongo, or a notebook with an index. I personally preferred to use anaconda, especially for TMAs.”

“Perhaps an exercise on markdown formatting would be useful. Something along the lines of how to attractively present your material using tables, highlighting, borders, headings, indenting, etc. I think, perhaps there is a such an exercise, but I forget.”

*“This is based on memory and a quick web search, so it might be wrong... I think I converted every notebook to html en-masse by putting them all in the same directory and running the command: `jupyter nbconvert --to html *.ipynb` at the command line.”*

“Skills were not ‘taught’ insufficient instruction via hard to search Jupiter notebooks. Effort to get good grades was huge so withdrew from module although gained grade 1 in first TMA”

“Explicit explanation of how to access the Jupyter notebook. Maybe on the front page of the module webpage.”

Conclusions

R1 Does the use of notebooks effectively support students in their studies of the module learning outcomes?

The survey focused on students’ reflection on how they could study the module, so it was not a direct measure of how effective it was at supporting learning outcomes. However indirectly students reported that they felt supported and made use of the tools provided in the anticipated way. In particular students typically turned to the module website and VLE first when answering questions, and then the notebooks, showing good integration of theory and practice and suggesting that they were effectively supported.

R2 Do notebooks allow the students to integrate theory and practice?

Students reported that they followed the expected pathway of starting with studying the theory on the VLE website, then notebooks, followed by computer marked assessments and tutor marked assessments. However, this was not a straightforward linear pathway with students typically using both the website and notebooks in the same study session. Furthermore, students attempted a large proportion of the exercises provided in the notebooks suggesting that a deep level of learning was taking place.

R3 Do students have technological problems in using notebooks?

Students reported that the software was mostly installed without problems, although some did need additional assistance. However not all features of the notebooks were apparent to the students and they struggled to find material within the notebooks on demand as they were hard to search.

R4 Does the use of notebooks dictate when and where students are able to study?

Whilst the majority of students spent most of their study time on a desktop or laptop computer, this was not always the case. Students studied in a variety of locations and with a variety of devices. It’s likely that the fact that notebooks were only available on a full computer skewed the results here. Comments from students highlighted their desire for more diverse study materials including those which are printed, and how these assist learning in more diverse situations.

R5 Is the use of notebooks restricted by accessibility constraints?

We did not target learners with specific requirements, so the results here look at accessibility across the respondents. However, within this sample there were a majority who identified no significant accessibility constraints and some who did. The comments provided focused on how easy the teaching material was to find and how it was presented, highlighting the need for printed material. As with any teaching individual needs will need to be assessed and supported appropriately when using Jupyter notebooks.

More significantly opinion was divided on if the theoretical part of the teaching should be included in Jupyter notebooks. One way to interpret this is that student valued the diversity of teaching materials where the best medium was used for each element.

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Appendix

Survey questions

Agreement to participate in TM351 Jupyter Notebooks survey

Thank you for responding to this survey about your use of Jupyter notebooks in your study of TM351. You will be invited at the end of the survey to provide your contact details but you may complete the survey anonymously if you prefer. We will not collect any other personal information in this survey and all responses will be aggregated and anonymised before publication of our results.

You will be able to ask for any personal information you have provided to be removed from the research data set by contacting s.r.dawes@open.ac.uk before 31st March 2020.

The survey should take you about 20 minutes to complete.

1 I understand the purpose of the study, my rights to withdraw and what is required of me and agree to participate.

2 For which presentation of TM351 are you responding to this survey?

3 Where had you previously studied Python before starting TM351?

3a Other (free text)

4 To what extent do you agree with the following statements about your preparedness for this module in hindsight?

I was well prepared at the start of this module to use Python

I was well prepared at the start of this module to use Jupyter notebooks

I was well prepared at the start of this module to use Pandas

I was well prepared at the start of this module to use SQL

I was well prepared at the start of this module to use Linux commands

5 Please tell us about your other Open University modules, checking all boxes that apply

Did you study any of these modules in a previous year to TM351?

Did you study (or are you studying) any of these modules at the same time as TM351

6 Which module software did you use?

7 To what extent do you agree with the following statement?

The module software installed without any problems

a Please add more detail about any problems here if you would like to. (free text)

8 Please tell us what percentage of study time you used each of the following resources for (answers should add up to 100%).

8a Other (free text)

9 Please tell us in what order you used the TM351 resources for each topic area.

9a Other (free text)

10 When you attempted the assignments did you create new notebooks or modify the provided ones in the first instance?

11 Did you usually study theoretical and practical parts of the module in the same study session?

12 Please tell us how you studied various parts of the module, checking all options that apply.

13 Did you study the practical parts of the module away from a computer?

14 Where did you study the practical parts of the module? Please tick all that apply.

14a Other (free text)

15 Please rank the following in order of 1 (most likely) to 6 (least likely) for where you were most likely to look for information to answer assignment questions?

Module website

Module forums

Jupyter Notebooks

Google

Your notes

Other

a If you answered Other to this question please explain what other resource(s) you used (free text)

16 Please comment on the extent to which you agree or disagree with the following statements

The resources provided supported my preferred way of learning well

I found the Jupyter notebooks' accessibility sufficient for my needs

I would prefer the taught theory to be included in Jupyter notebooks instead of on the module website

Completing the exercises in the Jupyter notebooks developed my theoretical understanding well

a Please comment if you would like to explain any of these answers further (free text)

17 What percentage of the exercises in the notebooks did you attempt?

18 Is there anything else you think future students would find useful to know about Jupyter notebooks? (free text)

19 We will be inviting some students to more detailed follow up interviews. Would you like to be involved in this? (Participants will be given a voucher).

If you answered yes to this please provide the following details so we may contact you.

a Name:

b Telephone number to contact you on:

c Email address:

d What is the best time of day for you to for an interview?

Ethics approval

- SRPP/SSPP – Approval from the Student Research Project Panel/Staff Survey Project Panel was obtained according to the Open University’s code of practice and procedures before embarking on this project. Application number 2019/155
- Ethics approval was granted by the Open University (HREC/3456/Dawes)
- Data Protection Impact Assessment/Compliance Check – A Data Protection Impact Assessment/Compliance Check was obtained according to the Open University’s code of practice and procedures before embarking on this project. Data Protection registration number 28-04-26