

**Project Title:**

Understanding and mitigating students' difficulties in undertaking complex practical activities on their computers

**Keywords:**

Practical activities, virtualisation, student support

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## Executive summary

Hands-on practical activities can improve students understanding of technological concepts and provide an opportunity to improve their technical skills. In OU Computing & IT modules, practical activities often require students to download, install and configure specialised software to their own computers. This can be a daunting task for less technical students. When a problem occurs, getting immediate technical support is difficult as they are distance learners. Attention has been turned to virtualisation technology, which has the potential to mitigate installation problems by providing students with access to pre-configured virtual machines, which are virtual computers containing all the required software. There are two types of virtualisation technology: cloud-based or local. With cloud-based virtualisation, students do not need to download and install software as activities are undertaken online but it requires a reliable internet connection and involves a relatively high installation and maintenance cost to the provider. In contrast, local virtualisation requires students to install virtualisation software on their own computers but it does not rely an internet connection to run once installed.

This study investigated students' experiences of using virtualisation for their computing practical activities and identified the common difficulties they experienced. Using the 12 hour long practical activities in TM255: Communication and Information Technologies as an example, the study employed the OU's VLE Real-Time Student Feedback (RTSF) facility and telephone interviews to investigate TM255 students' experiences in using local virtualisation and their opinions about cloud-based virtualisation. The participants were from the 18J cohort, which had about 440 students registered at Week 24 which was when the survey took place. The number of responses from RTSF is 88, which equates to 20% response rate. Nine telephone interviews took place in the summer of 2019, when the randomly chosen interviewees had completed the module.

Although the common perception is that students would prefer cloud-based virtualisation as no software installation and configuration are required, 58 (64%) RTSF respondents preferred using local virtualisation techniques. The main reasons were that the process of installing the virtualisation software and virtual machines improved their understanding of virtualisation technology and developed a useful practical skill. It also allows students to stop, save their progress, and resume a practical activity when they wanted to. However, 2 of these respondents mentioned they wanted the cloud-based virtualisation as a backup. The main reason for those who preferred cloud-based virtualisation was that it allowed them to use any computing device to do the activities. All 9 telephone interviewees agreed a cloud-based option would be useful. If the OU was to provide a virtual lab (that is a cloud-based virtualisation option) for this module, it was important to students that the appearance and design should be consistent across all modules using virtual labs.

As for study support, the module team provided a technical support forum with a list of frequently asked questions posted at the top of the forum and step-by-step guides for the practical activities. In addition, tutors provided tutorials focussed on the practical activities. All nine interviewees agreed these were very useful resources. However, a Mac user found the step-by-step guide was too PC specific and wanted a separate guide for Mac users.

Overall, 86 (98%) RTSF respondents could follow the instructions to complete all activities. However, 2 (2%) RTSF respondents said they encountered a technical problem, but they were able to resolve the problem after seeking help from the technical forum. When asked to rate to what extent the practical activities improved their understanding of the technical concept on a scale from 1 to 10, the score was 8.1. Additionally, 98% of students agreed virtualisation is an appropriate tool for facilitating the practical activities.

The finding of this study suggests that while students wish to do computing and IT practical activities without having to install and configure specialised software and have the flexibility to do the activities using any computing devices (e.g. tablets) they also value the practical skills development opportunity provided by local virtualisation. Whilst enjoying the flexibility local virtualisation provides, they also want to have the cloud-based virtualisation as a backup.

## Aims and scope

The aim of the project is to understand the difficulties students face when they undertake computing practical activities that are part of the module, which require them to download, install and configure specialised software on their computers. It is also to evaluate the support strategies employed, their effectiveness and whether the use of virtualisation technology can mitigate the difficulties students experienced when undertaking computing practical activities.

Hands-on practical activities can improve students understanding of technological concepts and provide an opportunity to improve their technical skills (Moon 2013). However, less technical students often find installing and configuring software on their computer a daunting task. When a problem occurs, getting immediate technical support is difficult as they are distant learners. Furthermore, a higher specification computer is usually required to run the software. This can be a burden for some students and also prevent students in undertaking the activities using mobile computing devices such as tablet computers.

One potential solution is to provide a fully configured online learning environment for students to undertake the practical activities by using cloud-based virtualisation (Sandhu and Sood 2015). However, the drawbacks of this approach are high installation and maintenance costs, limited availability and reliance on an internet connection. Another solution is to apply local-virtualisation, which allows students to import pre-configured virtual machines to their virtualisation environment, such that students do not need to install and configure specialised software. However, students will still need to install the virtualisation software (Donelan et al., 2018).

This study investigated the needs of students, the problems they face and explored the viability of different options through surveys and interviews. The cohort of the 18J presentation of TM255: Communication and Information Technologies was chosen as the subject of this study. TM255 was chosen because it includes 12 hours of practical activities requiring students to install two pieces of specialised software.

The finding of this study could improve students' learning experiences on this module, and more widely inform approaches on other modules that include practical activities that require specialist software.

## Activities

Building on a prior study undertaken in 2014 on student experience of using virtualisation techniques for practical networking activities (Donelan et al., 2018), this study combines both quantitative and qualitative data analysis techniques to investigate student experiences on a new module. As the performance of personal computers, network capacity and virtualisation technology have significantly improved since 2014, the new student experiences are expected to be different. Informed by the 2014 study, the practical activities on TM255 are based on a local virtualisation

method and the learning support focuses on tutor moderated technical support forums and subject specific tutorials. This study investigates students' opinions on the effectiveness of these virtualisation approaches and learning support mechanisms by using real-time student feedback (RTSF) surveys and telephone interviews on the 18J cohort of TM255 students.

### Real-time student feedback surveys

RTSF surveys allow opinions and feedback on learning materials to be collected while students are still studying a module. These early insights enable the module team to better monitor the module and apply interventions timely (The Open University, n.d.). RTSF surveys can be incorporated into the VLE and provide a consistent survey experience to students. The relatively simple approval process makes it attractive for short surveys. Two Real-Time Student Feedback (RTSF) surveys were used to gather data on students' experiences in this study. Both surveys were approved by the SRPP before going live to students

The first survey took place between weeks 3 and 6, which were the period when students were doing or had just completed the first set of practical activities – which were on topic of wireless networks. The survey aimed to check whether students could download, install and use the specialised software, explore the difficulties they encountered, how they dealt with the difficulties and their opinions on the practical activities guide. The RTSF tool gives immediate feedback to students according to the answer they choose. We used this feedback facility to encourage students who encountered problems to visit the technical support forum or contact their tutors. The responses from the first survey enables us to gauge the technical problems students were facing. This guided us in the design of the second survey.

The second survey focussed on students' experiences of doing the second set of practical activities - on the topic of cybersecurity. The survey took place between weeks 24 and 25, when students were doing or had just completed the cybersecurity practical activities. The survey investigated students' experiences of downloading, installing and setting up the virtualisation environment using the specialised software. It explored the difficulties they encountered, how they dealt with the difficulties, their feedback on the practical activities guide, their opinions on local- and cloud-based virtualisations including their preferences and reasons.

These two surveys were largely quantitative and responses were analysed using statistical methods. A copy of the survey questions is available in Appendix A.

### Telephone interviews

To complement the RTSF surveys, which are mainly quantitative, semi-structured telephone interviews were used to gather more in-depth opinions on the practical activities and virtualisation. The interviews took place between late July and early September 2019 when the 18J presentation of the module was completed.

The SRPP, ethical and data protection guideline were duly followed, and the interview questions and procedures were approved before the interviews took place. The interview documentation, including a participant information leaflet, consent form, invitation email template and interview questions, is available in Appendix B.

The demographic of the TM255 18J cohort is summarised below.

- Registered at start: 515; Registered at 25% 512 (500 continuing and 12 new).
- 83% male, 17% female.
- 74% from England, 8% Scotland, 6% Wales, 5% NI, 5% EU and 1% Ireland.

- Age bands: 25-29: **22%**, 30-34: **21%**, 21-24: **16%**, 35-39: **15%** (74% between 21 and 39)
- 84% white
- 16% disabled

After the SRPP approval, a list of 190 TM255 students were provided by SRPP that could be contacted for this research. Given the cohort demographic and the limited student sample, plus constraints on time available for this phase of the research, 10 students that aimed to represent demographics of the cohort was chosen for interview. The following is a summary of the demographic of the interviewee set.

- Gender: **2** female and **8** male students
- Under 25: **2**; Age 26- 35: **5**, Age 36 – 45: **2**; Age 46 – 55: **1**
- Ethnicity: **9** white and **1** non-white
- Nationality: **9** GB and **1** non-GB
- Disabled: **2**
- Result grade: Pass 1: **1**; Pass 2: **5**; Pass 3: **4**

To ensure the interviewee sample was composed of the desired demographic, students were invited in batches, with each batch composed of 30 to 50 students of desired attributes. To encourage participation, students were informed that those who completed the interviews would be given a £10 gift voucher. The invitees were given one week to reply. On each batch, 2 to 3 students agreed to participate. The desired demographic was achieved after 4 batches of invitations. However, one participant did not take part in the interview.

The interviews were conducted by a TM255 AL. The length of each telephone interview was approximately 30 minutes and was recorded. The recorded voice files were transcribed into text by a professional transcriber. The interview transcriptions were anonymised before analysis took place. Thematic analysis (Braun et al., 2019) was used to analyse the interview transcriptions. The themes identified were compared and cross-checked against the results of the RTSF surveys.

## Findings

### RTSF survey 1 (networking practical activities)

The networking activities include a fairly straight-forward process of downloading and installing the virtualisation software. This survey aims to capture students' experience on this process.

The followings are the key findings of the survey:

- 133 students responded to the survey (26% response rate)
- 96% respondents could download and install the specialise software
- 5% respondents experienced a problem but managed to resolve it.
- 96% respondents could follow the instructions to complete the two networking practical activities
- 67% prefer to use the local version, while only 33% would prefer a cloud-based virtual lab.
- Mac users expressed more interest in using a virtual lab as there was no Mac version of the software available at the time they did the activities.

As the response rate is not very high, the results need to be evaluated with caution. Nevertheless, the result does indicate that large majority of students had no problem in downloading and installing the specialised software and could follow the instructions to complete the two networking practical

activities. Those who encountered a problem managed to resolve it at the end. This indicates that Level 2 IT and Computing students are competent in following instructions to download and install simple specialised software.

When asked about virtualisation, it is surprising to see that more students preferred conducting the activities on their computers than using a cloud-based virtual lab. This contradicts our original expectation, which is students would prefer cloud-based virtualisation because no software installation and configuration are required.

### RTSF survey 2 (cybersecurity practical activities)

The setup of the cybersecurity activities involved a more complicated process of downloading multiple large files, installing the virtualisation software and setting up a virtualisation environment. This survey aims to look at students' experience on this process and their opinions on virtualisation.

The followings are the key findings of the survey:

- Survey took place at Week 24, when 440 students remained registered
- 88 students responded (20% response rate)
- All 88 respondents could download, install the virtualisation software and import the virtual appliances, but 10 respondents experienced a problem.
- All respondents could follow the instructions to complete the practical activities
- All respondents agreed virtualisation was an appropriate tool for these practical activities (cybersecurity) and the average score they gave to the activities is 8/10.
- 66% prefer to use a local version, while only 34% would prefer a cloud-based virtual lab.

Again, the response rate is not very high, so the results need to be evaluated with caution. Nevertheless, the result does indicate that large majority of students had no problem downloading, installing and setup the virtualisation environment and could follow the instructions to complete the week-long cybersecurity practical activities. Those who encountered a problem managed to resolve it at the end. When asked about virtualisation, 66% of respondents preferred local virtualisation than cloud-based virtualisation. This observation agrees with the previous RTSF survey. The survey asked respondents the reasons for their choices. Figure 1 and 2 shows the reasons for choosing local and cloud-based virtualisation respectively.

In the Question 7, you choose the *PC based virtualisation* as your preferred method. Please tell us what reasons that discourage you to use the browser based version (please check all that apply).

Response	Average	Total
A requirement to have an internet connection to complete the activities.	46%	27
I prefer to be able to start/stop working half way through an activity on my own computer.	64%	38
Uncertainty about whether the service would be accessible whenever I wanted to access it.	46%	27
I value being able to use real world tools like VirtualBox on my own computer.	75%	44
I already use Virtualbox.	36%	21
Other reasons (please specify in the space provided).	3%	2
Total responses to question	67%	59/88

Figure 1 Reasons for choosing local virtualisation

In Question 7, you choose the *online version* as your preferred method. Please tell us what reasons that encourage you to use the browser based version (please check all that apply).

Response	Average	Total
I always have an internet connection available.	67%	20
I could use any device with a browser to access the activities.	63%	19
I could access the activities from any computer not just my own.	63%	19
I would know that the software is properly installed / configured.	50%	15
I would know that I was receiving an equivalent experience to other students irrespective of how good my own computer is.	40%	12

Figure 2 Reasons for choosing cloud-based virtualisation

### Telephone interviews

Based on the thematic analysis, Table 1 summarises the most frequently appeared nodes in the interviews. The full codebook can be found in Appendix C



Name	Description	Files	References
Computers		1	8
cybersecurity activities		9	17
future study		8	17
group project		3	8
Learning support		4	17
forum		2	2
helpful		5	14
tutorials		4	10
Problem		2	8
crashes		1	2
Installation		2	3
remote lab		7	23
consistency		6	9
good idea		3	3
internet		7	10
virtualisation		7	26
prior experience		7	17
personal		6	15

Further analysis on the reference texts of these nodes, the following points can be summarised:

1. All 9 interviewees agreed the cloud-based option was useful but the option to be able to run the activities on their own machines was also desirable.
2. If a virtual lab is provided, it is important the appearance and design should be consistent across all modules.
3. Equivalent support for MAC users would be appreciated.
4. Most students could cope with setting up VMs and doing the activities (having previous experience on virtualisation (from TM129) helped).

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5. Forums were the first/quickest/most useful support mechanism
6. Screencasts/demos would be used by students if produced.

Points 3, 4 and 5 agree with the findings of the RTSF surveys. While point 1 highlights a greater preference for a cloud-based solution. However, both RTSF surveys and telephone interviews revealed that students want both options to be available. The interviewees strongly expressed that if a virtual lab was to be provided, it was important the appearance and design should be consistent across all modules.

In addition to reading the reference texts, word clouds were used to highlight words associated with particular themes. Figure 3 shows the word cloud for the "Problem" theme. The words Mac, keyboard, assignment and crashing appear frequently so it can be deduced that some interviewees suffered keyboard and crashing problems. This is expected as the keyboard layout of a Mac is different to a PC and Mac users might not have been able to find the unusual symbol used in the command line activities in their keyboard. It is also known that VirtualBox will crash if certain system settings are in conflict with their computers.

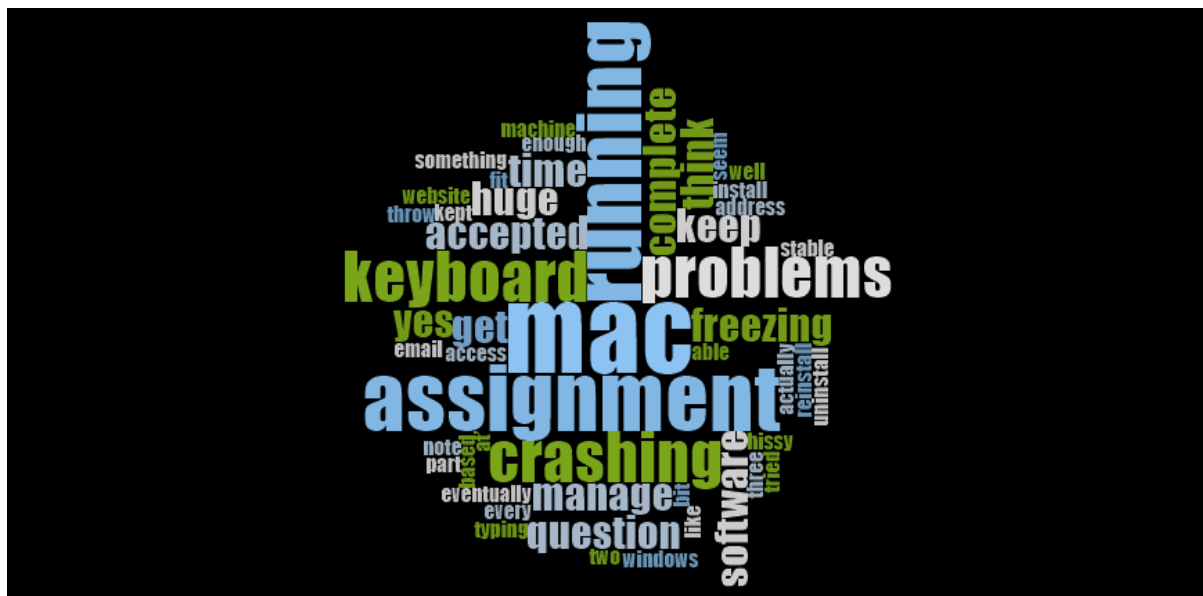


Figure 3 Word cloud for the Problem theme

Figure 4 shows the word cloud for the learning support theme. The words "forums" and "tutorials" appear frequently in this word cloud. These were the two main learning support mechanisms provided by the module.

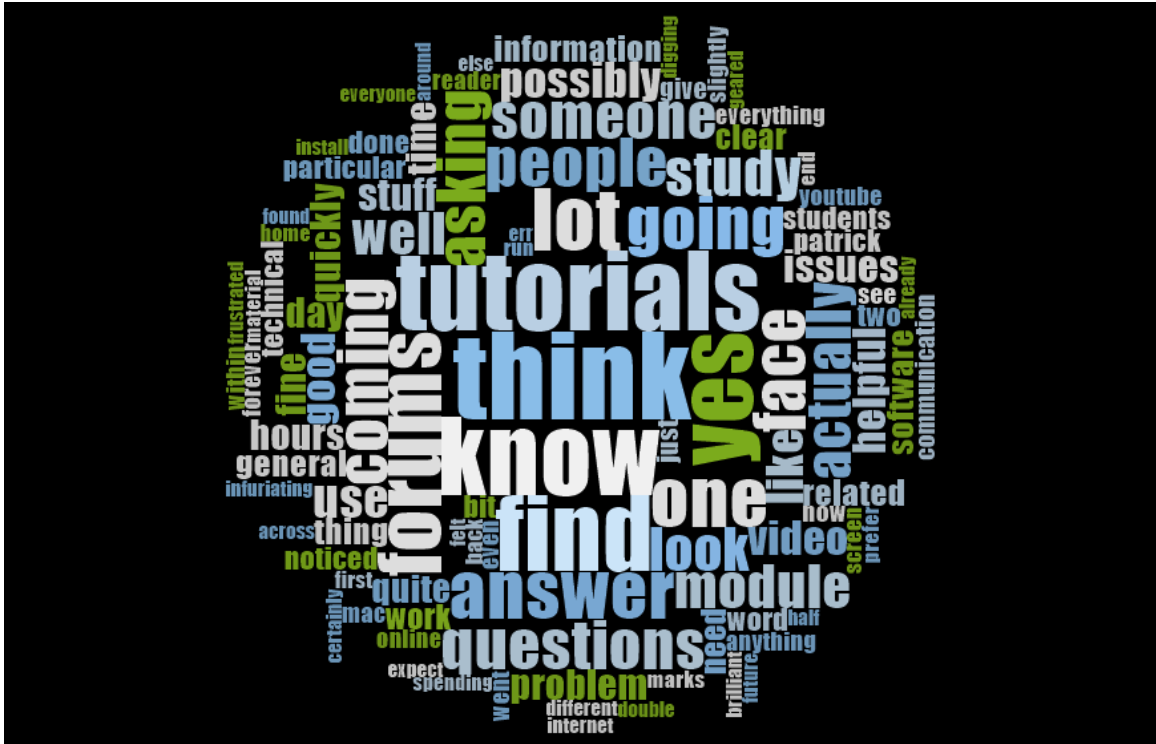


Figure 4 Word cloud for the Learning support theme

Figure 5 shows the word cloud for remote lab. The big yes in the middle indicates the interviewees preferred the remote lab. The word “consistency” also appears in the word cloud. These observations agree with the summary points 1 and 2 above.

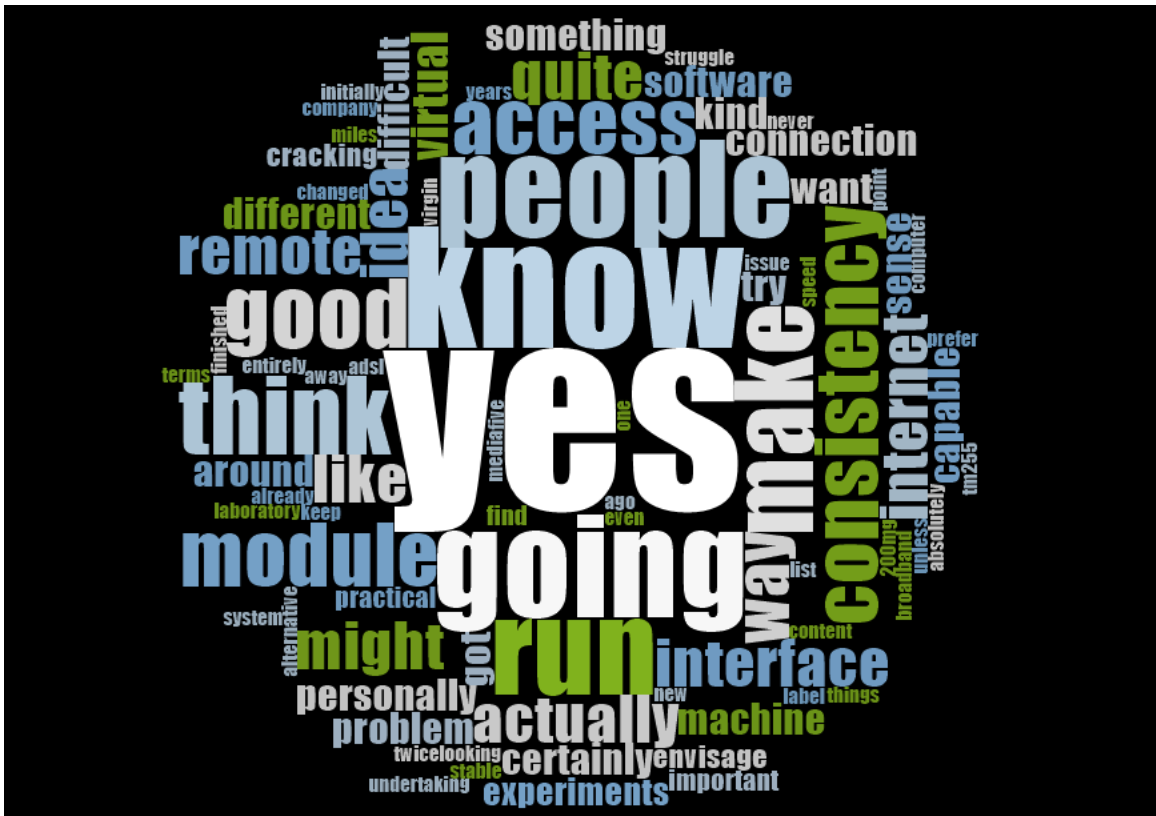


Figure 5 Word cloud for the remote lab theme

## Conclusion

In conclusion, the finding indicates that students like the idea of having virtual labs but also want the option to be able to do the activities on their own computers. If a virtual lab is to be offered, it would need to provide consistent experience across modules. Many students value the practical skills developed during the setting up of the labs on their computers, so not all students would choose the installation-free virtual lab option. Technical forums (with FAQs) appear to be an effective supporting mechanism. However, students thought tutorials and screencast videos going through the setup of the labs were useful.

## Impact

### Student experience

The study informed the TM255 module team that the technical support forums were effective, tutorials and screencast videos going through the setup of the labs was useful and equivalent installation guide for Mac users was desired. As a result, screencast videos and installation guide for Mac users have been produced and made available for the 20J presentation. Tutorials covering the practical activities are scheduled for each presentation.

### Teaching

The finding of this study shows that a more convenient (installation free) virtual lab option is not necessarily the students' preference. Many students value the skill and experience gained through the installation opportunity. This is in contrast of what our expectation was. Informal discussions among academics in the School of Computing and Communications implied that many academic expected students would prefer to do practical activities on a virtual lab.

The study also finds that the RTSF survey is a valuable tool for obtaining students opinions timely.

### Strategic change and learning design

The School of Computing and Communications are considering provision of a virtual lab for modules across the school. This study informs the school that students want the virtual lab to be consistent in style and structure across all modules and want an alternative option as a backup.

## Deliverables

The finding of this study was presented in the eSTEEeM conference 2020 (Wong et al., 2020).

## University approval processes

### SRPP

Approval from the Student Research Project Panel was obtained according to the Open University's code of practice and procedures before embarking on this project. Application number 2019/074.

### HERC

An ethical review was obtained according to the Open University's code of practice and procedures before embarking on this project. Reference number HREC/3316/Wong.

## Data Protection

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 was not required for this project.

## References

- Braun V., Clarke V., Hayfield N., Terry G. (2019) Thematic Analysis. In: Liamputtong P. (eds) Handbook of Research Methods in Health Social Sciences. Springer, Singapore.  
[https://doi.org/10.1007/978-981-10-5251-4\\_103](https://doi.org/10.1007/978-981-10-5251-4_103)
- Donelan, Helen; Smith, Andrew and Wong, Patrick (2018). Virtualization for computer networking skills development in a distance learning environment. Computer Applications in Engineering Education, 26(4) pp. 872–883.
- Moon, J.A., (2013). A handbook of reflective and experiential learning: Theory and practice. Routledge.
- Open University (n.d.) 'Implementing Real-Time Student Feedback', Analytics 4 Action [Online]. Available at <https://learn3.open.ac.uk/course/view.php?id=300833> (Accessed 30/7/2020).
- Sandhu, R. and Sood, S. K. (2015). A commercial, benefit driven and secure framework for elearning in cloud computing. Comput Appl Eng Educ, 23: 499–513. doi:10.1002/cae.21621
- Wong, Patrick; Donelan, Helen and Hirst, Tony (2020). Understanding and mitigating students' difficulties in undertaking complex practical activities on their computers. In: 9th eSTeEM Annual Conference, 29-30 Apr 2020, Milton Keynes, England.

## Appendix A (RTSF Surveys questions)

### A1. RTSF Survey 1 (Networking activities)

## REAL TIME STUDENT FEEDBACK

**Purpose:** “Capturing feedback from students during their study to help shape support or change the students’ learning experience”

<b>Title: (module code/presentation date/description e.g. TU100 15J Induction Activities)</b>	<b>TM255</b>
<b>Module Team Chair:</b>	<b>Patrick Wong</b>
<b>Module code and presentation:</b>	<b>18J</b>
<b>CAU:</b>	<b>STEM</b>

Once you have completed this form please email it to IET-SRPP for Student Research Project Panel (SRPP) approval and copy in [learningdesign@open.ac.uk](mailto:learningdesign@open.ac.uk).

*Please insert or delete rows as required*

<b>Question Name</b>	<b>What is the question?</b>	<b>Go live dates (Start and finish dates for questionnaire)</b>	<b>Question answer options (e.g. Student selects multiple choice option if applicable)</b>	<b>What is the response to the students selected answer:  A: any automated response to student?  B: Intended intervention?</b>	<b>Intended student behaviour and how will it be measured?  (e.g. VLE engagement data, TMA submissions etc.)</b>
Q1 Cisco account	<i>Have you enrolled in the Cisco academy, which is required to</i>	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<b>A: Answer option</b> <i>Yes, I have enrolled in the Cisco academy</i>	<b>A: Feedback response</b> Excellent. Thank you for your feedback.  <b>A: Intended intervention:</b> N/A	<b>Intended student behaviour:</b> Student is able to sign up a Cisco account and use Packet Tracer  <b>Success measure and method:</b>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
	<i>use Packet Tracer?</i>		<p><b>B: Answer option</b> <i>No, I can't find the link to enrol</i></p> <p><b>C: Answer option</b> <i>No, the enrolment procedure is too confusing</i></p>	<p><b>B: Feedback response:</b></p> <p>Please revisit Activity 3.5 (exploratory) Part 1, which gives details of the enrolment procedure. If you still have a problem enrolling, check the Block 1 Technical support forum for clarification. If you cannot find a solution in the forum, create a new post with details of the problem you encountered.</p> <p><b>B: Intended intervention:</b></p> <p>Module team requests the student's tutor to arrange with the student for a call and to talk them through the enrolling procedure.</p>	Student is able to participate in Packet Tracer activities and have higher engagement in the module

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				<p><b>C: Feedback response:</b></p> <p>Please revisit Activity 3.5 (exploratory) Part 1, which gives details of the enrolling procedure. If you still have a problem enrolling, check the Block 1 Technical support forum for clarification of the signup procedure. If you cannot find a solution in the forum, create a new post with details of the problem you encountered.</p> <p><b>C: Intended intervention:</b></p> <p>Module team requests the student's tutor to arrange with the student for a call and to talk them through the enrolling procedure.</p>	
Q2 Downloading Packet Tracer	Have you successfully downloaded Packet Tracer?	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<b>A: Answer option</b> <i>Yes, I have downloaded Packet Tracer</i>	<b>A: Feedback response</b> Excellent. Thank you for your feedback.  <b>A: Intended intervention:</b>	<b>Intended student behaviour:</b> Student is able to download Packet Tracer



Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<p><b>B: Answer option</b> <i>No, because the server is unavailable</i></p> <p><b>C: Answer option</b> <i>No, because of a slow connection</i></p> <p><b>D: Answer option</b> No - Other (Please specify the problem)</p>	<p>N/A</p> <p><b>B: Feedback response:</b> If the server is unavailable, please try it again at a later time. You may find further advice at the Block 1 Technical support forum.</p> <p><b>B: Intended intervention:</b> The module team will help the student to obtain a copy of the software, e.g. put the software on a USB stick and post it to the student.</p> <p><b>C: Feedback response:</b> If your internet connection is too slow, please be patient and wait for the download to complete. Try to download the software at a different time of day. You</p>	<p><b>Success measure and method:</b> Student is able to participate in Packet Tracer activities and have higher engagement in the module</p>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				<p>may find further advice in the Block 1 Technical support forum. If you can't find a useful solution, create a new post in the forum with details of the problem you encountered.</p> <p><b>C: Intended intervention:</b></p> <p>The module team will help the student to obtain a copy of the software, e.g. put the software on a USB stick and post it to the student.</p> <p><b>D: Feedback response:</b></p> <p>Thank you for your feedback. You may find further advice in the Block 1 Technical support forum. If you can't find a useful solution, create a new post in the forum with details of</p>	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				<p>the problem you encountered.</p> <p><b>C: Intended intervention:</b></p> <p>The module team will help the student to obtain a copy of the software, e.g. put the software on a USB stick and post it to the student.</p>	
Q3 Installing Packet Tracer	Have you successfully installed Packet Tracer?	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<p><b>A: Answer option</b> <i>Yes, I have installed Packet Tracer.</i></p> <p><b>B: Answer option</b> Yes, but I did have some problems</p>	<p><b>A: Feedback response</b> Excellent. Thank you for your feedback.</p> <p><b>A: Intended intervention:</b> N/A</p> <p><b>B: Feedback response</b> Excellent. Please share how you overcame the problem</p>	<p><b>Intended student behaviour:</b> Student is able to install Packet Tracer</p> <p><b>Success measure and method:</b> Student is able to participate in Packet Tracer activities and have higher engagement in the module</p>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<p><b>C: Answer option</b> <i>No, because I received an error message when installing Packet Tracer</i></p>	<p>in the Block 1 Technical support forum.</p> <p><b>B: Intended intervention:</b> N/A</p> <p><b>C: Feedback response:</b> Check the Block 1 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the error message you are presented with, and your computer specification including: the make (PC/Mac), name and version of your operating system, virus scanner, and the amount of RAM your computer has.</p> <p><b>C: Intended intervention:</b></p>	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<p><b>D: Answer option</b></p> <p><i>No, the installation procedure is too confusing.</i></p> <p><b>E: Answer option</b></p> <p>No - Other (Please specify the problem)</p>	<p>The module team is to investigate the problem based on the information the student provided. If no solution can be offered, the module team will provide the student with alternative activities.</p> <p><b>D: Feedback response:</b></p> <p>Check the Block 1 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the problem you encountered. Please also discuss your problem with your tutor.</p> <p><b>D: Intended intervention:</b></p> <p>Module team requests the student's tutor to arrange with the student for a call</p>	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				<p>and to talk them through the installation procedure.</p> <p><b>E: Feedback response:</b></p> <p>Check the Block 1 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the problem you encountered, and your computer specification including: the make(PC/Mac), name and version of your operating system, virus scanner, and the amount of RAM your computer has.. Please also discuss your problem with your tutor.</p> <p><b>E: Intended intervention:</b></p> <p>The module team is to investigate the problem</p>	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				based on the information the student provided. If no solution can be offered, the module team will provide the student with alternative activities.	
Q4a Activity instructions	Were you able to follow the instructions to complete the two activities?	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<p><b>A: Answer option</b> <i>Yes, I was able to follow the instructions.</i></p> <p><b>B: Answer option</b> <i>Yes, I was able to follow the instructions but I found them difficult to follow.</i></p> <p><b>C: Answer option</b> <i>No, I found the instructions too difficult to follow.</i></p>	<p><b>A: Feedback response</b> Excellent. Thank you for your feedback.</p> <p><b>A: Intended intervention:</b> N/A</p> <p><b>B: Feedback response</b> We are sorry you found the instructions difficult to follow. We will explore ways of improving these.</p> <p><b>B: Intended intervention:</b> N/A</p>	<p><b>Intended student behaviour:</b> Student is able to use Packet Tracer to complete Activity 3.14</p> <p><b>Success measure and method:</b> Student is able to participate in Packet Tracer activities and have higher engagement in the module</p>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				<p><b>C: Feedback response:</b></p> <p>Please revisit the <b>Comment</b> section of Activity 3.14 (practical) and 3.19 (practical), which gives a step-by-step guide in screenshots of the activity. Please also discuss your problem with your tutor.</p> <p><b>B: Intended intervention:</b></p> <p>Module team requests the student's tutor to arrange with the student for a call and to talk them through the activities.</p>	
Q4b Activity instructions b	If you answered 'no' to the previous question, please tell us	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<b>A: Answer option</b> <i>Activity 3.14 (practical)</i>	<b>A: Feedback response</b> Thank you for your feedback. We will explore ways of improving the instructions.	<b>Intended student behaviour:</b> Student tells us which practical activity they find it most difficult to follow



Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
	which part of the instructions you find most difficult to follow.		<b>B: Answer option</b> <i>Activity 3.19 (practical)</i>	<b>A: Intended intervention:</b> N/A  <b>B: Feedback response:</b> Thank you for your feedback. We will explore ways of improving the instructions.  <b>B: Intended intervention:</b> N/A	<b>Success measure and method:</b> Module team can identified the problem and improve the step-by-step instructions.
Q5. Skill for wireless network a	Do you agree these practical activities help you to develop skills for wireless	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<b>A: Answer option</b> <i>Yes, the practical activities helped me to develop skills for wireless network setup.</i>	<b>A: Feedback response</b> Excellent. Thank you for your feedback.  <b>A: Intended intervention:</b> N/A	<b>Intended student behaviour:</b> Student developed the practical skill for setting up a basic wireless network.  <b>Success measure and method:</b>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
	network setup?		<b>B: Answer option</b> <i>No, the practical activities did not help me to develop the skills for wireless network setup.</i>	<b>B: Feedback response:</b> Please complete Question 5b  <b>B: Intended intervention:</b> N/A	Student is able to participate in Packet Tracer activities and have higher engagement in the module
Q5b Skill for wireless network b	If you answered 'no' to the previous question, please tell us why you feel <i>the</i> practical activities do not help you to develop the skill for wireless	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<b>Open response questions</b>	<b>Feedback response:</b> Thank you for your feedback. We will explore ways of improving the activities.  <b>Intended intervention:</b> N/A	<b>Intended student behaviour:</b>  Student tells us why practical activities does not help them  <b>Success measure and method:</b>  Module team can identified the problem and improve the activities.

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
	network setup.				
Q6a Online browser-based Packet tracer a	If an online browser-based version of Packet tracer (i.e. installation free) was available, would you prefer to use the online version or a local version?	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<b>A: Answer option</b> <i>Local version because, for example, I can use it without the need of an internet connection and it gives me more flexibility.</i>  <b>B: Answer option</b> <i>Online version because, for example, no installation would be required and I could use it on my portable computing device, e.g. iPad.</i>	<b>B: Feedback response:</b> Thank you for your opinion.  <b>B: Intended intervention:</b> N/A	<b>Intended student behaviour:</b> Students tells us their preferences on using the software online or on their local computers  <b>Success measure and method:</b> Through improved activity design, students have higher satisfaction on the module activities.
Q6b Online browser-based Packet tracer b	If the reason(s) for you choice are other than those specified in the answers in Q6a, can	<i>Week 3 – end of Week 4 (20.10.18 – 02.11.18)</i>	<b>Open response questions</b>	<b>Feedback response:</b> Thank you for your feedback.  <b>Intended intervention:</b> N/A	<b>Intended student behaviour:</b> Students tells us their preferences on using the software online or on their local computers  <b>Success measure and method:</b>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
	you tell us your reason(s) please?				Through improved activity design, students have higher satisfaction on the module activities.

## A2. Real-time Student Feedback Survey 2 (Cybersecurity activities)

### REAL TIME STUDENT FEEDBACK

**Purpose:** “Capturing feedback from students during their study to help shape support or change the students’ learning experience”

<b>Title: (module code/presentation date/description e.g. TU100 15J Induction Activities)</b>	<b>TM255</b>
<b>Module Team Chair:</b>	<b>Patrick Wong</b>
<b>Module code and presentation:</b>	<b>18J</b>
<b>CAU:</b>	<b>STEM</b>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
Q1 Downloading VirtualBox and the three virtual appliances	Have you successfully downloaded VirtualBox and the three virtual appliances?	<i>Week 24 – end of Week 25 (30.03.19 – 05.04.19)</i>	<p><b>A: Answer option</b> Yes, I have downloaded VirtualBox and the three virtual appliances</p> <p><b>B: Answer option</b> <i>No, because the server is unavailable</i></p> <p><b>C: Answer option</b> <i>No, because of a slow connection</i></p> <p><b>D: Answer option</b></p>	<p><b>A: Feedback response</b> Excellent. Thank you for your feedback.</p> <p><b>A: Intended intervention:</b> N/A</p> <p><b>B: Feedback response:</b> If the server is unavailable, please try it again at a later time. You may find further advice at the Block 3 Technical support forum.</p> <p><b>B: Intended intervention:</b> The module team will help the student to obtain a copy of the software, e.g. put the software on a USB stick and post it to the student, or refer the student to an online hosted alternative.</p> <p><b>C: Feedback response:</b> If your internet connection is too slow, please be patient and wait for the download to complete. Try to download the software at a different time of day. You may find</p>	<p><b>Intended student behaviour:</b> Student is able to download VirtualBox and the three virtual appliances</p> <p><b>Success measure and method:</b> Student is able to participate in the cybersecurity activities and have higher engagement in the module</p>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<i>No - Other (Please specify the problem)</i>	<p>further advice in the Block 3 Technical support forum. If you can't find a useful solution, create a new post in the forum with details of the problem you encountered.</p> <p><b>C: Intended intervention:</b> The module team will help the student to obtain a copy of the software, e.g. put the software on a USB stick and post it to the student.</p> <p><b>D: Feedback response:</b> Thank you for your feedback. You may find further advice in the Block 3 Technical support forum. If you can't find a useful solution, create a new post in the forum with details of the problem you encountered.</p> <p><b>D: Intended intervention:</b> The module team will help the student to obtain a copy of the software, e.g. put the software on a USB stick and post it to the student.</p>	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
Q2 Installing VirtualBox	Have you successfully installed VirtualBox?	<i>Week 24 – end of Week 25 (30.03.19 – 05.04.19)</i>	<p><b>A: Answer option</b> <i>Yes, I have installed VirtualBox.</i></p> <p><b>B: Answer option</b> <i>Yes, but I did have some problems</i></p> <p><b>C: Answer option</b> <i>No, because I received an error message when installing or running VirtualBox</i></p>	<p><b>A: Feedback response</b> Excellent. Thank you for your feedback.</p> <p><b>A: Intended intervention:</b> N/A</p> <p><b>B: Feedback response</b> Please share how you overcame the problem in the Block 3 Technical support forum.</p> <p><b>B: Intended intervention:</b> N/A</p> <p><b>C: Feedback response:</b> Check the Block 3 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the error message you are presented with, and your</p>	<p><b>Intended student behaviour:</b> Student is able to install VirtualBox</p> <p><b>Success measure and method:</b> Student is able to participate in cybersecurity activities and have higher engagement in the module</p>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<p><b>D: Answer option</b> <i>No, I cannot follow the installation procedure</i></p> <p><b>E: Answer option</b> <i>No - Other (Please specify the problem)</i></p>	<p>computer specification including: the make (PC/Mac), name and version of your operating system, virus scanner, and the amount of RAM your computer has.</p> <p><b>C: Intended intervention:</b> The module team is to investigate the problem based on the information the student provided. If no solution can be offered, the module team will provide the student with alternative activities.</p> <p><b>D: Feedback response:</b> Check the Block 3 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the problem you encountered. Please also discuss your problem with your tutor.</p>	



Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				<p><b>D: Intended intervention:</b> The module team requests the student's tutor to arrange a call with the student and to talk them through the installation procedure.</p> <p><b>E: Feedback response:</b> Check the Block 3 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the problem you encountered, and your computer specification including: the make(PC/Mac), name and version of your operating system, virus scanner, and the amount of RAM your computer has. Please also discuss your problem with your tutor.</p> <p><b>E: Intended intervention:</b> The module team is to investigate the problem based</p>	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				on the information the student provided. If no solution can be offered, the module team will provide the student with alternative activities.	
Q3 Importing the virtual appliances	Have you successfully imported the virtual appliances?	<i>Week 24 – end of Week 25 (30.03.19 – 05.04.19)</i>	<p><b>A: Answer option</b> <i>Yes, I have successfully imported the virtual appliances.</i></p> <p><b>B: Answer option</b> <i>Yes, but I did have some problems</i></p> <p><b>C: Answer option</b> <i>No, because I received an error message when importing or starting the virtual appliances</i></p>	<p><b>A: Feedback response</b> Excellent. Thank you for your feedback.</p> <p><b>A: Intended intervention:</b> N/A</p> <p><b>B: Feedback response</b> Excellent. Please share how you overcame the problem in the Block 3 Technical support forum.</p> <p><b>B: Intended intervention:</b> N/A</p> <p><b>C: Feedback response:</b> Check the Block 3 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the</p>	<p><b>Intended student behaviour:</b> Student is able to setup their virtual environment to complete the cybersecurity activities</p> <p><b>Success measure and method:</b> Student is able to complete the cybersecurity activities and have higher engagement in the module</p>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<p><b>D: Answer option</b> <i>No, I cannot follow the importing procedure</i></p> <p><b>E: Answer option</b> <i>No - Other (Please specify the problem)</i></p>	<p>error message you are presented with, and your computer specification including: the make (PC/Mac), name and version of your operating system, virus scanner, and the amount of RAM your computer has.</p> <p><b>C: Intended intervention:</b> The module team is to investigate the problem based on the information the student provided. If no solution can be offered, the module team will provide the student with alternative activities.</p> <p><b>D: Feedback response:</b> Check the Block 3 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the problem you encountered.</p>	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	<p>What is the response to the students selected answer:  <b>A: any automated response to student?</b>  <b>B: Intended intervention?</b></p>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				<p>Please also discuss your problem with your tutor.  <b>D: Intended intervention:</b>  The module team will request the student's tutor to arrange a call with the student and to talk them through the installation procedure.</p> <p><b>E: Feedback response:</b>  Check the Block 3 Technical support forum and see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the problem you encountered, and your computer specification including: the make (PC/Mac), name and version of your operating system, virus scanner, and the amount of RAM your computer has. Please also discuss your problem with your tutor.</p> <p><b>E: Intended intervention:</b></p>	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
				The module team is to investigate the problem based on the information the student provided. If no solution can be offered, the module team will provide the student with alternative activities.	
Q4 Activity instructions	Were you able to follow the instructions to complete all the cybersecurity activities?	<i>Week 24 – end of Week 25 (30.03.19 – 05.04.19)</i>	<p><b>A: Answer option</b> <i>Yes, I was able to follow all of the instructions.</i></p> <p><b>B: Answer option</b> Yes, I was able to complete the activities but I found the instructions difficult to follow. (Please specify the problem activities)</p> <p><b>C: Answer option</b> <i>No, I found the instructions of some or all activities too difficult to</i></p>	<p><b>A: Feedback response</b> Excellent. Thank you for your feedback. <b>A: Intended intervention:</b> N/A</p> <p><b>B: Feedback response</b> We are sorry you found the instructions difficult to follow. We will explore ways of improving these. <b>B: Intended intervention:</b> N/A</p> <p><b>C: Feedback response:</b> Thank you. Check the Block 3 Technical support forum and</p>	<p><b>Intended student behaviour:</b> Student tells us which practical activity/activities they find it difficult to follow</p> <p><b>Success measure and method:</b> Module team can identified the problem and improve the step-by-step instructions.</p>

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: <b>A: any automated response to student?</b> <b>B: Intended intervention?</b>	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<i>follow.</i> (Please specify the problem activities)	see if a solution has been posted there. If you can't find a solution, create a new post in the forum with details of the problem you encountered. Please also discuss your problem with your tutor.  <b>C: Intended intervention:</b> The module team will request the student's tutor to arrange a call with the student and to talk them through the problem activities.	
Q5. Virtualisation for practical activities	Do you agree virtualisation is an appropriate tool for facilitating the cybersecurity experiments?	<i>Week 24 – end of Week 25 (30.03.19 – 05.04.19)</i>	<b>A: Answer option (checked boxes)</b> Yes, I agree because: <ul style="list-style-type: none"> <li>○ it enables the high-risk experiments to be undertaken in a virtual environment</li> <li>○ the test systems can be packaged</li> </ul>	<b>A: Feedback response</b> Excellent. Thank you for your feedback.  <b>A: Intended intervention</b> N/A	<b>Intended student behaviour:</b> Students tell us their opinions about using virtualisation for the security activities.  <b>Success measure and method:</b> Student is able to complete all practical activities and have higher engagement in the module

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<p>as appliances for easy importing.</p> <ul style="list-style-type: none"> <li>○ it allows the software to be delivered in a consistent and reliable way to students with a variety of end-user devices</li> <li>○ Other reason(s). Please specify.</li> </ul> <p>Please check all that apply.</p> <p><b>B: Answer option</b> <i>I do not agree because ... (Please specify the reason(s) in the space provided)</i></p>	<p><b>B: Feedback response:</b> Thank you for your feedback.</p> <p><b>B: Intended intervention:</b> N/A</p>	
Q6 Cybersecurity skills	To what extent did this set of	<i>Week 24 – end of Week 25</i>	<b>Answer option (Selection and free text)</b> <i>On a scale of 1 to 10,</i>	<b>Feedback response:</b> Thank you for your feedback.	<b>Intended student behaviour:</b> Student tells us their opinion about the set of practical activities.

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
	practical cybersecurity activities helps improve your understanding of the cybersecurity concepts covered in Block 3 Part 2?	(30.03.19 – 05.04.19)	<i>where 1 indicates not helpful at all and 10 highly helpful, please select your score. Please specify the reason(s) in the space provided.</i>	<b>Intended intervention:</b> N/A	<b>Success measure and method:</b> Module team will identified problems and improve the activities.
Q7 Online browser-based virtualisation (a)	If an online browser-based virtualisation system was available (i.e. installation free), would you prefer to use the online version?	Week 24 – end of Week 25 (30.03.19 – 05.04.19)	<b>A: Answer option</b> <i>I would still prefer the PC based virtualisation, but will use the online version as a backup</i>  <b>B: Answer option</b> <i>I would prefer the online version, but will use the PC based virtualisation as a backup</i>	<b>A: Feedback response:</b> Thank you for your feedback.  <b>A: Intended intervention:</b> N/A  <b>B: Feedback response:</b> Thank you for your feedback.  <b>B: Intended intervention:</b> N/A	<b>Intended student behaviour:</b> Student tells us their preference on undertaking the activities online, at their local computers, or at both.  <b>Success measure and method:</b> Through improved activity design, students have higher satisfaction on the module activities.



Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
Q7 Online browser-based virtualisation (b)	In the previous question, if you choose the <i>PC based virtualisation as your preferred method</i> , please tell us what reasons that discourage you to use the browser based version	<i>Week 24 – end of Week 25 (30.03.19 – 05.04.19)</i>	<b>Answer option (checked boxes)</b> <ul style="list-style-type: none"> <li>○ A requirement to have an internet connection to complete the activities</li> <li>○ I prefer to be able to start/stop working half way through an activity on my own computer</li> <li>○ Uncertainty about whether the service would be accessible whenever I wanted to access it</li> <li>○ I value being able to use real world tools like VirtualBox on my own computer</li> <li>○ I already use Virtualbox.</li> <li>○ other reasons (<i>Please specify in the space provided.</i>)</li> </ul> (Please check all that apply)	<b>Feedback response:</b> Thank you for your feedback.  <b>Intended intervention:</b> N/A	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
Q7 Online browser-based virtualisation (c)	In the previous question, if you choose the <i>online version as your preferred method</i> , please tell us what reasons that encourage you to use the browser based version	<i>Week 24 – end of Week 25 (30.03.19 – 05.04.19)</i>	<b>Answer option (checked boxes)</b> <ul style="list-style-type: none"> <li>○ I always have an internet connection available</li> <li>○ I could use any device with a browser to access the activities</li> <li>○ I find installing software difficult</li> <li>○ I have an old computer that struggles to install some OU software</li> <li>○ I use other sorts of virtualisation software that is inconsistent with VirtualBox</li> <li>○ I could access the activities from any computer not just my own</li> <li>○ I would know that the software is properly installed / configured</li> </ul>	<b>Feedback response:</b> Thank you for your feedback.  <b>Intended intervention:</b> N/A	

Question Name	What is the question?	Go live dates (Start and finish dates for questionnaire)	Question answer options (e.g. Student selects multiple choice option if applicable)	What is the response to the students selected answer: A: any automated response to student? B: Intended intervention?	Intended student behaviour and how will it be measured? (e.g. VLE engagement data, TMA submissions etc.)
			<ul style="list-style-type: none"> <li>○ I would know that I was receiving an equivalent experience to other students irrespective of how good my own computer is</li> <li>○ other reasons (<i>Please specify in the space provided.</i>)</li> </ul> (Please check all that apply)		

## Appendix B (Telephone interview documents)

### B1. Interview questions

#### **TM255 Practical cybersecurity activities interview questions**

The aim of this survey is to find out students' study experiences of the cybersecurity activities and what can we do to improve them. The interview should take 20 to 30 minutes. The bullet points below the questions are intended to probe the interviewees for further explanations.

##### **Welcome and introductions**

- Thanking the interviewee for agreeing to take part in the research
- Confirmation that the participant is giving informed consent (referring back to the consent form that the interviewee will have signed)—including for recording this interview, which will take up to 30 minutes
- Explain the aim of the study and what is going to happen in the interview

##### **Interview questions**

###### **1. Practical cybersecurity activities**

- TM255 included some practical cybersecurity activities. Did you complete them?
  - If yes, ask whether they can remember what they were or involved?
    - If no, remind them what the practical cybersecurity activities are.
  - If no, ask why they didn't complete the activities.
- How do you feel about the inclusion of the practical cybersecurity activities in the module in term of helping you to develop your understanding of cybersecurity, which was covered in Block 3 Part 2?
  - If positive, ask in what way they improved their understanding and their opinions about the activities covered, e.g. enough activities, covered the appropriate topics and if anything is lacking.
  - If negative, ask for the reasons for why they feel the practical activities are not helpful.

###### **2. Virtualisation**

- Prior to TM255, had you had any experience of using virtualisation tools?
  - If yes, ask which tools and in what context?
    - If it was through an OU module, ask which module(s)
    - Ask if they encountered any problems when installing the virtualisation tool or running the virtual machine?
      - If so, ask what the problem was and how did they resolve the problem, if the problem was resolved? Which operation system the computer used?

- In TM255, what is your experience in using virtualisation for these activities?
  - If the student used virtualisation before, ask how their prior experience impacted on their experience in this module. In term of virtualisation tool used and installation procedure, was the experience consistent? If not, what are the differences?
  - Ask the reasons for the experience (positive or negative).
  
- What is your experience with using VirtualBox in TM255? Have you experience any problem?
  - If experienced problems, ask the details of the problem and what did they do to resolve it.
  - Ask whether they want to have a freedom of choosing an alternative virtualisation tool, e.g. VMware, even if the module team cannot offer full support for the alternative? (The reason we chose VirtualBox is that it is open-source and free. It is difficult to support a range of virtualisation tools as we don't have expertise on all the possible tools).
  - Do you value the experience of installing and using a virtualisation tool that is widely used by the industry and why?
  
- What is your opinion of the university providing a remote laboratory such that no installation of software is required and all experiments are undertaken through a web browser?
  - If supportive, prompt them that the remote lab would always require an internet connection and the performance could be slower especially at peak time? Will they still have the same opinion?
  - If not supportive, prompt them that no software installation means more time can be spent on the actual experiment and the remote lab can be used on portable devices. Will they still have the same opinion?

### **3. Learning support**

- What is your opinion on the learning supports provided, e.g. technical forums, step-by-step guide and tutorials.
- Do you have any suggestions for other forms of support, e.g. providing screencasts (we didn't provide these because the text-based step-by-step guide is easier to update)?

### **4. Wider context**

- If the university could provide a remote lab that would be used by all modules for practical activities and students could have a more consistent experience, what is your opinion on that?
- Do you have any other suggestions for the module team or the university?

## **Understanding and mitigating students' difficulties in undertaking complex practical activities on their computers (2019)**

### **Participant Information leaflet**

As module chair of *TM255 Communication and Information Technologies*, I would like to invite you to participate in a research study that we are conducting as part of a scholarship project intended to enhance the student experience on TM255.

This information leaflet provides details about why the research is being carried out and what involvement would be expected from you if you decide to participate. Before you agree to take part in this study, I would be grateful if you could take some time to read the information on this leaflet. If you have any questions or concerns, please do get in touch with me at [patrick.wong@open.ac.uk](mailto:patrick.wong@open.ac.uk).

This study has been approved by the OU's Student Research Project Panel (SRPP).

#### **What is the purpose of the study?**

The primary aim of the project is to understand the difficulties students face when they undertake the practical activities that are part of the module. These activities require students to download, install and configure specialised software on their computers. It is also to evaluate the support strategies employed, their effectiveness, and whether other methods for undertaking practical activities could mitigate any problems student currently face.

Using the experience from TM255, this project will develop a better understanding of the needs of students, the problems they face and test the viability of different options for delivering practical computing activities to distance learning students.

#### **Why have I been chosen for this study?**

As a student who has completed TM255 we would be interested to hear your experiences of the practical activities (using Packet Tracer in Block 1 and Virtual machines in Block3 ) to help us develop a better understanding of the needs of our students and how the OU can support them better. We would like to gain a representative view from TM255 students, so we shall be speaking to a cross section of students.

#### **What happens if you take part?**

The study involves private telephone interviews. These can be done via telephone or Adobe Connect at a date and time convenient to you. We want the interviews to be conversational, relaxed and comfortable, so that you can truly express your views. If you do not like a voice interview, we can arrange a text-based chat facility for the interview. The conversation will last around 30 minutes, but may take longer if chat using text.

The interviews will be undertaken by a TM255 tutor, recorded and then transcribed. You will need to sign a consent form which confirms that you agree to participate in this study.

### **What happens to the information you disclose?**

Any information you disclose will be treated in the strictest confidence and will only be reported once analysis has been undertaken to avoid you being identified personally. Any quotes taken from the interview will be anonymised. The information you provide is entirely separate to your studies and will not influence your results in any way.

All information relating to recorded conversations or chat transcripts will be stored in accordance with Data Protection and Freedom of Information Acts and equal opportunities legislation. All data containing your personal information will be deleted immediately after the end of the scholarship project (at the latest December 2019). You have the right to ask for a copy of any personal data held in relation to you and this study and no one else has this right. You do not have the right to view any other participant's data.

### **Can you withdraw your participation?**

If at any point during the study you feel that you do not wish to continue, you are free to withdraw and to request any data that has been gathered from you to be destroyed. However once the data has been anonymised and brought together for analysis, it will no longer be possible to remove you from it. The date where you will no longer be able to withdraw is 30<sup>th</sup> September 2019.

### **Timescales**

We hope to undertake the interviews between Mid July and Mid August 2019, at a date and time that is convenient to you.

### **About me**

I am a lecturer in the School of Computing and Communications and the chair of TM255. I am also a supervisor of postgraduate research students. My interests are in image processing, computer vision and artificial intelligence.

### **Contacts for further information:**

Please do not hesitate to get in touch with me if you have any further questions. My contact details are:

Dr. Patrick Wong

Email: [patrick.wong@open.ac.uk](mailto:patrick.wong@open.ac.uk)

Other members of the project team are:

Dr. Helen Donelan

Dr. Tony Hirst

I hope you will be interested in taking part in this very important study and look forward to hearing about your experiences and views if you are willing and able to participate.

Thank you for taking the time to read this leaflet and please remember to keep a copy of it should you decide to take part.

Best wishes,

Patrick Wong

Chair of TM255

### B3. Consent Form

## **Understanding and mitigating students' difficulties in undertaking complex practical activities on their computers (2019)**

### **Consent form for interview participants**

Thank you for your interest in taking part in this research study.

I am asking you to complete this form to make sure that you are clear about what is involved, including how any data about you will be collected and kept safe.

The form confirms your agreement to be interviewed as part of this research. The interview will be conducted by telephone and will be recorded and then transcribed. If you do not like a telephone interview, we can arrange a text-based chat facility for the interview. The conversation will last between 20 and 30 minutes, but may take longer if chat using text. The interviewer will ask you about your experience on the practical activities in TM255 during the 18J presentation of that module. I would be particularly interested in hearing what difficulties you encountered, how you resolved the problems and suggestions for improving the activities and student experience.

If at any point during the research you feel that you do not wish to continue you are free to withdraw and to request any data that has been gathered from you to be destroyed. However once the data has been anonymised, I shall be unable to remove you from it. The date where you will no longer be able to withdraw is 30<sup>th</sup> September 2019.

Your details and the data generated from the project will be stored in files protected by password and no one except the interviewer, transcriber and 3 academics in the project team will have access to it. Any findings from the research will not identify you individually and names of participants will be anonymised.

Your participation or non-participation in this research project is something that is separate from your OU study and will not affect your assessment in any way.



If you are willing to take part in this research, please tick the box, complete the details below, and return the signed form.

- I am willing to take part in this research, and I give my permission for the interview to be recorded and the data collected to be used in an anonymous form in any written reports, presentations and published papers relating to this study. My written consent will be sought separately before any identifiable data are used in such dissemination.*

Signing this form indicates that you understand the purpose of the research, as explained in the email invitation and participant information leaflet, and accept the conditions for handling the data you provide.

Name:

Signature:

Date of Signature:

Please return this completed form to [patrick.wong@open.ac.uk](mailto:patrick.wong@open.ac.uk). A typed or electronic signature will suffice.

B4. Invitation letter

## **Understanding and mitigating students' difficulties in undertaking complex practical activities on their computers (2019)**

### **Interview invitation letter/ e-mail**

Dear (First name of student)

As the module chair of *TM255 Communication and information technologies*, I am contacting you in the hope that you can help with my research by talking to us about your experiences and opinions of some of the practical activities you encountered during the 18J presentation of that module. Specifically, I am interested in your experiences of the packet tracer and cybersecurity practical activities in Block 1 and 3. I am also interested in exploring with you different ways of implementing practical activities and supporting students through them. I anticipate that the findings of the research will be used to improve the student experience on TM255 and influence more widely how the university delivers practical activities to distance learning students.

The commitment would be a 20 to 30 minute private interview over the telephone (recorded), at a time that would be convenient for you and the interviewer (a TM255 tutor). If you prefer to be interviewed through a text-based chat facility, please let me know and I will ensure that is arranged.

To show our appreciation of your contribution, you will be sent a £10 Amazon e-Gift voucher if you take part in the interview.

You will be required to sign a consent form which outlines the purpose of the research and how your data will be used. I have attached a *Participant Information Leaflet* which provides further information about the research and why you have been invited to participate. This is a great opportunity for you, as a student, to have your say and hopefully influence the OU's practice in general.

If you are able to spare the time, please reply to this email stating your willingness to participate. I will then ask the interviewer to contact you again to confirm details.

Many thanks for your time.

Best wishes,

Patrick

Dr. Patrick Wong

TM255 Module Chair

## Appendix C

Name	Description	Files	References
assessment		2	4
EMA		1	1
Exam		1	2
TMA		1	1
Computers		1	8
Age		1	1
Mac		1	3
PC		1	2
concurrent study		2	2
cybersecurity activities		9	17
Fully completed		2	2
hands on		1	1

Name	Description	Files	References
helpful		9	13
Partially completed		1	1
unhelpful		0	0
disability		1	1
frustrating		2	3
future study		8	17
group project		3	8
Learning materials		2	3
helpful		1	2
unhelpful		1	1
Learning support		4	17
forum		2	2
helpful		5	14
suggestions		1	2
unhelpful		0	0
proactive		1	1
screencasts		2	2
step-by-step guide		1	2
Clear		1	1
unclear		1	1
tutorials		4	10
Problem		2	8
crashes		1	2
Installation		2	3

Name	Description	Files	References
keyboard		1	1
remote lab		7	23
browsers		0	0
consistency		6	9
good idea		3	3
internet		7	10
Prefer PC based lab		1	1
technical competent		2	2
virtualisation		7	26
alternative		1	1
bad experience		1	1
Good experience		1	1
prior experience		7	17
personal		6	15
TM129		1	1
work		1	1
useful		3	3
VirtualBox		1	2
VMware		1	1
wider context		2	4
student interaction		1	1
website		1	1