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## **ENCOURAGING DEEP LEARNING THROUGH COLLABORATIVE PROJECTS AND PUBLIC EXHIBITION**

**Lee Kwok Lang**

*Assistant Professor, Technological and Higher Education Institute, Hong Kong*

[kwoklee@vtc.edu.hk](mailto:kwoklee@vtc.edu.hk)

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### **Abstract**

*This paper will present the advantages in the use of methodologies and tools of project based learning (PBL) in the teaching of a group of year one product design students in the Hong Kong context. The use of projects within the curriculum is not a revolutionary idea in design education nor education in general. In fact, PBL within design education at the tertiary level is common practice because its content is similar to real world jobs, in which tasks and projects are encountered by workers in their everyday jobs. Through PBL students can investigate things and explore some new insights within a working environment, in which over a period of time they can produce some realistic outputs (Kumari & Nandal.) It has also been noted by educators that long projects within PBL, where students work together, can promote deep learning (Prenuel et al.)*

*This paper focuses on one project within a particular first year module taken by product design students in the first semester as part of their four-year degree programme. The research will look at how student learning can be enhanced by the use of PBL and how it can be further strengthened by collaboration with external organizations with the incentive of having selected students' work exhibited in a major cultural event.*

*A simple questionnaire was used to gauge the receptiveness of the students taking part in the module to this mode of collaboration to see whether this had any effect on their learning and outcome of the project.*

*The findings are expected to show that collaborating with external parties will enhance the learning experience for the students and that the works from the project will demonstrate the link between the desire to perform well (i.e. to have one's work exhibited) as a catalyst for deep learning.*

**Keywords**

Product Design, Project Based Learning, Deep Learning, Collaboration, Education

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## **1. Introduction**

This paper will present the advantages in the use of methodologies and tools of project based learning (PBL) in the teaching of a group of year one product design students in the Hong Kong context. The use of projects within the curriculum is not a revolutionary idea in design education nor education in general. In fact, PBL within design education at the tertiary level is common practice because its content is similar to real world jobs, in which tasks and projects are encountered by workers in their everyday jobs. Through PBL students can investigate things and explore some new insights within a working environment, in which over a period of time they can produce some realistic outputs (Kumari & Nandal.) It has also been noted by educators that long projects within PBL, where students work together, can promote deep learning (Prenuel et al.)

This paper focuses on one project within a particular first year module taken by product design students in the first semester as part of their four-year degree programme. The research will look at how student learning can be enhanced by the use of PBL, and how it can be further strengthened by collaboration with external organizations with the incentive of having selected students' work exhibited in a major cultural event.

PBL is very apt for this particular module as it involves understanding and interpreting design theories, investigation, exploration and creating artifacts. According to Zafirov, students become more engaged in learning when they have the chance to be involved in projects which closely resembles real life problems, ones that are complex, challenging, and sometimes messy.

## **2. Methods**

A simple questionnaire was used to gauge the receptiveness of the students taking part in the module to this mode of collaboration to see whether this had any effect on their learning and outcome of the project. It was conducted directly after the students had given a final presentation to representatives of the collaborating organization on the last lesson of the module.

## **3. Project-Based Learning**

The effective learning of design is an evolutionary process where the acquisition of design skills occurs over a period of time, and which involves the accumulation of knowledge and experience through continuous developing of effective methods in tackling design problems. Of course there is a lot of aspects which will contribute to how students may learn to design. These may be to do with the learning environment, the students aptitude and motivation, the quality of the teaching methods and also the design of the curriculum. The key aspects in learning to design involves the complex changes we make through the way we see a problem. Of course this also involves the accumulation of a complex, interdisciplinary domain of declarative/conceptual knowledge, the mastery of procedural knowledge and experience that leads to the appropriation of strategic knowledge (Curry, 2014).

For instance, Ellmers (2017) related that students of graphic design are typically taught through a series of design projects and they learn through the process of creating solutions to design problems introduced within the different projects. This can accurately describe the way students of product design are introduced to the theories and principles of the subject as well. This approach of learning by doing is typical of most design courses and reinforces the pedagogical assumption that the best way of learning design is by doing. This is probably why Project-Based Learning (PBL) is so popularly used in design education.

As mentioned, the use of Project-Based Learning (PBL) in the teaching of design based subjects is very common across the different design disciplines and continues to be the primary means of educating future design professionals. Student usually work in groups to solve difficult problems that have no model answers. These problems are usually authentic and curriculum-based. As PBL usually involve skills such as collaboration and reflection, and also because it is mostly connected to something real and where the learning is considered to be inherently valuable (Solomon, 2003). One of the noted strengths of PBL is that it encourages problem

solving and solution exploration (Curry, 2014) under the watchful eye of an experienced and knowledgeable teacher. Here students can develop abilities in problem solving, planning, form making and aesthetic judgement as well as being introduced to the theories and principals of design.

In some ways Projects-Based Learning is similar to Problem-Based Learning in that *“knowledge, skills, and professional attitudes are simultaneously addressed”* (Ramsden, 1992). Its central premise being that the student learns through experience (Solomon, 2003), and like Problem-Based Learning *“it requires students to question, to speculate, to generate solutions”* (Biggs, 2011). Solomon further states that because PBL activities are real world focused, students are more motivated as they will see their work as valuable since the projects they tackle involve solving real problems or it may be impactful on others.

One of the importance of this approach is that it also prepares students for employment after they leave university, so that they are able to appropriately apply their learning to the wider contexts in design in real life.

Research has shown that PBL leads to students achieving deeper learning (Thomson, 2014). It is believed that life skills such as problem solving, creativity, responsibility, communication, and self-direction are also increased in the student when PBL is used in their learning activities (Wurdinger & Qureshi, 2015). Also students are more like to appreciate the sharing of ideas and thinking skills (Tongsakul et. al., 2011).

### **3.1 Deep & Surface Learning**

Strictly speaking there are two approaches students can take when they go through their learning, they can either use a deep or a surface approach. Deep learning is arguably the most preferred approach as it requires the student to engage task in meaningful and appropriate ways. It is where students try to apply the most appropriate cognitive method in tacking the task (Biggs, 2011).

Students who use this approach are more positive in how they feel towards their study. They find learning as pleasurable and will come to class in expectation of learning new things. Deep learning leads to better grades and outcomes that are of higher quality (Ramsden, 1992).

Surface approach is where student focus is on merely getting the task done with minimal level of engagement. Here the student is less engaged with the learning activities and is functioning in a cognitive level that is far below what is needed. The student operates on a level

where they may just try to memorize facts and figures in order to pass an exam so that very little deep understanding of the subject is developed. Students who use this approach tend to have negative feelings towards their learning activities.

Deep and Surface approach used by students can be affected by the teaching environment since they are not personality traits. Students will switch between the two when they encountered learning activities that do not match the learning outcomes (Biggs, 2001).

Research have shown that students who tended to adopt the surface approach in their learning compared to those who used less of this strategy is less likely to achieve a better final degree (Trigwell et. al., 2013). That is probable because this approach relies heavily on memorization and is atomistic in nature; where the student focus is on incidental features such as specific facts rather than important ones like evidence and relationships between ideas (Entwistle, 2009).

### **3.2 Motivation**

Motivation is an influence or a stimulus (Gom, 2009). People are driven to work towards the achievement of something due to this stimulus, but no two people are motivated in identical ways. The expectancy theory proposes that people will put a value on goals and that they will weigh the effort and behavior which they will then apply to the attainment of the goals depending on their value.

Motivation comes in two forms, one is intrinsic and the other extrinsic. Extrinsic motivation can be explained as something which can drive behavior through external reinforcements, such as the need to pass an exam or achieve some form of external recognition such as a prize and even recognition from others (Gom, 2009).

Intrinsic motivation concerns the students own desire to learn purely because it is what they want to do and where external factors are not involved, to learn for the sake of increasing one's own knowledge and improving oneself intellectually. These students derive pleasure simply from the interest they have in what they are being taught. Students who are motivated by intrinsic factors will devote more time and exert greater effort, and are more likely to achieve deep learning. Research has shown that in higher education intrinsic motivation will lead student to greater engagement in the learning process, and will lead him/her to greater personal understanding and academic success.

Of course, motivation comes in many forms. They can derive from vocational motivation, achievement motivation or simply the fear of failure (Entwistle, 2009). There is also research to suggest that students from no-western cultures report motives that relate to social responsibility, when their success in learning will lead to the benefit of their own country (Entwistle, 2009).

### **3.3 External Collaborator**

Hulu Culture is a Hong Kong based non-profit organization established in 2009 with the aim of protecting and carry forward the local traditional culture and heritage, with the mission to promoting it to a worldwide audience. It has worked with local authors and provided assistance to them in publishing their works. It has also held various exhibitions and seminars large and small around Hong Kong, focusing on community culture as its main themes. Hulu Culture is partly funded by the Hong Kong Jockey Club and grants provided by the Hong Kong government. It concerns itself on the renewing of local culture in the context of the modern-day Hong Kong's economic and urban development.

In the past few years Hulu Culture have organized large thematic exhibitions around Hong Kong in specially designed venues focusing on different locations centered around the distinct histories of these places. Exhibits have included artifacts which relates to the history of the place and artworks by local artist, designers and students based around the theme of the exhibition. It is the third time that Hulu Culture have been invited to work with students on this module and a good working relationship has developed between the members of the organization and programme team.

### **3.4 Module Requirements**

The project takes place in the first semester year one Product Design module named "Form, Structure and Function". The aims of this module are to develop students' knowledge and understanding of the significance and relationship between form, structure and function in design by introducing techniques and skills necessary to generate form and structure with considerations of function and aesthetics. This module also serves as an introductory course for students on the workings of a model making workshop. For many of the students it will be the first time that they will have of the experience of working within such an environment.

The module is fourteen weeks in duration involving three assignments. It covers theories on geometric and natural form, its transformation and manipulation, and the properties of spatial

forces. Most of the lessons take place in a workshop environment and all three assignments involve the creation of physical artifacts.

Prior to the start of this project students were trained on the safe operation of workshop machinery such as the drill press, sanding machine, band saw, jig saw, foam cutting machines, ovens and plastic heaters, and an assortment of hand tools. The skills learned will eventually be applied on to the final project that is reported in this paper.

The research focuses on the last assignment of the module which is six weeks long and involves two classes of students. Students were required to work mainly in groups of four. The project brief was to:

*“Generate ideas for the design of a free standing or hanging lighting structure which can appropriately reflect the cultural heritage of the Hong Kong New Territories native cultural heritage using the assigned materials.*

*Articulate your design ideas into a final design using the provided PP plastic material and bamboo strips. Your final model **must have a minimum height OR width of approximately 1 metre** and may incorporate other materials that you feel to be appropriate.”*

### **3.5 Project Briefing**

Key members of the Hulu Culture team came into the campus to give a one-hour briefing to the students. First, the students were introduced to nature of the organization itself, then the project specifics regarding the district and theme to be focused on that year and the final artifact that is expected to be produced for exhibition.

Students were then given a forty-minute-long presentation of the history and heritage associated with the particular district. This was followed by a short questions and answers exercise.

A week later students were taken on a one-and-a-half-hour visit to the particular district, and specifically the site of the planned exhibition, and were given a tour of the area by a knowledgeable guide. Students were encouraged to take notes and photograph objects and motifs which they could use in the development of their projects, and were encouraged to return to the area for more in-depth research in their own free time.

A week prior to the briefing by Hulu Culture, students had already been briefed on the module requirements of the project and divided into groups. There were two classes which ran

on the same day with one class in the morning and another in the afternoon. One class had twenty-eight students while the other had twenty-nine meaning that there were a total of fourteen groups with roughly four people per group.

### **3.6 Design Process**

A key feature of the project is that Hulu Culture was able to provide a well-established and well-known local practicing product designer as an external mentor to come into the lessons for three sessions during the project to provide advice to students.

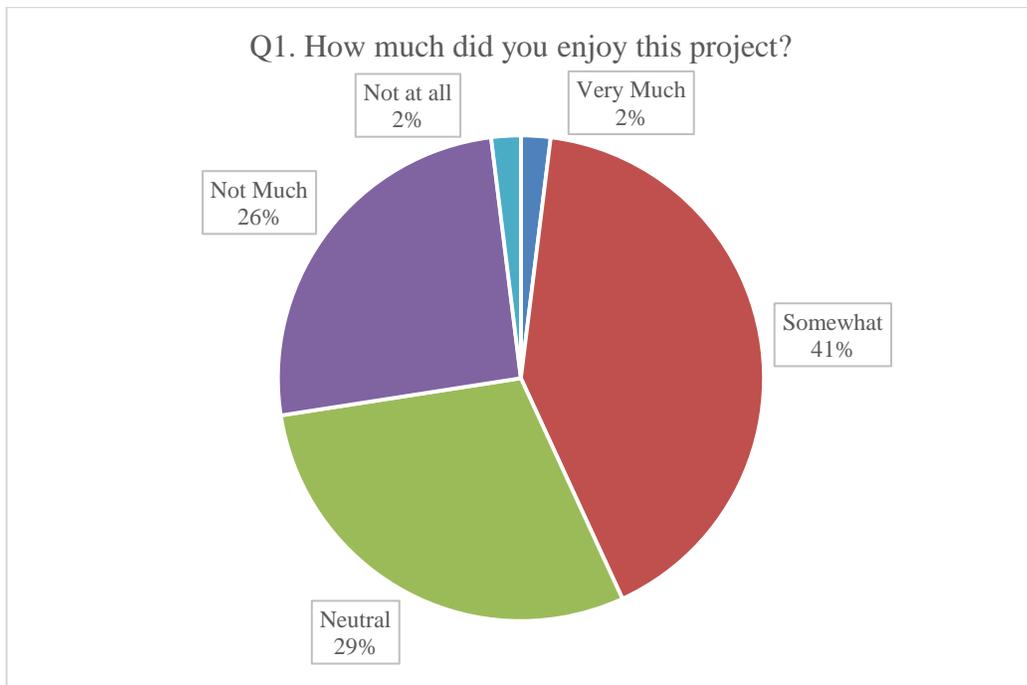
Students were expected to work on their projects outside class as part of the notional learning hours and were expected to discuss their work during tutorials in class. They were encouraged to explore how to incorporate elements of the local heritage and culture within their designs, experiment with the prescribe materials while also developing form through sketching and model making.

On the third week of the project students were asked to bring in their work for a critique with the module teacher and external collaborator. Students then had to decide on the design direction of their final artifact and further develop their design before embarking on making of the physical artifact using the available workshop facilities.

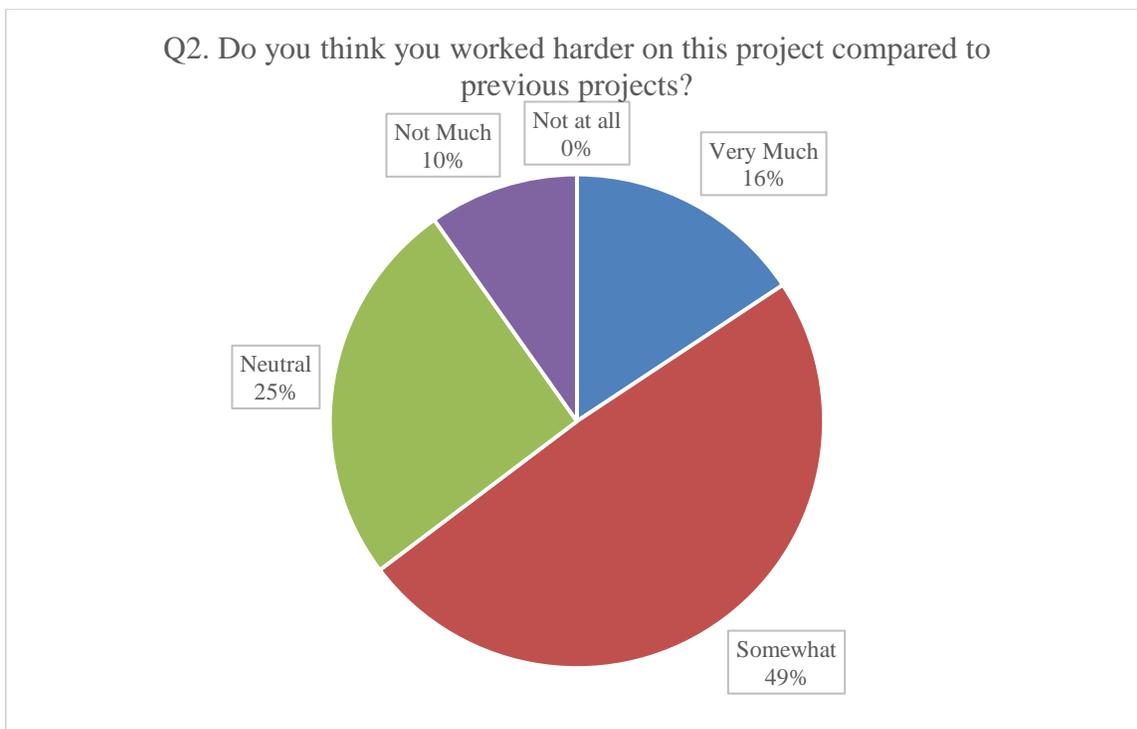
On the final week of the project students presented the final designs in the form of a physical artifact. Representatives from Hulu Culture were present to hear the students give a verbal presentation of their final designs. Finally, eight pieces of work were chosen from a total of fourteen by Hulu Culture for exhibition based on their aesthetic, relatedness to the theme, structural integrity and quality of the craftsmanship of the artifact.

## **4. Findings**

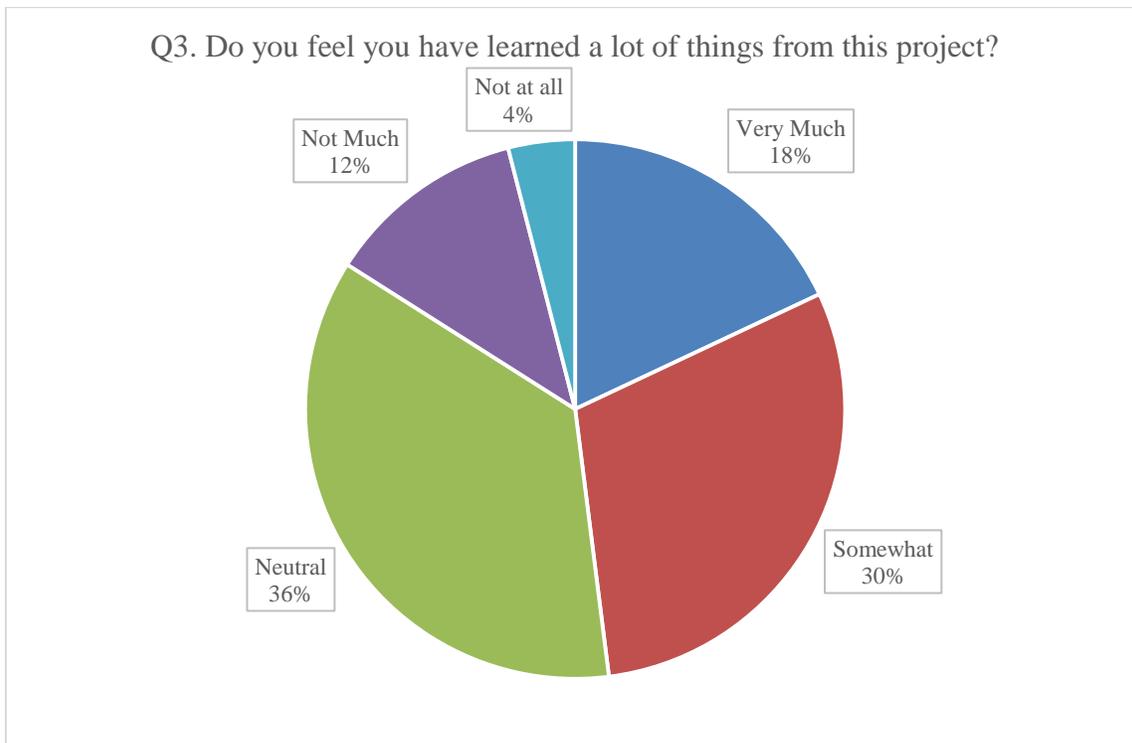
Students were asked to fill in a simple questionnaire consisting of six Linkert-type scale questions and four Yes/No questions related to their experience in this project. The following shows the questions and responses.



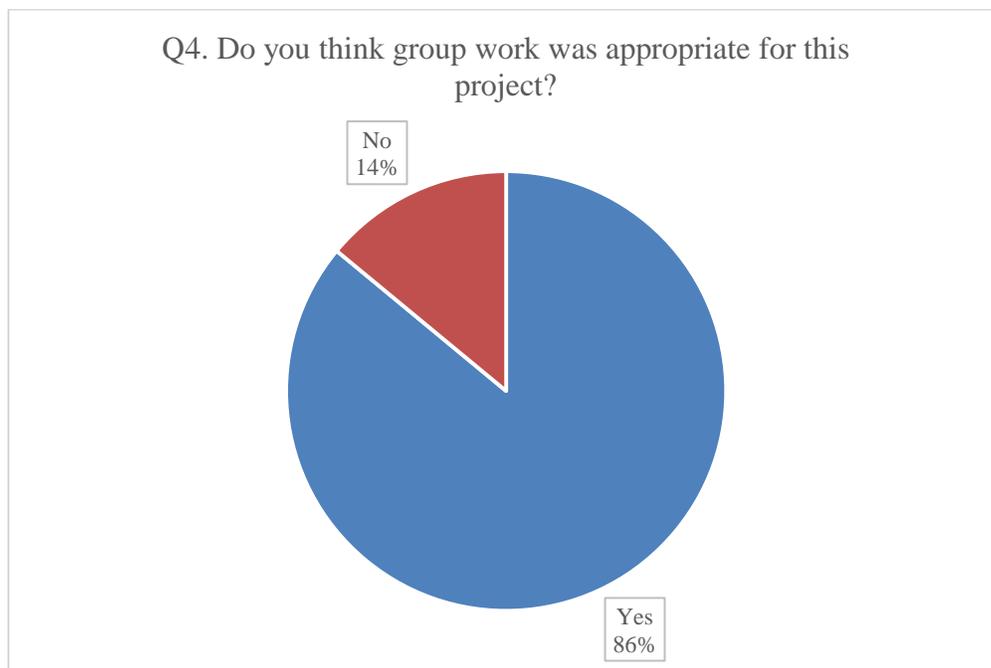
**Figure 1:** *How much did you enjoy this Project?*



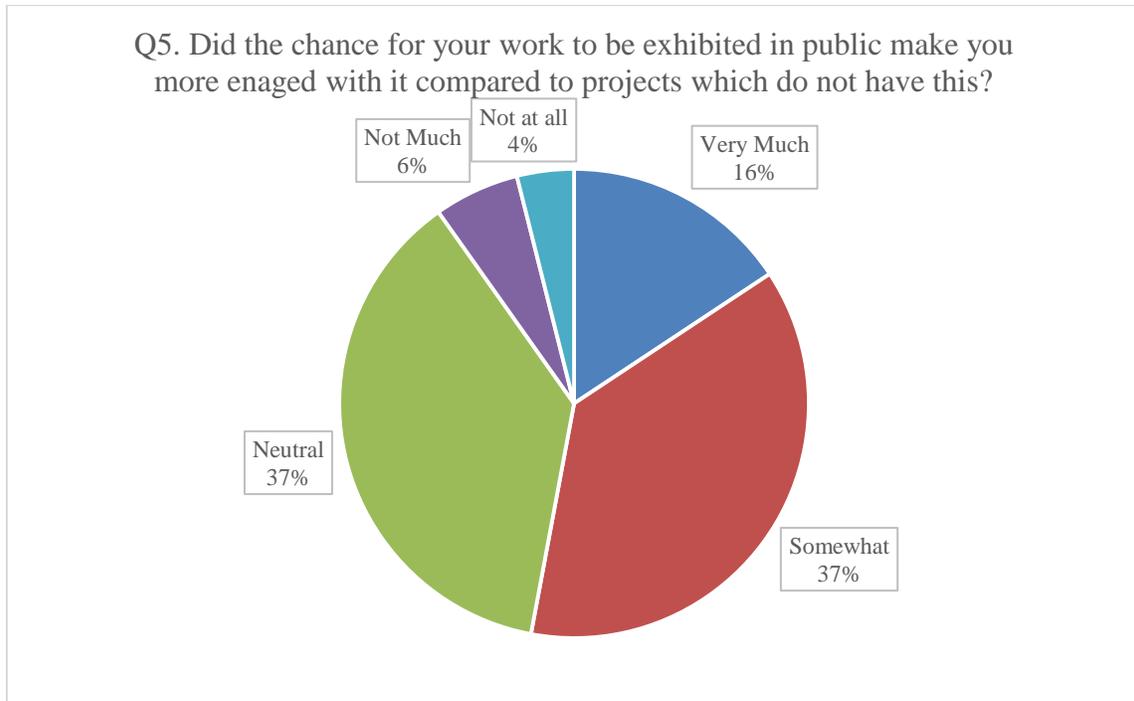
**Figure 2:** *Do you think you Worked Harder on this Project Compared to Previous Projects?*



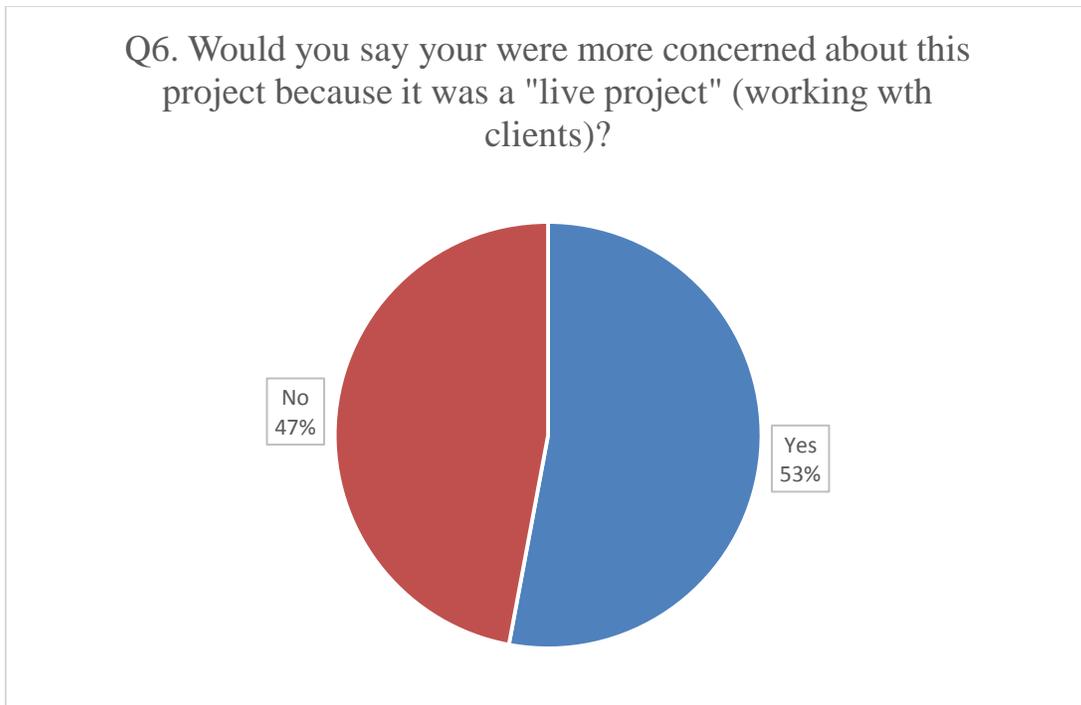
**Figure 3:** *Do you feel you have learned a Lot of Things from this Project?*



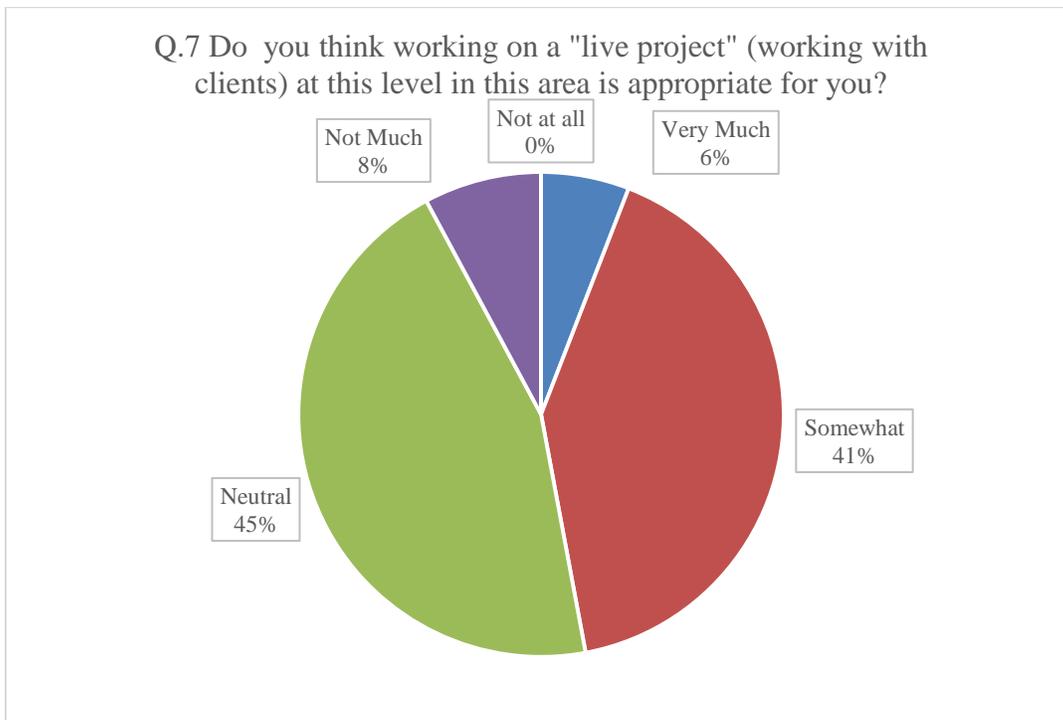
**Figure 4:** *Do you think Group Work was Appropriate for this Project?*



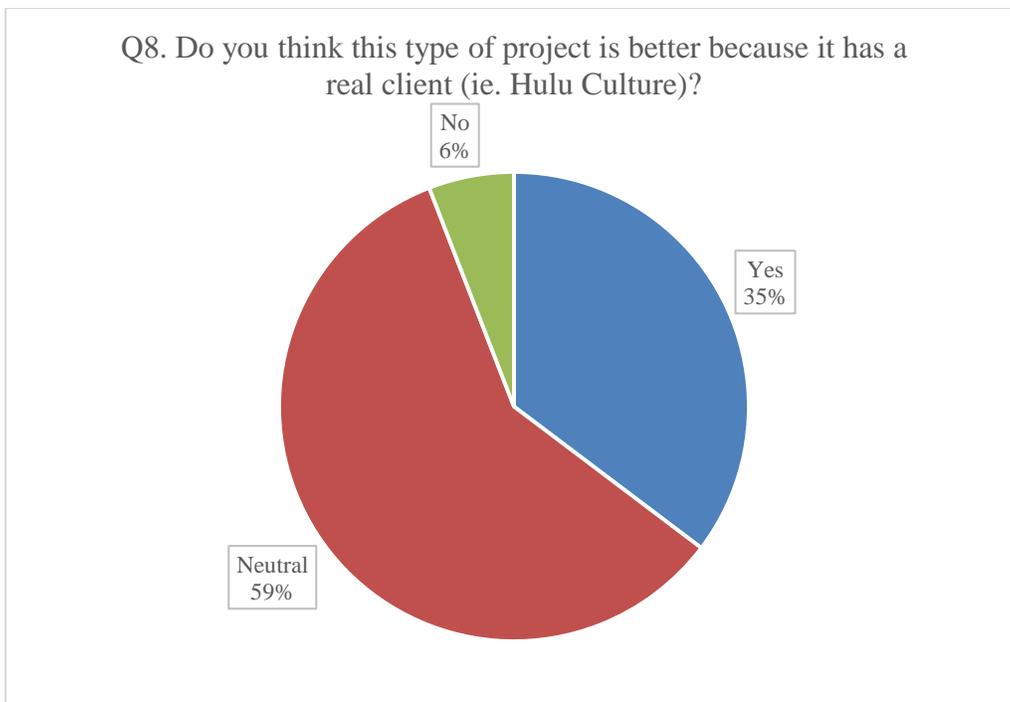
**Figure 5:** Did the Chance for your Work to be Exhibited in Public make you more Engaged with it Compared to Projects which do not have this?



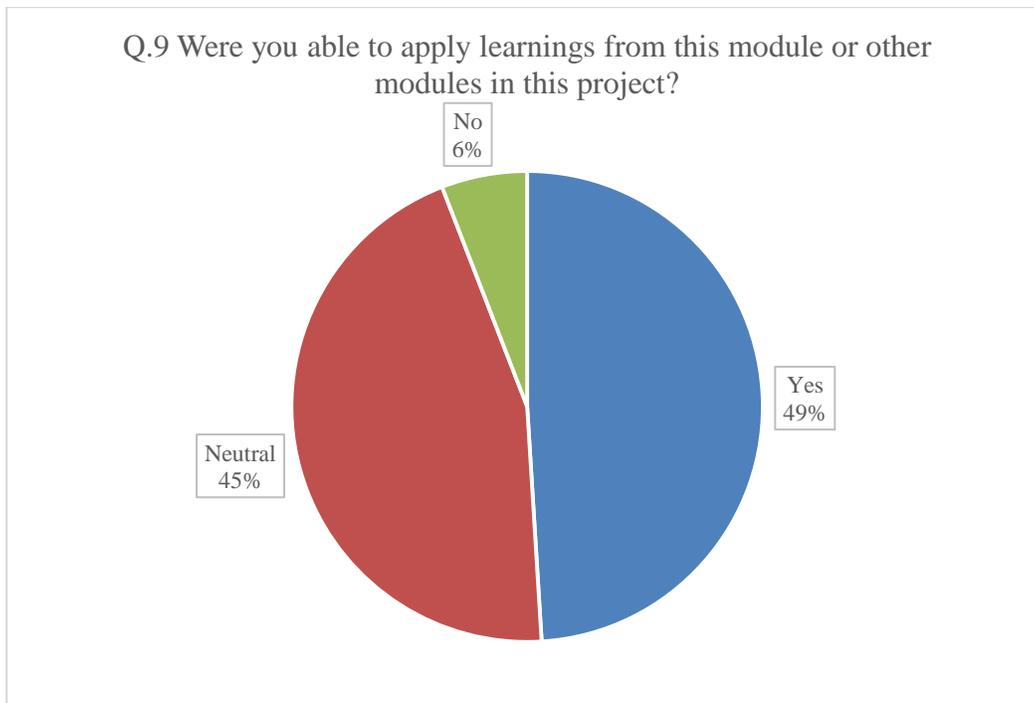
**Figure 6:** Would you say your were more Concerned about this Project because it was a "Live Project" (Working with Clients)?



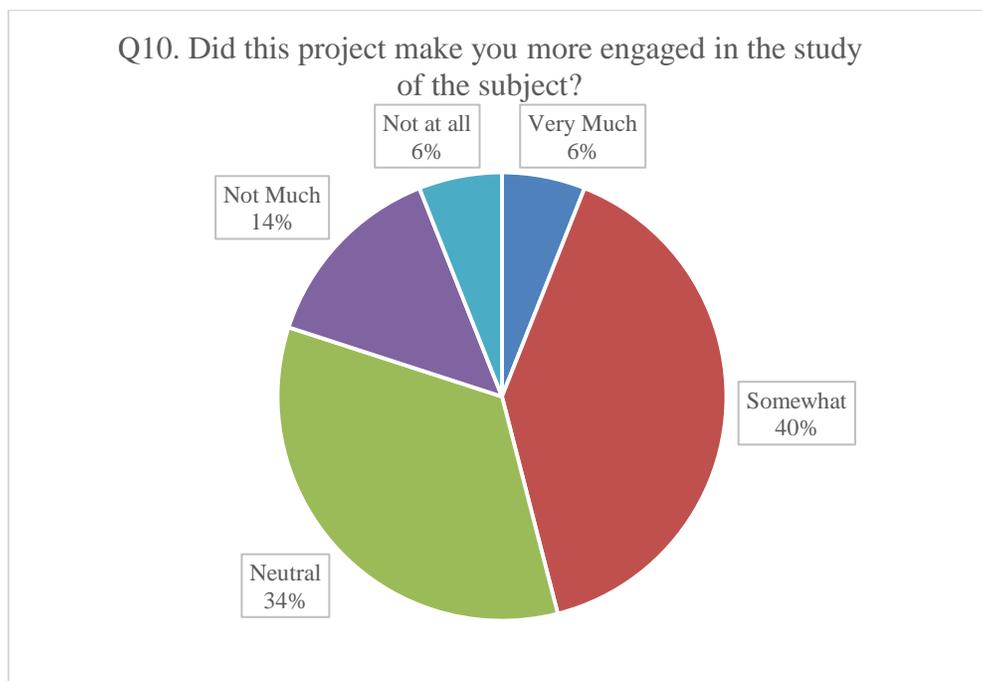
**Figure 7:** Do you think Working on a "Live Project" (Working with Clients) at this level in this Area is Appropriate for you?



**Figure 8:** Do you think this type of Project is better because it has a Real Client (ie. Hulu Culture)?



**Figure 9:** *Were you able to apply Learnings from this Module or other Modules in this Project?*



**Figure 10:** *Did this Project make you more engaged in the Study of the Subject?*

In response to the second question 65% (Figure 2) of students claimed to have worked harder than the two preceding projects in the module. Although only 48% of the students felt they have gained new learnings from this project as is shown by the response in question three (Figure 3).

From the student's responses to the fifth question which asks whether the chance to exhibit their work in public made them more engaged in the project shows that 53% of the students were somewhat or very much so (Figure 5). This tallied with the next question which asked whether they were more concerned because it was a "live project", here students who answered yes were also 53% (Figure 6). This may show that projects which includes an outside collaborator has a definite impact on some students, although it may not necessarily be positive in nature judging by the response to question eight, where only 35% of students felt the project was better because it had a real client (Figure 8). At the same time only 47% of students felt having a "live project" was appropriate at this level (Figure 7).

## **5. Conclusion**

From the findings, we can assume that some deep learning must have taken place as a final tally of eight pieces (57%) of student work were chosen and finally exhibited to the general public, and this seems to have some correlation to the 53% of students who claim to have been more engaged in the project due to the chance of exhibiting their work. These pieces of work were chosen because they had reach a standard that were judged to be appropriate for public viewing due to their quality in design, ability to express the theme, and quality of craftsmanship, and for it to have reach this level students would have needed to have incorporated their learnings from the module and applied it to the project for the successful outcome.

The fact that 53% of students reported that they were more engaged and more concerned with the project and that finally 57% of the work were chosen and exhibited may show some relationship in the way student study when offered a chance to get public recognition.

Although we can draw a general conclusion to the causal relationship between deep learning and outside collaborative projects through the analysis of the data gathered in the questionnaire we cannot understand why some students are affected by this format of project work. To get a better understanding of the relationship future studies can incorporate in-depth interviews with students to tease out why some students respond positively and others do not.

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