



**Project Title: Are we making progress? Progression through learners' interaction in OpenStudio across a qualification.**

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## Executive Summary

The project set out to better understand how learners in the Design and Innovation Qualification at the Open University progress in OpenStudio as they move through their qualification. OpenStudio is primarily a social learning space, in which students share their work, view others' work and comment and engage in discussion around the work that has been shared.

The design of the OpenStudio at the OU has attempted to translate the design studio culture from a physical to a virtual space. In traditional design pedagogy, the studio model has been in place since the start of the 20<sup>th</sup> century (Webster, 2005). Problem-based learning is its signature pedagogy (Crowther, 2013). Research into design pedagogy in traditional design education shows how students develop from being novices to final year students, becoming more independent learners (Ashton & Durling, 2000), (Garner & Evans, 2012). However, little is known about how this is achieved at a distance (Jones, 2014).

The project builds on the premise that social learning is key to student success and progression in online learning (McAllister, Whiteford, Hill, Thomas, & Fitzgerald, 2006) (Hill, Song, & West, 2009). However, surprisingly little is understood about exactly which social behaviours and interactions support learners' engagement and success in the OpenStudio. Our seminal work on social engagement in the OpenStudio (Lotz, Jones, & Holden, 2015) revealed that at level 1, there is a positive relation between viewing and commenting on the work of others and the student's success.

To extend the validity of this finding onto further levels of study, to better understand the criteria for engagement throughout a qualification and construct a progression pathway for the Design and Innovation Qualification, the project team collected two sets of quantitative and qualitative data about engagement with the OpenStudio (work packages 1-4) and devised a OpenStudio STEM workshop to construct OpenStudio progression pathways (work package 5).

Work package 1 collected statistical data from OpenStudio usage of nearly 3000 students distributed over 5 presentations of U101, 2 presentations of T217, and 1 presentation of T317 between 2012 and 2014. Work package 2 devised a Consensual Assessment (CAT) of the quality of the work uploaded to OpenStudio by these students. Work package 3 collected qualitative data on the perceptions of OpenStudio by interviewing 11 qualification students. Work package 4 analysed the conversations around students' uploads by some of the interviewed students qualitatively. Work package 5 was a workshop held to construct STEM OpenStudio progression pathways, which helped to devise a Design progression pathway.

The project team found valuable social engagement with OpenStudio in U101 at level 1, which did not extend to levels 2 and 3 of the qualification. Social engagement in OpenStudio at level 1 is linked to the gaining of confidence, skills development and student success, and unexpectedly, found that this is also true for students who adopt the more passive engagement approach of 'lurking'. Engagement decreases at higher levels, which may be explained by a shift in studio culture (influenced by learning design, and activity design, student cohort and background) in these levels.

The findings have impact on efforts to improve the student experience across the qualification, including designing module specific inductions to OpenStudio, the redesign of modules and OpenStudio module activities in the qualification, and the implementation of the Student Advisory Website. A wider audience of STEM academics and LTI staff benefitted from the project findings in the workshop which took thinking beyond the implementation of OpenStudio in individual modules to think about progression strategies across a qualification. Finally, the project opened up new avenues for collaboration with external academics and bidding for external funding to investigate the design of social online learning environments in design and innovation.

## Introduction and Background

The studio is a key feature in almost all design education (Kvan, 2001) (Higgins, Aitken-Rose, & Dixon, 2009). It emerged from the beaux-arts traditions of Europe in response to a need to expand and systematise professional design education. Such is the importance of this mode of learning that it is often argued to be a signature pedagogy in design and in other domains of professional education, representing both the form and content of knowledge in a particular discipline (Crowther, 2013)(Shulman, 2005).

The principle characteristics of this signature pedagogy can vary depending on the authority consulted but typically involve a range of active learning methods: problem-based, experiential, performative and simulated learning (Chickering & Gamson, 1987); (Bonwell & Eison, 1991). These are supported by a series of particular affordances: physical space/press, professional community, and access to experts (Shulman, 2005); (Brandt et al., 2011). Finally, the importance of social learning and support mechanisms are now emerging in literature: peer support, evaluation, comparison and peer critique (Cennamo & Brandt, 2012) (Ashton & Durling, 2000), but little research considers specific mechanisms of social comparison in design. In proximate studios, this form of learning is often implicit and its implementation in the physical studio is assumed to take place naturally.

OpenDesignStudio (ODS) is an online portfolio and communication space that allows students to post, view and discuss artefacts that they create and find. Digital artefacts can be uploaded to predetermined 'slots' which are presented as thumbnail previews to the entire course cohort to give a visual representation of the studio via other students' work. The interface is simple enough to use so that no significant time is needed for familiarisation, particularly if students are familiar with similar social media tools such as Pinterest.

Especially building on the seminal work undertaken by the research team and more specifically the finding in (Lotz et al., 2015), we gained the understanding that, in level 1, a form of social learning through peer comparison is taking place. But a much better understanding of engagement in OpenStudio throughout the qualification needs to be gained.

An early workshop with the eSTeEM sister project on 'OpenStudio use across STEM subjects' (PI Elaine Thomas) identified that there is incomplete knowledge about progression in OpenStudio across a qualification. Both projects were able to share and agree on key mechanisms of social learning in OpenStudio that could be investigated further in this project.

## Aims and scope

The main aim of this study was to understand how learners' progress in OpenStudio as they move through the Design and Innovation qualification (Q61) and to construct progression pathways in OpenStudio to support the learning of Design and Innovation at the Open University.

Further goals of this study were to:

- Quantify and qualify engagement in the OpenStudio across Q61 qualification
- Understand whether OpenStudio engagement behaviours are related and if so how and the impact of these behaviours on students' success throughout the qualification
- Understand the development of students' communication, collaboration, professional and learning skills
- Recognise if, when and how, learners engage in reflective activity on OpenStudio

- Identify progression pathways in OpenStudio in STEM.

### **Activities: approach, methods and analysis**

The project took a mixed method approach to observe and measure engagement in OpenStudio throughout the Design and Innovation Qualification (Q61). Q61 was chosen as context for this study because the project members know the programme and its individual modules well, and are part of the module teams. This is also a qualification in which OpenStudio is used at each stage in the core design modules, U101, Design Thinking, T217 Design Essentials and T317 Innovation. This favourable context offered helpful routes to participant and AL recruiting, data collection and dissemination, as well as impact generation.

The project was split into 5 data generating work packages. Two quantitative and three qualitative sets of data were collected.

#### **WP1: OpenStudio engagement and success**

Work package 1 collected and analysed quantitative data on six measures of engagement with OpenStudio on three modules: U101, T217, and T317 across a total of eight presentations (between 2012 and 2014). Additional data the rank measure of students' success for each module was collected. A summary overview of the measures is displayed in Table 1. All datasets were cleaned, sorted, ordered and brought together for reporting, visualisation and statistical analyses. Data from 8 module presentations were obtained, representing almost 3000 students across all levels of study (5 at Level 1; 2 at Level 2 and 1 at Level 3). This dataset contains over 110, 000 instances of student work and 80, 000 comments – all measured alongside other interactions and divided by weekly time periods for each module. Appendix A delivers a full technical report of work package 1.

**Table 1 Measures of engagement in OpenStudio throughout Q61**

Engagement
E1 (inverse of) Number of empty* slots
E2 Number of views of other slots
E3 Number of comments made on own slot
E4 Number of comments made on other slot
E5 Number of feedback requests
E6 Number of pinboard slots created

#### **WP2: Consensual assessment of students' work (CAT)**

Work package 2 collected quantitative data from experts' ratings of 30 artefacts and their descriptions of students' work uploaded to OpenStudio. Qualtrics survey software was used to collect data on the ratings using the Consensual assessment technique (CAT). Four AL's (plus two CO-I's) were recruited to independently rate 30 artefacts, each individually, on twelve dimensions in four main rating categories:

- 1 Creativity, Novelty, Originality
- 2 Strength of concept, Feasibility, Usability
- 3 Communication Representation, Description
- 4 Liking, Aesthetic appeal, Shining example?

(see Appendix C for a completed rating exemplar).

Each item was rated on a scale from extremely strong to extremely weak. After the rating was carried out at a distance, raw data was downloaded and cleaned, sorted and ordered for analyses. Appendix B delivers a report on data collection, analysis, validation and results.

### **WP3: Student interviews**

Work package 3 collected qualitative data from interviews with **eleven** Q61 students. OULive Blackboard Collaborate software was used to conduct and record the interviews at a distance. The recruited AL's, PI and one CO-I conducted semi-structured interviews with the students, each lasting about 1 hour. An interview script and template was used to guide the discussion, make notes during the interview and complete the notes after the interviews to avoid having to fully transcribe each interview. The interview was divided into 6 main areas: 1) warm-up questions, 2) questions about the use of OpenStudio, 3) collaboration and Community, 4) OpenStudio across the qualification, 5) Skills development and 6) Opinions of OpenStudio. The interviews were then analysed thematically. Appendix C shows an exemplar filled in interview template.

### **WP4: OpenStudio conversation analysis**

Work package 4 collected qualitative data of the comments and conversations around **173** artefacts posted to OpenStudio from 4 students in the Q61 qualification selected from those whose work had previously been rated using CAT and who had taken part in the interviews. All students' posts were viewed and those with at least one comment were printed to PDF. Each print was analysed using Herring's (2007) Computer Mediated Conversation Analysis framework and a framework on Reflective practice by Reyman (2003). Appendix D shows a conversation analysis for all OpenStudio comments and conversations on all uploads made by one student.

### **WP5: Progression in OpenStudio workshop**

Work package 5 generated additional qualitative data for the construction of progression pathways in a day-workshop with 10 STEM academics and LTI. The workshop was conceptualised as both knowledge and experience sharing, co-construction and dissemination event. Participants engaged in three co-construction sessions: 1) conceptions of progression in OpenStudio, 2) factors for progression in OpenStudio, 3) Learning design for OpenStudio that progresses across a Qualification. After the first session, the researchers introduced the concept of Studio signature pedagogy in the proximate studio and its comparison with the online studio was discussed. Before the second session the projects findings from the work packages 1-4 were presented and discussed using Posters (Appendix E), and after the ensuing co-construction session, factors for progression identified in the project were presented. The workshop presentations are attached as PDF (Appendix F).

### **Challenges**

- What changes did you have to make to your plan (aims, project activities, etc.) and why (e.g technical problems, difficulties in involving users/stakeholders, etc)?

Because of difficulties in getting ALs together physically the planned AL focus group was replaced by a combination of face-to-face and email discussions with ALs in parallel to data collection and analysis.

Measures of engagement: OpenStudio collection of quantitative engagement data (and time segmented) took much longer than anticipated and not all measures could be collected from the different versions of OpenStudio being used on the different presentations. Only one set of data at level 3 was available, which limits the confidence of the statistical findings at this level. Time based data was collected but there was limited time and resource available on the project to analyse it. It was difficult to determine the right level of granularity of analysis, ranging from individual student to entire cohort, to get meaningful results.

CAT and Interviews: Recruiting: Not enough AL's were interested in participating in the CAT and interviews due to the problems surrounding GTP. The AL who took on the role of recruiting students found it hard to make contact with students and we had to extend her contract. She persevered and eventually we managed to arrange interviews with eleven Q61 students, many of whom the PI had identified as desired interviewees (level of engagement, study results, etc.).

CAT: Using the free version of the Qualtrics rating tool had its limitations and determined how many pieces could be rated. This meant that the number of ratings were too low to get robust data. Inter-rater agreement was, sufficient (Cronbach Alpha: 0.6803) but not good enough to draw very confident conclusions. The CAT data was not deemed to be suitable for use as part of the combined quantitative evaluation due the lack of consistency from the small sample sizes used in the process. For further work, we would recommend more raters should rate more artefacts but with fewer rating categories.

Interviews: A small number of recorded interviews were interrupted, incoherent and incomplete due to the AL's problems with bandwidth when using OULive.

Conversation analysis: As a result of a workshop with the sister eSTeEM OpenStudio project (PI Elaine Thomas), conversation analysis was added as new method to gain insight into reflection on OpenStudio. A problem we encountered was that it is not currently possible to search for all the comments a particular student has made, especially on other students' slots. Thus the analysis could not gain a full picture of a particular students' conversations and reflective behaviour and or progression on OpenStudio.

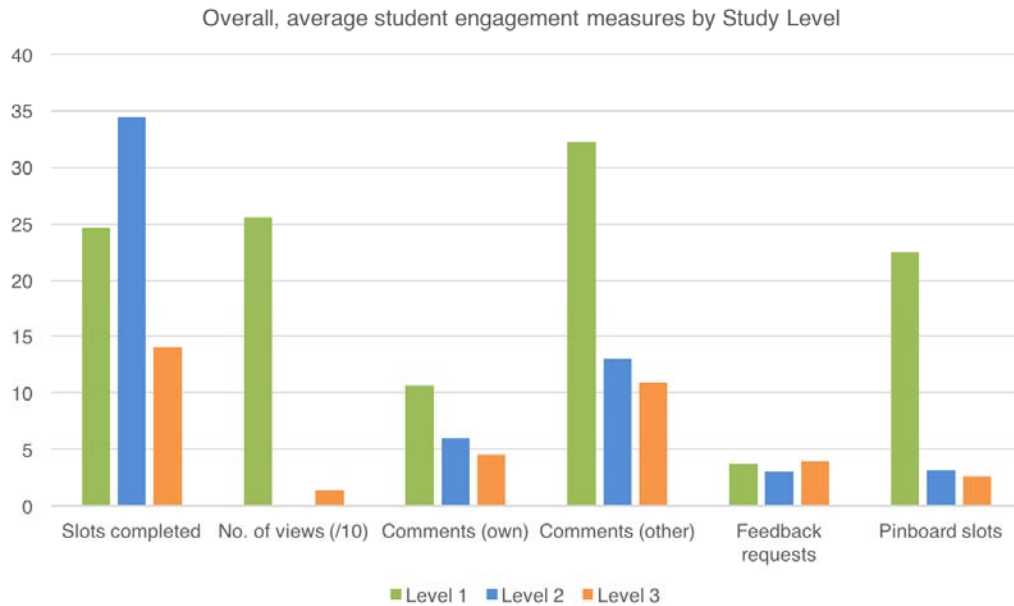
## Findings

- What are your main findings? What evidence supports these findings?

### Engagement in OpenStudio across the Q61 qualification

Findings from statistical analysis of engagement in OpenStudio revealed that there is a measurable drop in engagement measures between modules at Levels 1 and 2 and again between 2 and 3.

Engagement seems to decrease as students' progress through the stages of their qualification. On average, Level 1 students will complete about 73% of the planned (structured) slots required by studying in the module compared to only 16% at Level 3 and 42% at Level 2. U101 students are 2-3 times more likely to comment on their own slots compared to T317 students, and are 3-4 times more likely to comment on other slots. The average number of Pinboard slots created is similar between T217 and T317 students and both of these are significantly lower than the numbers on U101.



**Figure 1 Overall, average student engagement measures by study level (note data not available for all No. of views)**

In our seminal work on engagement in one presentation of U101 we developed a hypothesis about the positive relation between student engagement and student success. This needed to be tested across a qualification with the main results that the Pearson Product Moment Correlations and/or Spearman Rank correlation between individual success and engagement measures across the Q61 qualification are not very strong overall. There are reasonable correlations of students' success in U101, across all presentations for the measures, slots completed, slots viewed, comments on own and on others' slots, pinboard slots created. Overall there are very few statistically significant correlations between engagement and success in T217 and these should be considered weak correlations. There are no statistically significant correlations between engagement and success in T317. This result is supported by the decrease in the perceived value of OpenStudio across the qualification (Figure 2).

Finally, the strongest, single correlative engagement factor is viewing others' work. This is often considered a passive and hence underestimated form of engagement. The value of 'lurking' in learning should be reconsidered and take seriously as a 'learning action' as valid and important as commenting, in its own right.

## Was ODS useful?

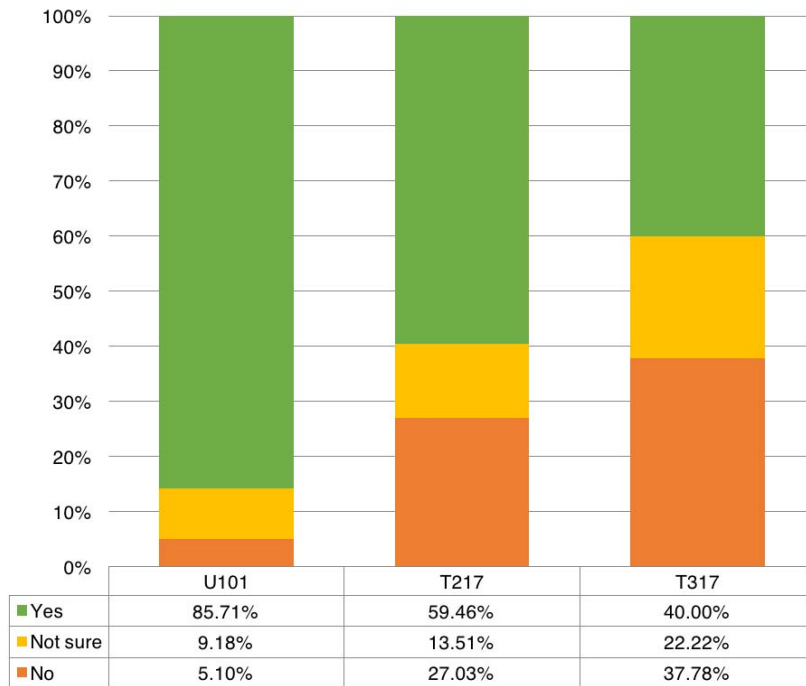


Figure 2 Perceived value of OpenStudio across the Q61 qualification

## Time based engagement

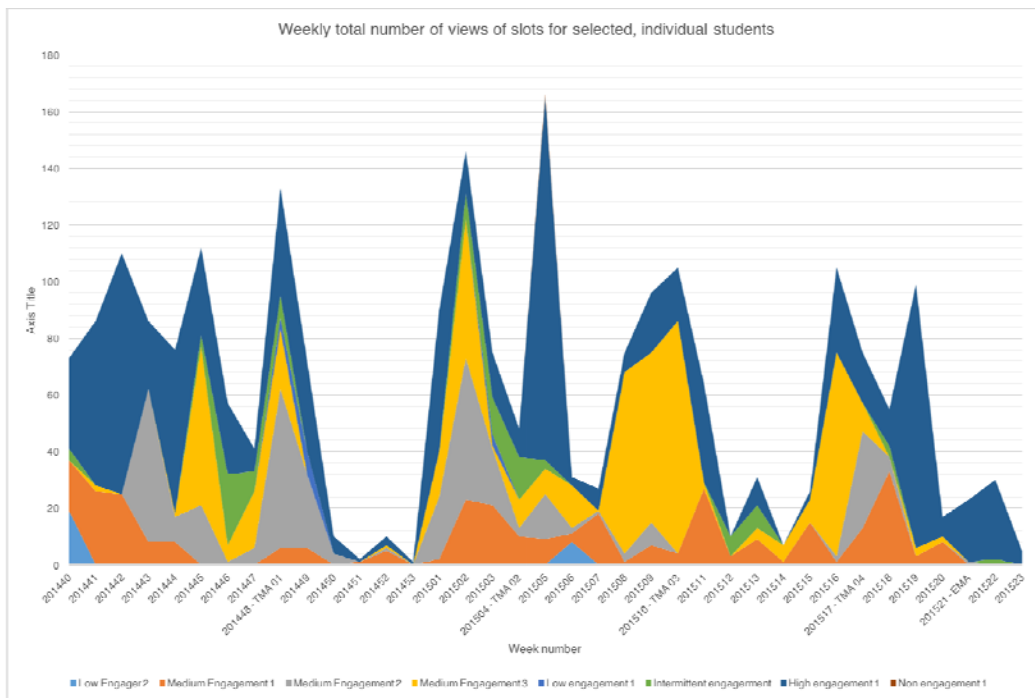


Figure 3 Weekly total number of slot views for 8 individual students

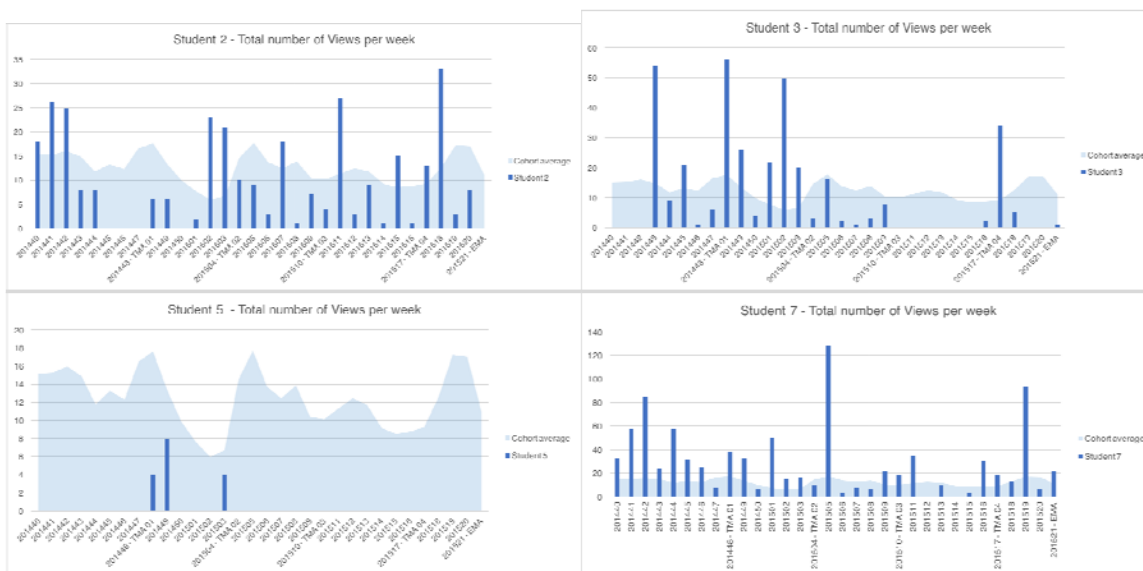
All modules demonstrate an overall drop in all engagement measures during the module study period. Engagement measures are seen to increase at assessment points, a well-documented observation in other modes of learning and teaching (Gibbs & Simpson, 2004). This was an expected result but the level



to which it is possible to visually determine where assessment points are by looking at engagement points is always worth restating (see for example in Figure 3 the time based engagement of 8 individual students).

As with assessment points, engagement measures also respond to critical holiday points in the year (Christmas, Easter, summer, etc.) as noted by a corresponding reduction in all measures. Once again, this was an expected result which reinforced the link between engagement, assessment design and student performance.

What also arose from this analysis is that single statistical measures are insufficient to give enough detail to a learning designer when considering the issues noted above. For example, it is statistically correct that assessment and engagement are correlated but 1) the causal factors remain complex and 2) precisely how this correlation is expressed is of greater use as a qualitative reading of the data. In figure 3a, the engagement level (views of slots) are shown for four different, individual students (bars) compared to the cohort average (fill background). These demonstrate individual engagement responses to the studio as well as their contribution to the assessment correlation. But between these two levels of analysis and detail are potential opportunities teachers might make use of to inform learning design.



**Figure 3a Engagement level (views of slots) of individual students (bars) compared to the cohort average (fill background): Top left, consistent engagement; top right, Inconsistent engagement (drop off), bottom left, consistent non-engagement; bottom right, excessive engagement ('super commenter').**

The lesson here is that standard forms of descriptive statistics have to be interpreted very carefully and in sufficient detail to generate claims in such a socio-cognitively complex domain as education.

### Q61 students' engagement

Data from individual qualification students show a similar reduction in engagement to that identified for the whole cohort. This suggests that, overall, qualification students are spread across the engagement spectrum – being neither exceptionally high or low engagers and not outliers with regard to the measures of engagement distribution. Furthermore, engagement reduces over time whether the student is a high or low engager, although the reduction is greater in low engagement students, this is observed across the entire data set. The data suggest that higher engaging students are more likely to persist with OpenStudio when compared to lower engaging students.

### CAT rating of Q61 students' work on OpenStudio

The CAT study was motivated by the question of whether there is a relation between the quality of the posts uploaded to OpenStudio and the engagement with, and interaction around, the upload. The quality of work is measured by experts using a rating system based on a set of characteristics related to 1) creativity, novelty and originality, 2) strength of concept, feasibility and usability, 3) communication, representation and description and 4) liking, aesthetic appeal and 'shining example'. The research found a weak linear relation between the sum of these characteristics from each upload and the level of interaction around the upload. However, the correlation between quality and interaction was found to be strong at Level 1.

Comparing students' ratings across the qualification, two general trends can be observed. For half of the students rated the quality of their work went up, while for the other half quality went down in the ratings as study across the stages progressed. Figure 4 shows two example students, one who goes down in rating (Student A left) and another who goes up in rating (Student B right). The observation that the rating went down was found not to relate to the student's outcome. For example, Student A was a distinction student throughout, but Student B moved from a pass in levels 1 and 2 to distinction in level 3. It might be that a very good student will do very good regardless of the 'quality' of engagement with OpenStudio, but for a middle of the road student, the quality of OpenStudio engagement might have a positive impact on student success and qualification outcome. This is a hypothesis that would need to be tested further, with larger numbers of items being rated by more raters, to gain more robust statistical results.

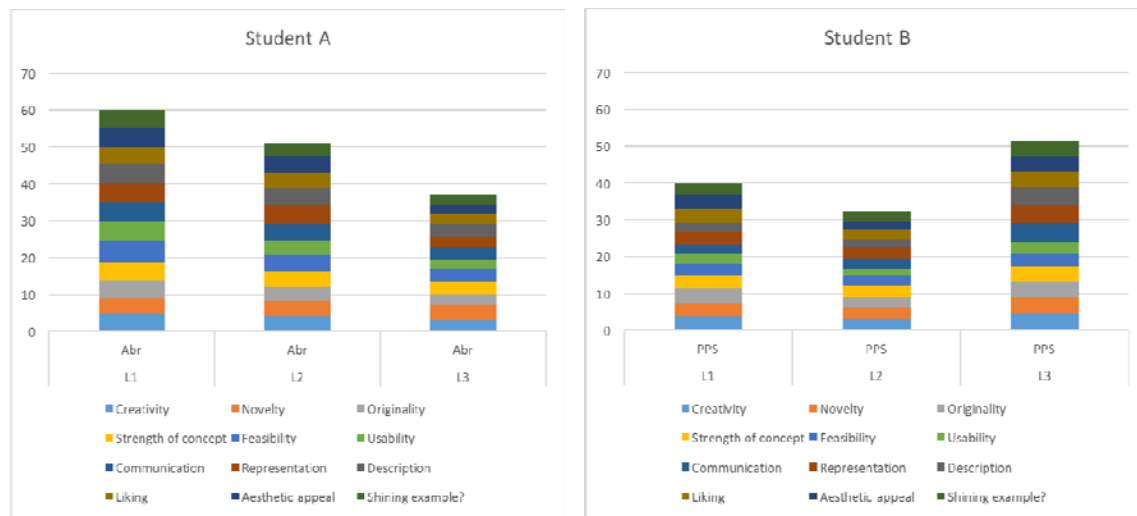


Figure 4 Student A going down in rating and Student B going up in rating of the 'quality' of the work uploaded to OpenStudio

## Insights from Interviews with Q61 students

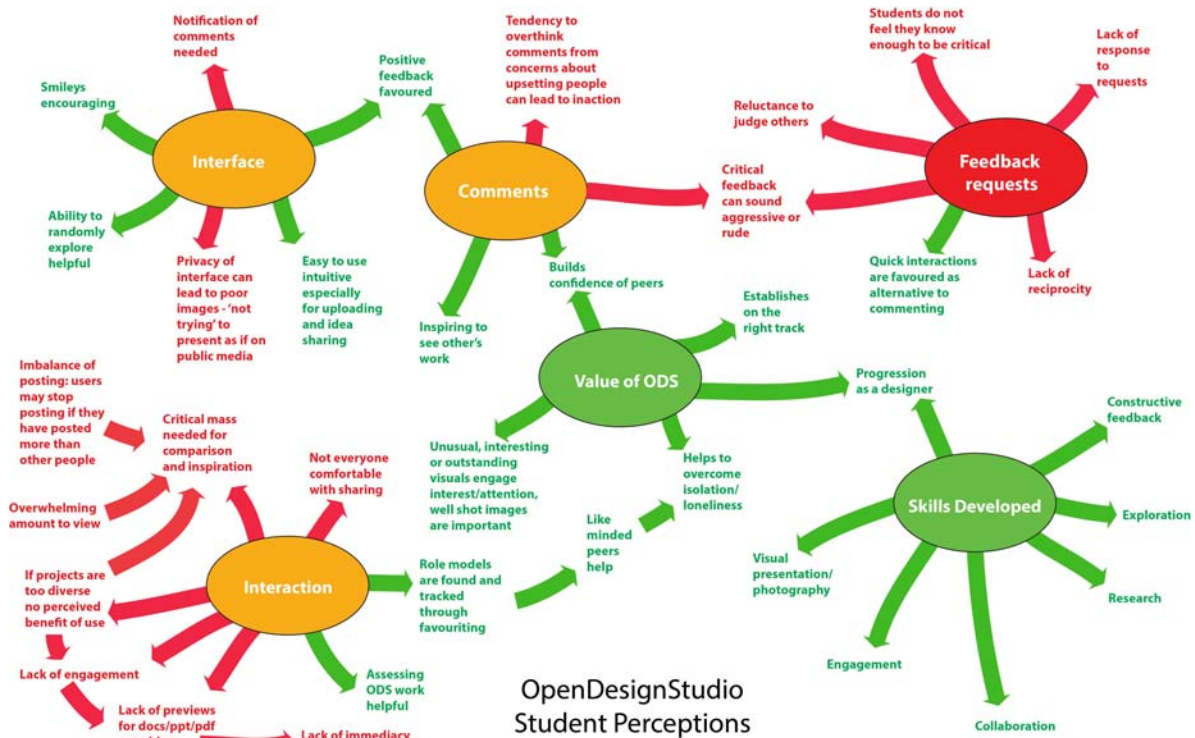


Figure 5 Themes of Q61 students' perception of OpenStudio

Thematic analysis of the interviews showed a number of themes for students when discussing their experience. These are summed up diagrammatically in Figure 5, with green showing largely positive comments, red, largely negative and orange a mix of positive and negative. Overall the findings were that ODS is valued for developing skills, confidence and for reducing the sense of isolation of learners.

In discussion of the interface there was general agreement about the interface being easy to use and quite intuitive. Uploading and sharing ideas were picked out as good points. The use of smiley faces, to encourage engagement was seen as helpful by a number of students. However, one suggestions for improvement that was raised by a several interviewees was the need for notifications to alert users to activity in ODS particularly comments posted.

Interviewees reported issues around commenting on other people's work with concerns raised about offending and upsetting people which led to a reluctance to give critical feedback. This was seen as a problem of confidence, with students reporting that they did not feel they knew enough to pass judgement on the work of others. However, most agreed that commenting encourages learning and inspiration from peers with students and that the ability to make constructive comments developed over time. However, asking for feedback seems to have been much less used. The concerns raised were similar to those for commenting, i.e. difficulty in being critical, or, when received feeling feedback was aggressive even if it was not intended not intended to be so. There was a tension here as feedback was perceived as necessary to build ideas however not everyone had received feedback when they asked for it this lack of reciprocity had affected the view of its usefulness. One student commended the quick feedback tools (Favourite, Smile, Inspired) as a way to give give quick feedback that makes people feel good.

An important factor for interaction, reported by students, was visually interesting and well shot images. Students reported that viewing other people's posts could be inspiring but, importantly, enabled comparison of work with others, showing different interpretations of tasks and different viewpoints. Identifying like-minded peers with similar interests helped to some extent, create a sense of community although few reported relationships which extended beyond ODS. Although most students were comfortable with sharing some did not feel comfortable at first.

Students identified the skills developed through use of ODS as including research, exploration, critique, communication, interaction, engagement, collaboration, photography, problem solving, constructive feedback, visual skills and model making though it must be considered that this may be a summary of learning from the modules as a whole, not just ODS.

Overall, the value of ODS is seen as helping progression as a designer, building confidence and design thinking by making students think about, and pay more attention to, their work, including aiding time management.

It also helps in thinking about communication, in the development of visual skills and the use of images, particularly as a 'public' demonstration of these via a large group to communicate with.

Encouragement and knowing, from viewing the work of others, that a student is on the right track, were seen as very positive. Peer to peer learning was seen as helpful. Seeing other perspectives on a common task was also seen as valuable.

Students report developing confidence in giving constructive feedback. The importance of ODS for building community and overcoming isolation and loneliness is flagged by several students as important. ODS is also seen as an interesting space to explore randomly

The challenges that students identify pinpoint lack of engagement and interaction as problematic, it is suggested that marking engagement as part of the assessment might encourage more interaction and avoid students opting out of use of the interface. Another issue concerns the quality of posts, one student comments that the private nature of the interface may mean that people try less hard to present good images and that there is a need for better image making. At third level, there is an additional technical challenge in as much as the posting of documents is facilitated but these cannot be viewed without downloading them. This means there is a lack of immediacy which is cited as off-putting and an inhibitor of interaction.

Moderation of the amount of content posted was also cited as an issue, a student reported not wanting to post too much, as that might make others feel bad. This relates to some degree to the quantity of posts that are there and the amount of time needed to view them.

A different challenge for a student new to design at level 3, concerned the naming of the studio which he had understood as a CAD studio rather than a place for collaboration.

An insight into the drop in use of ODS across the qualification was provided by one level 3 student who reported that because students are carrying out diverse projects ODS is seen as less relevant because it is harder to compare like for like. Though, another student pointed to the need for a critical mass of use when expressing surprise at how interaction dropped between levels 1 and 2 despite her own willingness to engage with the interface.

### **Qualities of conversations in OpenStudio across levels**

From the four students whose posts to OpenStudio were analysed in depth, 178 contained a conversation, which is roughly a third of all posts made.

### Timeliness, structure, goal and style of conversations

The conversation analysis has shown that the first conversation unit – a comment to a post and reply to this comment - needs to be ‘on time’ for a conversation to begin, by which we mean within a the next day of the original posting. Comments that follow don’t have to be on time for a conversation to continue. We noted an increasing lack of timeliness in comments in higher levels of study. This could be a function of reduced overall engagement. The reply of the poster to the first comment is key for a conversation to occur and continue. Students in U101 seem to ‘learn’ to reply to comments over the first weeks of module, i.e. conversation later in the module will be replied to in more timely manner. However, this practice is not continued in higher levels.

Conversations, set as tasks in the module’s learning design, are an exception to the observation that the poster has to reply to a comment for a conversation to occur/continue. Where this is a structured activity, for example for assessment, students will carry on the conversation. A further exception is when there was a series of immediate responses to a post, for example when an image is particularly striking.

Looking at the conversation goals, it can be observed that showing off ‘skills’ is often rewarded with a conversation. Otherwise, most posts just seem to want to accomplish a task set by the learning design. A further goal of conversations, which only sets in at a later point in a module, is to maintain social relationships that have formed. Having fun or enjoyment in conversations is unique to U101 (probably because of the tone of the module). Fun and ironic conversations are more often carried out in parallel to other conversations in the same thread. Otherwise, very few conversations go off topic. The style and tone of a conversation is not set by the poster’s style. Conversations range in style conversations from formal and objective to subjective, emotional or fun and ironic. Styles generally become more formal and serious at higher levels.

### Distributed reflection

Why are we particularly interested in conversations? The occurrence of reflection (reflective learning, reflective practice) is the reason why conversation is considered important. Although often conceptualised as individual activity, ‘distributed’ reflection emerges in OpenStudio conversation, especially in lower levels. Similar to Schön’s observed design studio practice, reflective practice is drawn out in a conversation (Schön, 1987). Reflective conversations share characteristics of being analytical, synthesising thoughts and drawing conclusions, but a reflective conversation doesn’t need proceed in a linear way from analysis to synthesis to conclusion. The conversation analysis identified incomplete, weak and strong reflection in conversations. Although there is no increased reflectiveness within levels or across levels, we can see a tendency at higher levels for reflection to become less distributed and for the poster to be more reflective in their initial post description. This may reduce the need to draw out reflections through conversation.

## **Workshop on progression in OpenStudio across a qualification**

### The concept of progression

Progression was conceptualised as the act of moving from being a supported learner to becoming an independent learner. Showing progress brings benefits for the students whilst perceiving and monitoring progression has value to tutors and educators. In the early levels of study progression is supported by tutors’ comments this is characterised as leading by example, while at higher levels good progress would show a switch from tutor dependence to peer support. The role of OpenStudio of ODS in this progression is that its visual nature makes progression seem very intimate and individual. The downside is that the personal nature of interaction in OpenStudio makes some learners shy away and not make use of it to show progression. This was perceived as a missed opportunity by all workshop participants, who agreed that OpenStudio progression was something that needs to be ‘sold’ to students and tutors to encourage the development of a well-curated collection of activities that shows progression to good advantage.

## Factors for progression

The project team in discussion with workshop participants compiled a list of 16 factors that support progression in OpenStudio. The factors distinguish the learning design decisions, social implications or contexts and technical factors that might support or hinder the effective implementation of a learning design.

**Table 2 Factors for progression in OpenStudio**

	Learning Design	Social	Technical
1.	Quick fun tasks initially	Generate critical mass for viewing	Interface introduces itself
2.	Interaction around a thing Producing high quality images might lead to work overload	Generate comparison and competition Visually stimulating range of contributions	Key image and headline Visible on 'top layer'
3.	Timeliness of activities	Tutors to integrate late comers	Fade old posts
4.	Make clear when an activity is meant to happen	Integrate late comers	Activity Notifications List of OS activities with completion date
5.	Relevant activities Save space to share	Disrupting known groupings? Ad-hoc grouping good or bad for LD?	Rate up or down relevance of an activity/upload
6.	Level and module scope-appropriate OS induction: e.g. language use, I1 simple, I3 academic or professional	Create appropriate atmosphere A personalised conversation	Customised interface, Terminology changes interaction
7.	What activity goes into which space and for what reasons. Part of module specific OS induction	Specialised spaces Module wide, tutor group, exhibition (rock of the week), pinboard private only?	Agency, privacy and control Move content across spaces
8.	Tuition on OS	Identify as tutor but not as individual	Module team profile Slots indicated as tuition slot
9.	Assessed activities, e.g. comments on others' work	If students don't comment tutors will	Highlight which are tutor comments and which slots are assessed Export for assessment
10.	Descriptions and comments	Encourage dialogue	Interface guide description/comment
11.	Peer review, peer critique, comments	Status: reward super commenters	rating of helpfulness by others
12.	Refer to your OpenStudio in L1 and 2, redo activity, see the difference	Comparison with self and others	Can't 'see' previous OS contributions in higher levels yet
13.	Informal to Formal: A framework	Students self-doubt, Give	'Guided comment'

	for commenting, not overcomplicating comments	Confidence	interface
14.	Time and context based interaction on the go (form mobile phone)	Comment on the go are allowed to be less perfect	Likes instead of comments
15.	Private to public Portfolio, PDP and subject portfolio different	Value for PDP, professional portfolio Confusion of what the portfolio is for? Privacy issue?	Export portfolio, push to public Automatic image optimisation
16.	Structure activities according to time-based interaction (less around holidays, more around TMA's)	Continued but differentiated engagement	Intelligent and dynamic grouping of uploads Different algorithms in assessed and non-assessed times

### Learning Design for progression

Two progression pathways were developed at the workshop.

Group 1 used the concept of 'ramp-up'. In this model each level has similar kinds of activities, but they will ramp-up in terms of the complexity, commenting and collaboration required and the level of assessment.

Access level: Do a home experiment and post an image to OpenStudio. View others. (Awareness, not assessed)

Level 1: Do a home experiment, share image and result. View and comment on others. (Awareness not assessed)

Level 2: do a home experiment, each student with different parameters (in tutor group). Share result, using a graph and compare to others' results and graphs to get some additional insight. (Coordination and Cooperation, part of it assessed, i.e. the comment given to others)

Level 3: Decided collaboratively on parameters for experiments carried out by students individually. Then the group decides for some common parameters for a second series of experiments. They produce visualizations or even a website (full collaboration, full project assessed).

Group 2 build on the 'induct – reprise – repeat' strategy.

Key to this progression pathway is the use of the new Subject Advisory Website as an induction hub to OpenStudio usage, purpose and aims in each module as well as showing value of use across the qualification.

On each level the induction activities are similar but with increasing commenting, reflection and assessment around them.

Level 1: Tutor teaches the use and benefits of OS through exemplar posts and comments.

Level 2: Some posts and comments are assessed.

Level 3: Use of Sway to present of project work which is situated in OS, feedback on uploads is immediate, personalised and assessed.

## Discussion of findings

The main aim of this study was to understand how learners' progress in OpenStudio as they move through the Design and Innovation qualification (Q61) and to construct progression pathways in OpenStudio to support the learning of Design and Innovation at the Open University.

### Lurking and learning

One of the greatest insight we have gained from the statistical analysis is that a seemingly passive behaviour, i.e. viewing others' work, is correlated to student success even over and above more apparently 'active' engagement measures such as commenting or interacting. This seems to support the idea that far from being a passive activity it may indicate a deeper level of learning engagement that is often unrecognised. This supports previous findings from other scholars in distance learning (Beaudoin, 2002) (Dennen, 2008). Related research on engaging in distance learning highlights the relation between social presence and learning success (Garrison, Anderson, & Archer, 2010) and persistence to progress (Boston et al., 2010). Being in the OpenStudio seems to be more important than acting in the studio. This can be related to the forming of an identity as learner and designer in level 1 (Kear, 2011). Especially in creative disciplines, viewing other's work is helping learners to negotiate and construct an identity (Bennett, Rowley, Dunbar-Hall, Hitchcock, & Blom, 2016).

However, viewing other students' work is built on the premise that there is work uploaded to be viewed. The design of individual activities may have a significant effect on creating a momentum of engagement. A critical mass of uploads in quick, visual, fun, relevant and differentiable activities creates such momentum on U101. This tends to be less in evidence on T217 where activities are more complex, often contextualising the readings the students complete offline in books or in T317 where greater emphasis on analysis is the norm and OpenStudio uploads are, as a consequence, often textual rather than visual in nature. Furthermore, the key engagement aspect of the visual nature of OpenStudio is qualified by the finding that the quality of representation of an idea seems to generate greater engagement with the upload than the creativity of the idea shown. Thomas (Thomas et al., 2016) reports a similar finding: "... students enjoy the OpenStudio activities, especially the visual nature of artefacts and the idea that shorter comments may be made, rather than longer more discursive pieces of writing." Quick, simple and rewarding activities are thought to work best, whereas longer or more complex activities tend only to be completed by a core of students.

Without a critical mass of uploads that can be viewed and used to construct a learning identity, OpenStudio is not as effective in creating a culture of learners and designers, which is important when considering pathways for progression.

### Progression in a changing studio culture

We have previously observed that there is a spectrum from silent to vocal users in a course (Lotz et al., 2015) (Preece & Shneiderman, 2009) (Mustafaraj, Finn, Whitlock, & Metaxas, 2011) and hypothesised that there may also be a trajectory across the programme to move from silent to more vocally engaged learners. This desired assumption could not be observed.

Our research has shown that overall engagement with OpenStudio decreases over the course of each module, except when it peaks in assessment periods, and declines as students advance through the stages of study in the Design and Innovation qualification. Students also report a perceived decrease in the value of using OpenStudio at these higher levels. This chimes with a longitudinal research reporting declining student engagement across levels of study (Wylie & Hodgen, 2012). Wylie and Hodgen also highlight changing patterns in engagement which might call for changing learning designs. Although the learning design in the modules included in our study do change, it might not be a change that is aligned to the students' changing engagement trajectory.

The ratio of comments on the student's own work versus comments left for other students suggest that students are generally aware of others' work. Students orient themselves, compare their own work to



other students' and, in so doing, leaving more comments. However, the difference in commenting ratios between levels 1, 2 and 3 suggest there is a general difference in social engagement. In U101 students make around 3 times more comments on slots other than their own – in T217 this drops to about twice as many. This suggests a change in general engagement with other students and a move from engaging with other students' work to focusing their own work.

At level one, OpenStudio helps students to overcome isolation and inhibition. Quick and fun activities create a critical mass of posts that show the value of playfulness in creativity and ideation. At higher levels, a change in studio culture changes the engagement paradigm. At second level, individual activities are less playful, more technical, and also take longer to complete. At third level, projects run for a long time and individual progress is varied. Projects as well as students' backgrounds are extremely diverse and students may see less value to compare like for like. This is supported by other theories of social comparison that show how participants are very particular about how we select other people to whom we compare ourselves (Gilbert, Giesler, & Morris, 1995). Hence, no clear progression pathway can be seen through Q61 as yet in terms of learning outcomes or activities that demonstrate progress between levels.

A seedling of a pathway can be identified in U101 and T217 resembling the development of a T-shaped designer, first as generalist and then as specialist:

U101 Conversational, quick, informal, fun tasks, working towards socialisation into design – developing the horizontal 'generalist'.

T217 In-depth and longer skill development and project tasks, working towards a personal Portfolio - the vertical 'specialist'.

Following this trajectory, points to the need to develop a culture for T317 that helps students to better contextualise their learning and shine in their respective chosen pathway, contributing specialist and well as generalist commentary. This could, potentially, be facilitated by collaborative work or by identifying similar projects or study approaches. For example, as students actively follow others' progress they could contribute general knowledge and specific skills advice to others. The module might, for example assesses how students help similar projects. To achieve this OpenStudio would need to be able to be customised into groups of likeminded students rather than tutorial groups to facilitate their independent, project based learning. This agility in constructing a project based OpenStudio cultures is not yet possible from a technical, structural and tuition perspective.

The research also indicated a need for a 'spine' along which learners could progress their design and innovation learning from levels 1 to 3, in other words an ODS space which is available throughout the design qualification. Such a space might have a series of capabilities and affordances to support both the explicit learning outcomes of the qualification and the myriad of elements that enable learning opportunities which are found in any studio. For example, an overall affordance might be the social learning and support that takes place in a studio (physical or virtual). This could be aligned with a number of learning outcomes, such as the ability to work with and draw on the knowledge and expertise of others in a design team or studio. Finally, this affordance could be mapped across each stage of study with expectations and support appropriate to that level of study. The idea of a spine relates to the framework of developing a Community of Inquiry in distance education through integrating Social, teaching and cognitive presence (Akyol & Garrison, 2008) (Garrison et al., 2010). The role of such a programme level community is to allow students who pause, swirl or those who are in transit to remain part of a changing design learning identity and culture. This particularly addresses Rovai's (Rovai, 2003) internal factors for students' retention through raising awareness and giving choice of study pathways.

#### OpenStudio induction on every level

Recognition of different forms of OpenStudio use across the levels led to the identification of the need to support different studio cultures in different modules. One of the greatest insight that the project team

has gained is that each stage of study offers a different paradigm of OpenStudio interaction which requires specific induction.

The project has identified that appropriately tailored induction to OpenStudio for each module needs to be part of the modules' learning design. The Qualification strategy needs to identify the progression of studio cultures and interaction paradigms across the stages, tailoring OpenStudio with the aim of developing enabling the transition from the supported to the independent design learner, where the independent learner has developed an individual habitus of learning.

If a clearer Qualification OpenStudio progression pathway were implemented, with induction to the unique studio culture in OpenStudio at each stage this may help students to maintain their progress across levels. This may be achieved by the creation of a longitudinal OpenStudio space, as mooted above, connecting all stages of study although this would have its own challenges.

#### OpenStudio progression and student success

It's clearly disappointing that no explicitly clear and statistically significant correlation is evident between all engagement measures and student success. There are some moderate correlations, especially at Level 1. We have seen a slight overall downward trend in the assessment of students' quality of work uploaded to OpenStudio across a qualification, which mirrors the results from the drop of engagement measures across a qualification. This downward trend is created by two distinctive patterns in the quality of work uploaded. For distinction students we have studied, the quality of work uploaded decreases or they cease engagement entirely, while for students below the borderline for distinction, the rating of quality of work seems to increase across the levels. However, the sample is very low, so broad generalisations should be avoided. There is some indication that distinction students do not need OpenStudio interaction to succeed in their studies, while students below the borderline could benefit from OpenStudio interaction and move from a pass to distinction, and, to make this progression, those students need a stable core network. An a core stable network, a community of inquiry has been demonstrate to facilitate students success in related literature (Boston et al., 2010).

To return the starting question in the title of the project, "Are we making progress?" the answer is twofold.

In terms of existing progression pathways, the Design and Innovation qualification needs to invest in OpenStudio induction at each stage and possibly the development of a longitudinal, 'spine' module or transition space that supports the continuation of a core network of design and innovation learners on OpenStudio across a qualification. The possibility of introducing a qualification wide OpenStudio on the new Q61 Subject Advisory Website is a first step in this direction. Thanks to the project findings, the qualification team is now much more aware of the potential roles such a qualification wide OpenStudio needs to play, such as induction, the development of a stable core network of students, and portfolio space.

We are certainly making progress in terms of knowledge of distance design education but there are clear differences between the use of OpenStudio on the modules and there are no distance design learning theories that help us to fully explain these. Considering the immense interest this project has sparked at workshops and conferences, it becomes clear that the scale of OU tools, the investment in their design and development and scope of learning analytics to better understand their use, contributes to furthering understanding of online design learning beyond this scholarship project and is replicable and applicable in the wider HE sector.

## **Impact**

### a) Student experience

The projects findings show that the student experience using OpenStudio is inconsistent across the Design and Innovation Qualification. While positive and varied engagement at level 1 can be linked to student success and progression to further levels, further successes cannot be linked to social learning in the OpenStudio in higher levels. OpenStudio is valued as personal, visual and engaging, a fear and loneliness receding space to keep pace with others and to shine. OpenStudio contributes largely to a positive student experience in U101. Creating a progression pathway to extend these values to higher stages of study will have a positive impact on students' progression in the Design and Innovation Qualification. Some specific ways in which this might be achieved in learning design (strategically and specifically) have been outlined, as well as potentially valuable measures for their effectiveness. Many more students who sign up to the Qualification will benefit from this new understanding.

#### b) Teaching

Insights from this study inform the refresh of U101, highlighting to keep the principles and activities that are working really well and optimising others. The findings have inspired the T317 module team to produce an induction to OpenStudio at level 3 and will set off some larger changes to OpenStudio activities in the mid-life review. The STEM academics and LTI staff that participated in the progression workshop benefited from our understanding of engagement in OpenStudio to inform their Module and Qualification production.

#### c) Strategic change and learning design

LTI staff and particularly the OpenStudio development team benefitted from the Progression workshop, the presentation of the findings and resulting discussion on the affordances OpenStudio needs to offer to support progression. This, in turn, will inform the learning design of studios across the University as this interface becomes more widely used across disciplines and faculties.(it is currently used on more than 40 modules and this number continues to grow).

The project offers clear directions for the use of OpenStudio as part of the Subject Advisory Website, setting precedence for the school's and faculty's implantation of Subject Advisory Websites.

Wider dissemination of the project's findings to the Design Cluster Board External examiner and to a number of conferences attended by the project team has seeded new research networks and potential collaborations with Parsons, KISD, UAL and others.

### List of deliverables

Design@Open Blog entries <http://www.open.ac.uk/blogs/design/> [URL]

DRS 2016 workshop websites [URL]

<http://www.drs2016.org/559/?rq=lotz>,

<https://static1.squarespace.com/static/55ca3eafe4b05bb65abd54ff/t/585aedde59cc682219b3ce22/1482354145140/559-Lotz-VirtualDesignStudio-DRS2016-Conv.pdf>

<http://www.drs2016.org/564/?rq=lotz>

<https://static1.squarespace.com/static/55ca3eafe4b05bb65abd54ff/t/58559e81e6f2e1189aaf22fc/1482006206345/564-Singh-Future-of-Design-Education-DRS2016-Conf.pdf>

DGTF 2016 website [URL] <http://www.dgtf.de/projekte/100>

eSTeEM 2017 conference presentation [pdf] Appendix G

Cumulus 2017 paper [pdf] Appendix H

DEL 2017 presentation [pdf] Appendix I  
 DRS 2018 paper [pdf] Appendix K (to be sent on 14 November 2017)  
 Journal papers in planning.

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## Appendices

- Appendix A OpenStudio Engagement report [Lotz\_AppendixA.pdf]
- Appendix B CAT report [Lotz\_AppendixB.pdf]
- Appendix C Filled in Interview template [Lotz\_AppendixC.pdf]
- Appendix D A conversation analysis example [Lotz\_AppendixD.pdf]
- Appendix E 1-4 Posters for WP1-4 [Lotz\_AppendixE.pdf]
- Appendix F Workshop slides [Lotz+AppendixF.ppt]
- Appendix G eSTEEeM 2017 conference presentation [Lotz\_AppendixG.pdf]
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- Appendix I DEL 2017 presentation [Lotz\_AppendixI.pdf]