RESPONSE TO STUDENT CONSULTATION ON PRACTICAL, WORK-BASED AND PROFESSIONAL LEARNING

SUMMARY

This is a response to the consultation on support for students around different aspects of practical work, work-based learning and professional practice, which took place between 15 and 25 September 2022 on the Engineering and Innovation Board of Studies Student Consultative Forum. The forum can be found at STUDENT-CONSULTATION: Engineering & Innovation Board of Studies Student Consultative Forum - September 2022 (open.ac.uk) This consultation was open to any student currently studying Engineering and Innovation modules and qualifications. Both under-graduate and post-graduate students were invited to take part. In total there were 63 posts with around 40% being made by students. The purpose of the consultation was to ensure that students were engaging effectively in practical and practice-based learning; and what other approaches or engagement they were looking for. We were also interested in finding out more about work-based learning and how that might be more effectively interfaced with modules.

The discussion threads were separated into five main items: practical activities, professional practice, inclusion of other practical activities, skills or work-based activities and integrating work-based learning into modules. Students were asked to comment on the experiences and interaction with practical and practice-based learning as well as suggesting approaches they might like to see adopted in future.

The forum was moderated by;

− Anne-Marie Gallen, Deputy Director of Teaching, Engineering & Innovation,

− Donald Edwards, Foundation Degree in Engineering and Top-up BEng.(Hons) Qualification Lead,

− Georgy Holden, Design and Innovation Qualification Lead,

− Kevin Collins, Environmental Management and Technology Qualification Lead,

- Martin Reynolds, Systems Thinking Qualification Lead

− Stephen Jones, Student Support Team Lead, Engineering and Innovation

The summary of discussions was raised at the Engineering & Innovation Board of Studies. Recommendations for future actions will be discussed and agreed at the Board of Studies Executive meeting on 18 January 2023.

FULL RESPONSE

Theme	Extract from post	Response	You Said, We Did
Practical activities	Part of my activities involved building and testing electrical circuits using a variety of components (voltaic pile, voltage splitter etc). This enabled me to see and learn, in person, how these components react and how to use them in a practical sense. It was a great opportunity to work with them and practice the physical dexterity required for assembling the different rigs. It made learning the theory much easier as I had a point of reference to compare the descriptions to. It also helped to post my progress and results on the online forum as it was an excellent measure of how successful/accurate my particular set up was. This was also a great place for troubleshooting if I was having trouble deciphering my results.	Thank you for your positive comments.	None required.
	As part of T276 we had a series of practical experiments combining test rig assembly, Microprocessor data gathering and control, as well as the experimental methods and analysis. For the main part, these activities were inventive, enlightening and really very clever. A great deal of insight could be extracted from 3 complimentary activities. The concept and majority of the	Thank you for your positive comments about the activities. It is helpful to know about the difficulties that arose due to issues with deliveries and missing/faulty	

	execution is to be praised and I felt real benefit from doing the experiments. There were a few unexpected issues arising, however. Firstly, each set of activities required a delivery of specific components. A few key components were missing from my delivery and replacements took an age to arrive. Indeed, I needed to call student services twice to replace one component, as the courier lost the delivery and did not feed that back. This meant I missed the period available for specifically trained tutors to answer direct questions to any issues, which held me back considerably in trying to submit a TMA. Then, when I did get the parts, I found that the microprocessor sensors were not giving the expected data back from the experiment. I spent a total of 3 weeks, of the time I had available, in trying to produce reasonable data. Going so far as to build 4 different experimental rigs. I later found out the sensor was defective and bought a replacement board for the next set of activities. In that second set of activities, the task was to control a motor using the microprocessor and the commands available to it. The teaching text went through a procedure where the motor could be	components from the kits. We have changed our processes to make this more efficient in future presentations. Tutor contracts were devised pre-pandemic when face-to-face residentials took place, and so module tutors (ALs) were not responsible for the practical elements of the module. Specialist activity tutors were employed – this can only be for a limited amount of time. Plans	We have changed our processes to make the procurement and delivery more efficient in future presentations. Plans for new versions of the module will revisit the module tutor role.

controlled using two different commands, to produce different physical outputs from the motor. During the assessed part of the experiment, I had to use these two commands in order to produce the desired outcome. I mention these factors, because, it turns out the module tutors weren't fully trained in these experiments or the commands to control the motors. When I could not get assistance in the first activity, my tutor could not help. In both the assessments for the first two activities, I got marked down. Firstly because my conclusion in the first experiment was that my equipment was faulty and the results could neither prove nor disprove the theory, and then for using that second command to control the motor in a way that produced results! This made the preparation, execution and writing of the EMA question a harrowing experience, because, again, I had to "think outside the box" to get results which, I thought, related to the question being asked. I praise the concept and ambition of these activities. However, the execution of the parts delivery, narrow time scale for specialised support, lack of understanding of those being asked to	for new versions of the module will revisit the module tutor role.	

assess my efforts, and, just to mention it, vague wording of TMA and EMA questions, really meant that, I feel, a lot of the learning potential of these activities was unnecessarily diluted.		
I did the remote practical engineering activities for T276 and I did find them quite enjoyable. I think the explanatory notes were much more thorough than those for T176 the year before. I liked the way the TMA and then the EMA questions on the practicals were laid out the same for each assignment, so I gained confidence with each progressive practical and then the write up. It should have been much more clear that you can use any part of the experiment to write-up. I received all of my components in the first shipping, and judging from most students in the WhatsApp group, there was only a handful of lucky ones who had broken bits / bits missing. I also liked the way the experiments tied together lots of different elements of engineering. Basic coding, construction, resonance etc. Big downside was the limited time the forums with dedicated practical activity tutors were open for.	Thank you for your positive comments about the activities. Tutor contracts were devised pre-pandemic when face-to-face residentials took place, and so module tutors (ALs) were not responsible for the practical elements of the module. Specialist activity tutors were employed – this can only be for a limited amount of time. Plans for new versions of the module will revisit the module tutor role.	Plans for new versions of the module will revisit the module tutor role.

	As we study remotely, we are all on different schedules and some may fall behind or want to get ahead. To not be able to ask anyone for help when you are stuck is really unfair, especially as you get assessed on them.		
	I completed T176 last year and T276 this year, both had practical home experiment kits.

While I recognise the inclusion and accessibility considerations that must have been a priority in developing the kits, the overall experience was more of a "baby's first circuit" rather than something I felt I was learning from. The experiments felt more like something aimed at children with some uni level maths tacked onto the end.

This feeling was further compounded by my ADHD which limits my ability to work through things that aren't novel to me, T176 was actually the catalyst for seeking treatment purely because I felt the experiments were pointless and I was willing the give up on the degree rather than work through the tasks. Obviously this was a poor and self defeating mindset which I thankfully overcame with support from my tutors. | Thank you for your comments.

The experiments were designed for a broad range of students with abroad range of abilities and experience. Other students have commented on how useful they found the detailed instructions and the pace of the activities. | When the activities are next updated, we will look for opportunities to include more open-ended elements. |

| | In T276 the experiments were all heavily reliant on a microprocessor which had been severally limited by the MakeCode application, I later discovered this could be replaced with a program designed to utilise the microprocessors full capacity. It was explained to me that MakeCode had been chosen as it removed the burden of teaching students how to program, even though programming is mentioned in almost all the professional skills advice I've seen. I spent an extra week on experiment PE3, working out how to rebuild the experiment in another programming language, for me that felt like a more worthwhile endeavour than trying to convince the provided program to produce useful results. This was a success and I learned so much from it, but I had to create that experience for myself.

The solution here might be that experiments or practical activities should be a little more open-ended or come with optional objectives to cater to students that find the task too easy or boring. The concern I have with the current offering is it leads to student disengagement and a devaluing of the qualification overall. Would I be comfortable putting that experiment into my CPD? No, I wouldn't and I'd likely consider outside alternatives as evidence of my skills and knowledge. | We are pleased to hear that you went beyond the instruction notes and explored the further capabilities of the Express.

When the activities are next updated, we will look for opportunities to include more open-ended elements. | |

I think you could frame the activity differently, perhaps something like: You have been sent a home kit, the team who assembled it were able to build the following projects: A - A blinking LED (Introduction with full instructions) B - A temp sensor that outputs room temp as a colour (full instructions available if required) C - A controller that can automatically adjust a thermostat (tips given only) D - A Google Home integrated thermostat using API (no help given) Then lets say only B,C and D can be submitted to the TMA as a report, so there's a floor to what students learn but not really a ceiling. Depending on your time, knowledge and interest you just pick the project you feel matches you best, they all teach the same core concepts and by limiting the help on the advanced ones, you don't really increase the burden on the course team to write out more instructions.		

As part of T176 I carried out three types of practical experiments at home. In general, the activity notes were easy to follow with the exception of PE3 PV Energy, Activity 2.2, Characteristic of a Diode. I'm not sure if this was deliberate as it formed a large part of the EMA and therefore designed as more of a test. The materials and equipment provided for all were more than suitable and I had no issues with deliveries or damaged / broken items although several others on my module did, particularly with resistors. I felt like the forums allocated to each PE worked well with the moderators providing the right amount of support, advice and encouragement. I agree with previous comments around the length of time the forums were open, and some consideration should be given to extending them a week or two beyond the suggested week of the activity for those who may be out of sync with the module timeline. During the online project school we carried out a home activity around water temperature loss	Thank you for your comments. We are pleased to hear that you had no issues with the delivery of your activity kits. We are aware that some students did receive damaged items, and have worked with the warehouse packaging designers accordingly to resolve this for the upcoming presentation Tutor contracts were devised pre-pandemic when face-to-face residentials took place, and so module tutors (ALs) were not	We are aware that some students did receive damaged items, and have worked with the warehouse packaging designers accordingly to resolve this for the upcoming presentation Plans for new versions of the module will revisit the module tutor role.

	during the first part of the day, this felt extremely rushed and most participants felt the same way. The consensus was that more time to carry out the activity properly was needed. I would also suggest that the activity could have been carried out prior to the day, and the results discussed and compared during the first morning session.	responsible for the practical elements of the module. Specialist activity tutors were employed – this can only be for a limited amount of time. Plans for new versions of the module will revisit the module tutor role. Thank you for your comments on the home activity, which we will take on board during future redesigns.	
	For TMA1 we were to write up about an experiment to prove the model for a "simple" pendulum. The prep material goes in to compound pendulums. Then you get the activity to write up for the TMA. If the experiment is a "compromise" to examine the simple pendulum, then this should be stated clearly, so as time, effort, and marks,	Thank you for your comments. Based on feedback from students and tutors, we have endeavoured to improve the clarity of the	Based on feedback from students and tutors, we have endeavoured to improve the clarity of the instructions in the assessments.

don't get wasted being confused between what is being taught and what is being assessed. T192-194 do a fantastic job and bringing the different threads together. The material in T276 almost felt like a "fight" to get through, at times. Assumptions and vagueness seemed to cloud the message. I'm in the module to learn, but assessment is a measure of how well we're learning. If we get confused between the two, then that's counter productive.	instructions in the assessments. For example, the text of the TMAs has been updated.	
As part of T176 and T276 I have carried out various engineering experimental activities, as some of my fellow students mentioned. Pre-COVID era, the practical activities were held at residential school. Because of COVID, we were the first to take the practical activities online and experiment at home (academic year 2021/22). I happen to take both practical activities at the same time because the practical for T176 was postponed due to COVID. Based on the time assigned for residential school, five working days, I thought taking both practical activities at the same time was manageable. But given the sheer volume of experimental work involved and other	Thank you for your positive comments Based on student feedback for the 21B presentation, the pattern of study was modified to spread the home experiments throughout the study calendar as opposed to them all	*Action already implemented.* Based on student feedback for the 21B presentation, the pattern of study was modified to spread the home experiments throughout the study calendar as opposed to them all being concentrated into a 6-week period.

roles and responsibilities, it was a bit of a challenge.	being concentrated into a 6-week period.	
The support material provided were sufficient enough to carry out the activities independently at home. Some kits delivered to students could have some shortages or contained some malfunctioning items, which could be frustrating to wait for replacement parts, but from my experience there was quick response from the support team. TMAs were released in time that enables to appreciate what to expect from the practical engineering activities.		
To be honest, the experiments, basic circuit, program controller, PV, resonance, energy at home - thermal efficiency, sound, etc. were selected so that students can do the experiments at their home safely. For some they might not be challenging enough, but the idea is focused beyond the experimental results on team working, collaboration and cooperation, safety, hand-on skills and developing technical report writing skills. I was left to wonder what could be achieved in the five working days at the residential school, fellow students meeting for the first time in person.		
To conclude, it was a good experience which tested working in a team remotely - I have enjoyed		

	the experience. My personal opinion would be instead of getting bits of smaller experimental activities if the practical activity is focused on a list of activities to choose from and students choose from the list based on their interest or inclination and do some in depth practical activities as individual or group.		
	In modules 176 and 276 I had several experiences in experiments and activities that covered different engineering areas.What i found really usefull and that helped me during my project for module 452 has been the approach learned during the experiments in using new software and hardware, one for all is the use of a microcontroller to perform structural test analisys. That experience has been source of inspiration for my project and turned in the development of a PID motor controller based on Arduino.	Thank you for your positive comments. We are pleased to hear that your learning was useful and contributes towards your future studies.	None required.
	I just finished T276 and thought that the shaker table and tower building were great at-home practical activities. They highlighted the importance of taking your time to perform every building step with accuracy and care in order to wind up with a functional end product.	Thank you for your positive comments.	None required.

	Based on the forum discussion during this project, a lot of students were frustrated with the variability of quality and performance of parts that we had all been sent to carry out this experiment remotely. Amusingly, that was another great lesson in how the real world works. Theory and mathematics is one thing, but function of real-world products based on R&D doesn't follow seamlessly from design.

Having to trouble these problems is a critical engineering skill.

Seeing how much frustration some students went through during this experiment suggests that this valuable lesson was also delivered during the course of the module. | | |
| **Theme: Integrating work-based learning into modules** | I'm studying while working (work based learning), but I'm self sponsoring. My organisation are more interested in better management, time skills and practical applications, whereas I'm interested in these as well as other softer aspects, such as communication, team working and solving complex problems. I find it easier to take initiative in developing the skills that drive my career forward. And if I have to wait for when the | The student has highlighted positive aspects of the integration of work-based learning in to modules, and is being proactive in applying their studies | Papraphrase the comment for tutor briefing, for their benefit and to use in encouraging future students.

The feedback may also be useful to support the case for continuing to offer a work-based module for |

	company can sense the need for certain skills, it's usually a little too late.		students in Engineering employment, in parallel with standard modules.
	I am self funding whilst working full time as an engineer. Having already successfully completed a number of L3 OU modules was a big factor in getting my current job. Several of our middle and upper managers have taken OU degrees over the years and as a result they value OU students and grads highly. Part of the reason is the OU students ability to time manage, self motivate and complete tasks without a large amount of hand-holding and supervision. OU students are willing to invest in their own learning and the additional skills that brings, also the long term commitment itself shows ambition and independence.	The student has highlighted positive aspects of the integration of work-based learning in to modules, and is being proactive in applying their studies	Papraphrase the comment for tutor briefing, for their benefit and to use in encouraging future students. The feedback may also be useful to support the case for continuing to offer a work-based module for students in Engineering employment, in parallel with standard modules.
Theme: Skills or work-based activities	I'm a Compliance Officer at work, but I bring process improvement to this role too. My focus in this degree focuses on Interface Design (Q61). Therefore programming is a very strong factor in the course, and at work we use some of the programming packages that are taught the degree module. The beauty of this is that work colleagues are at hand to help with different ways of thinking of the problems one may be trying to address	The student has highlighted positive aspects of work-based learning. It is good to hear that the computing pathway of Q61 is relevant to real world work. These modules are run by the computing department but have been chosen to equip those wishing	Papraphrase the comment for tutor briefing, for their benefit and to use in encouraging future students. The feedback may also be useful to support the case for continuing to offer a work-based module for students in Engineering employment, in parallel with standard modules.

		to design for user experience**.**	
	I'm a Project Engineer, which involves quite a bit of design. I've used AutoCAD extensively through my studies, not just for creating diagrams, but also graphs, vector diagrams etc. As AutoCAD allows coordinate entry, and is vector based it was more accurate for me to draw in cad and measure directly from the drawing. This also helped me to check my calculations graphically in some modules. I have access to AutoCAD through work, however a free student package is available, so it would be something other students could utilise.	T198 does not require access to specific software so there is no particular issue for the module. However, the issue is pertinent to wider discussion about specialist software. Design response: This is something we are aware of and do point students towards via the Design and Innovation Qualification Site**.**	Collate information on current Engineering software available to students (in general not just OU) to share on forum. The information may also be useful to feed in to development work for virtual computer labs. We are considering how to approach this as we design new curriculum and are thinking about making time and opportunities for students to explore and learn software packages using available resources
	I moved into studying engineering after spending ten years working various construction-site based jobs and developing an interest through that work in carrying out my own home renovations and creating building projects. I have recently been working casually in in an engineering test-lab. All of these experiences combined have provided me with a great appreciation for the flaws and quirks of the real world, and developed my sense of how to trouble shoot inevitable problems that crop up	The student has highlighted positive aspects of work-based learning	Papraphrase the comment for tutor briefing, encouraging them to prompt students to share experiences via the forum. Consider including sharing of experience on Online Engineering Studio, or a similar

	while trying to actually create systems out of physical material. I absolutely can not imagine being able to engineer effective solutions in physical systems without having real-world experience tooling the materials you're trying to design with.		app, in the rewrite as a structured activity with scope for interaction
Theme: Inclusion of other practical activities	I have completed the design and innovation degree, u101, T217 and T317.

I have to say I enjoyed T217 more than any other module I took, I also done quite good in that module. However I would have loved to see **more diversity in each module** for example, exploring other parts of the world and seeing their designs rather than to read about Dyson (was a lot in the module). I would have also loved there to be a **project work that we have to do as a group as teamwork is a big thing in any design type of role**. Activities these modules could use is:

Level 1

- Design brief activity that has a personal element to it, for example we could be asked to make a notebook which can include something from your heritage or culture. This notebook would be a | We have welcomed this student's input as one of our interns in the Design and Innovation Group. These are all excellent points and we are embracing these as we design new curriculum | One initiative that has been taken to improve diversity is the creation of a Black and People of Colour reading group which is holding regular sessions looking at black designers and creating a space for discussion of different cultures and approaches. It is hoped that this will feed into new teaching materials. The |

	piece of the module that we would take along and keep adding to it (hope that made sense). Level 2 & 3 - Experiencing different programs such as auto cad, photoshop etc., (I had to learn that whilst doing a separate course in my own time) - More diverse design briefs that are there to build up your portfolio (definitely need that as we do not get any form of training for that) - Maybe an activity on working on a portfolio which the tutor or other students can help with?? (still working on that idea) In U101 it was modeling and sketching that we mostly done, which was good because we got to learn how to modle which we took with us into T217. All our activities were linked to the OpenDesginStudio (ODS) to engage with other students. In T217 we done quite a bit of modelling, sketching and got introduced to sketchup, however we didn't need to learn it properly as it wasn't required to be used in the tma's it was only used for a couple of activities to include in ODS.		development of a portfolio will also be more strongly supported as new curriculum is created.

	T317 module kind of lost that aspect of the other design modules, there wasn't much of any sketching or any form of modelling and the project which was a combination of tma4, 5 and the ema (if I remember right) was just a nightmare. Also T317 wasn't a module were you could use ODS for feedback.		
	Congratulations on completing the course. Just wanted to say thanks for writing about the Design and Innovation degree which I am now about to begin my level 3 modules. I am about to start T317 and I do agree with your comments, especially surrounding diversity within the design briefs. I would also say more female representation throughout the degree is also necessary. In addition, within T317, I am aware that there is the activity of building a portfolio. However there seems to be no indication of HOW students are supported to complete this task. I have also looked throughout the module to no avail. So, if there is an vital activity needed for this module, a tutorial or two on this would be a necessity. Lastly, in terms of inclusion, I believe additional emphasis is needed to include 'design' within the STEM field as I am sure there are students beginning U101 for instance who have	As above, we are very aware of the need for greater diversity of examples and recognition of students' different cultural background and we are working to improve this in the development of our new curriculum.	We are also aiming to provide more support for the building of a portfolio throughout the qualification.

	no idea that the design faculty is also related to STEM.		
Theme: Professional practice	I'm currently part way through MSc F47 having completed TB872 and soon to complete TB871. There is no indication in the literature of the industry position of F47 or it's constituent modules in the wider STiP environment […] As an Electrical Engineer I expect some indication of relevance for each course; an indication of CPD, process toward Chartership in a relevant recognised body, position within the wider industry; some sense that each module or the wider qualification is a step toward something, be it UK-Spec or whatever is appropriate. Instead there is a vague statement that: "<u>Careers and Employability Services</u> have more information on how OU study can improve your employability. Fundamental to STiP is the process of mapping the system within which you and your work exist. Rather than deferring students, under and post, toward a third party, clear provision of the system map within which the OU STiP qualification exists should be front and centre. This would also apply to other OU modules.	The suggestion of doing a systems map illustrating relevance to 'careers' is very helpful. Firstly, we can forward this idea to those responsible for ongoing development of the OU Employability framework and particularly the module mapping towards 'External awareness', suggested by the framework. The framework is a way of guiding Module teams in mapping employability issues to developing modules. I'm confident	More specifically for STiP, qualification team colleagues are now looking towards introducing a new Activity – either as part of teaching in a module or as part of group tutorial work. The proposed Activity will invite students on the cohort to do their own mapping of where they see relevance of the STiP modules in relation to their own perceptions of STiP and relative professional experiences associated with their area of practice. Sharing these maps on the Module forum (and/or the OpenStudio) can be an insightful learning exercise – both for students as well as STiP team members. There may then be opportunities for collating individual maps to a wider

	The days of study for the sake of study are long gone I'm afraid, context is essential when cost is the primary driver."	the team would welcome this feedback.	systems map –as another (possibly STiP group) activity. We are likely to give students the option of doing this through rich picturing, or systems influence diagramming, as well as systems mapping

Date: *January 2023*