CAT 4 RESOURCE DEVELOPMENT

PROJECT MAKERSPACE

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ABSTRACT

Project Makerspace is a convenient, accessible, and specific resource package which aimed to educate the users of the newly established Makerspace room about relevant safety procedures regarding the equipment and to propagate the importance of safety when using such equipment. The Makerspace room in question is a room that contains many pieces of equipment related to mechanical experiments which provides these materials and equipment to students who require them for use in their projects. Project Makerspace has three main components which we decided would be best to educate students about safety. Firstly, our project contains a collection of videos, which would be able to clearly illustrate how to safely and correctly use every piece of equipment in the Makerspace, providing a "first-person" view on how to specifically use the Makerspace equipment. Secondly, quizzes have been made with the purpose of assessing and affirming the students' knowledge, helping them to retain the important information. Lastly, we have created a website which was able to encapsulate and encompass all of our resources and also a written guide on how to use the equipment for those who do not prefer to watch the videos.

1   INTRODUCTION

1.1   Rationale

The Makerspace room was recently furnished and built this year at the location B101 of the high school section of HCI. However, with the establishment of such a facility, some major concerns arose, such as the question of safety regarding the users of the room. There are severe consequences that could arise from the mishandling of the equipment, such as potential threat to the user and possible damage to the equipment. We realised that it would be illogical and dangerous for students to use the Makerspace room's equipment without having adequate knowledge about the utilization and handling of such equipment. Thus, Project Makerspace provides a means for the school to educate students' about such knowledge and ensure that those who use the Makerspace are knowledgeable about relevant safety practices

1.2   Objectives

Project Makerspace has two main objectives:

- To raise awareness for and teach students how to handle the equipment safely and correctly
- To create a method to assess the students' knowledge on the equipment and its relevant safety procedures

1.3   Target Audience

The target audience of our project was students from Hwa Chong Institution who require usage of the Makerspace equipment for their project work in school, or for their own personal projects

1.4   Resources

Project Makerspace comprises of:

- 6 full videos explaining how to use the equipment in detail
- One quiz for each piece of equipment to affirm the students' knowledge
- Website to consolidate our resource and make it more accessible
- Written guide and safety tips for each piece of equipment for those who prefer to read

2   REVIEW

While there were definitely other existing resources and guides to educate people about how to use the equipment, there were several reasons why our resource was more relevant than those that we had reviewed.

1. While our videos and resources are focused largely towards the aspect of safety, other videos that are found online seemed to focus mostly on instruction while largely neglecting the vital and important aspect of safety
2. Our videos feature the exact/specific models of equipment found in the Makerspace while other existing guides may use alternative models. This may cause some misunderstanding amongst people trying to learn about these them.

Therefore, as our videos feature the exact tools found in the Makerspace, our resource will be clearer and easier to follow for students

Comparing to other resources: Specific usage of details compared to other videos

^Our video features the exact tools found in the jigsaw box

However, other popular videos online starts off by teaching cutting techniques

3. Our videos focus on beginner techniques and specific details regarding how to safely use the equipment while other videos may focus too largely upon more unimportant aspects such as advanced cutting techniques

<Specific details and close ups on how to set up and operate the saw

^Overemphasis on cutting techniques

3   METHODOLOGY

3.1   Needs Analysis

Initially, during our project proposal stage, when we were contemplating upon which avenue of resources would be the most effective for teaching safety, we decided to use a decision making matrix; considering factors such as clarity, popularity and outreach before eventually deciding upon our current resource package. We also conducted a survey with about 50 potential users of the Makerspace room to gauge the students' level of interest in the various methods of teaching and testing, which was why we eventually chose to put our resources online.

Which type of teaching method do you prefer?

43 responses

- ● One on One teaching
- ● Group teaching
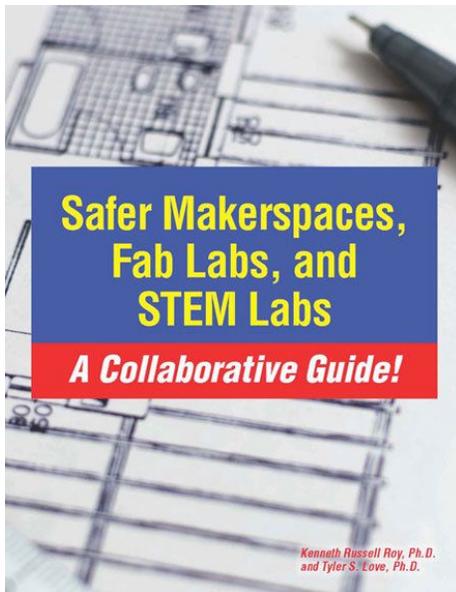- ● Online resources

58.1%

11.6%

30.2%
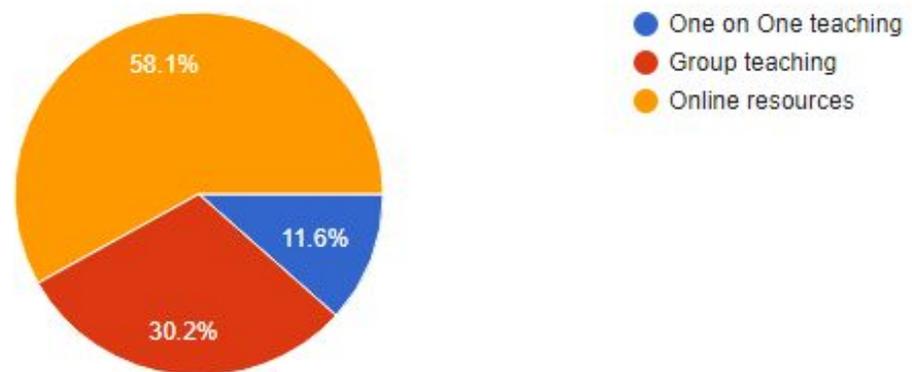
Feedback from the respondents of our survey

Furthermore, apart from collecting the opinions of the HCI students, we also conducted our own research upon existing case studies about which type of teaching/testing method was most beneficial to the retention of information. One example would be the case study which found out that students that frequently test themselves while studying retain and remember more information than students using our study methods (Wheeler and Roediger, 1992). Therefore, through all these avenues, we were able to draw the outline of what our resource package was to be.

3.2   Literature Review

Apart from conducting research about the various types of equipment and seeking guidance from our mentors, we also aspired to know even more about the nature of safety in Makerspaces, which was why we reached out to the Makerspace company (makerspaces.com). Upon hearing that we were undertaking a project regarding safety within Makerspaces, they expressed their thoughts about the importance of safety, and also recommended to us a useful book: "Safer Makerspaces, Fab Labs, and STEM Labs: A Collaborative Guide!" written by PhD holders Dr. Kenneth R. Roy and Dr. Tyler S. Love .This book proved to be very useful to us as its key focus was on safety and professional safety practices. The professional opinions and guides included within the book were also very helpful in the making of our resource, expanding our knowledge upon the topic of safety, and giving us a wider perspective to take consideration of when making our resource.

3.3   Development of Resources

Firstly, we went to the Makerspace room to make a preliminary list of which equipment we should create guides for. After that, we went to review and research upon other preexisting guides online along with consulting the Makerspace company and the guidebook they recommended to compile some important information and safety measures. Following that, we storyboarded and planned our videos before heading down to the actual Makerspace room to film the videos. We also wrote a written version of our guide for each piece of equipment, along with an accompanying quiz for each. Lastly, we uploaded all our resources to an online website which neatly displays all our resources in an accessible manner.
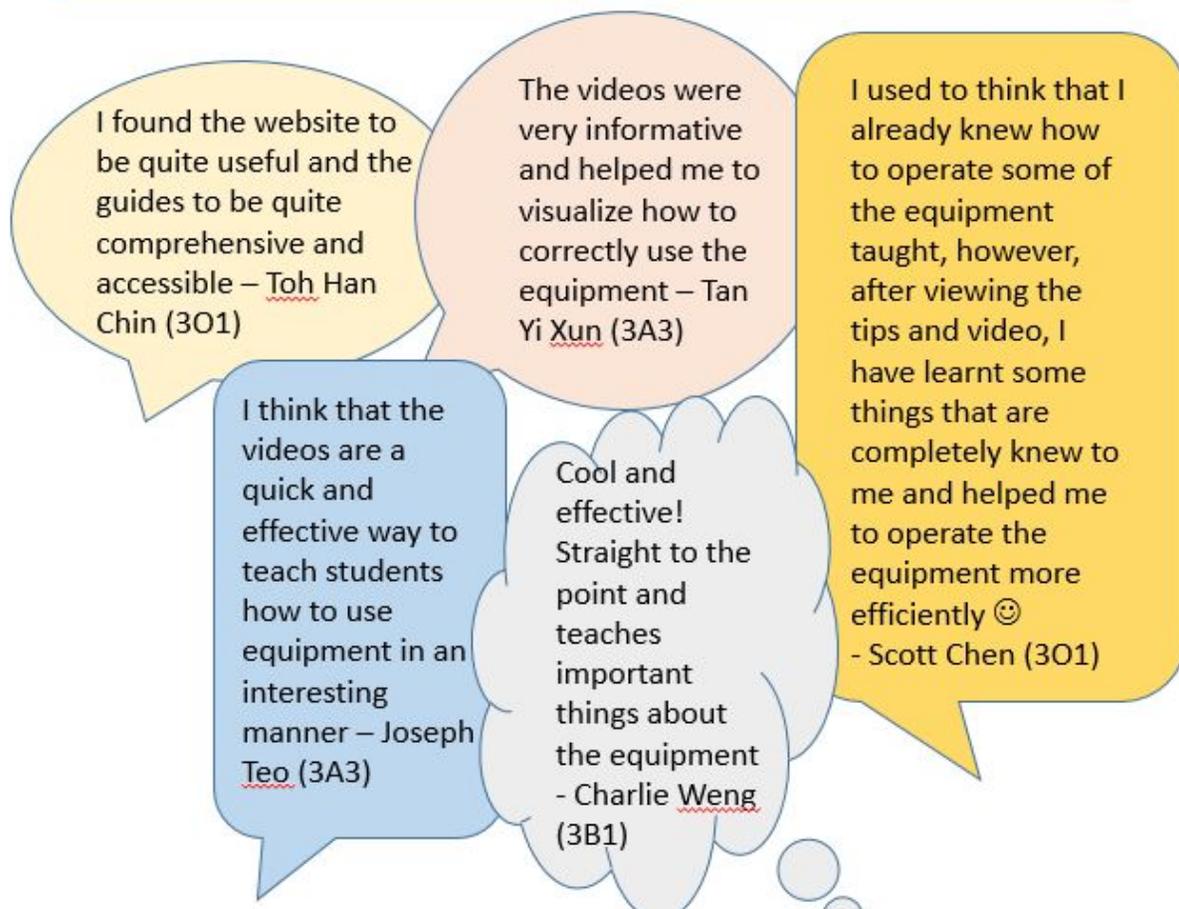
3.4   Pilot Test

A pilot test was administered to ascertain the usefulness of our project. After gathering about 20 of our peers and classmates, we got them to go to our website and watch our videos for each of the pieces of equipment, along with attempting the accompanying quiz. We then recorded the results in the form of graphs (below).

After the pilot test, we concluded that our resources were relatively effective as a large percentage of the test takers managed to pass our requisite score of 80% even though some may have had no prior knowledge about how to operate the equipment. Furthermore, collecting comments and opinions from the pilot test takers; we found that we have generally received positive feedback (below) and have concluded that our resource package was useful for its purpose and was generally accepted well.

Some of our pilot test takers feedback about our resources:

I found the website to be quite useful and the guides to be quite comprehensive and accessible – Toh Han Chin (3O1)

The videos were very informative and helped me to visualize how to correctly use the equipment – Tan Yi Xun (3A3)

I used to think that I already knew how to operate some of the equipment taught, however, after viewing the tips and video, I have learnt some things that are completely knew to me and helped me to operate the equipment more efficiently ☺ - Scott Chen (3O1)

I think that the videos are a quick and effective way to teach students how to use equipment in an interesting manner – Joseph Teo (3A3)

Cool and effective! Straight to the point and teaches important things about the equipment - Charlie Weng (3B1)

4   OUTCOME AND DISCUSSION

In the end, we were able to develop a resource package that achieved all our goals: To educate potential users of the Makerspace about how to use the equipment in the Makerspace safely and correctly, without endangering the safety of themselves or their neighbours. Our project will be used by the Makerspace team in HCI as means of a requisite to enter the Makerspace in the future. When a student wants to use the equipment in the Makerspace, they will be able to apply for entry into the Makerspace by using our resource package to learn about it, and if they pass our quiz, their information will be recorded and they will be allowed entry into the Makerspace. Therefore, our project holds quite a large amount of significance and is relevant towards the school community.

5   CONCLUSION

In conclusion, Project Makerspace was quite an elaborate and challenging project, and along the course of undertaking it, we had learnt many important skills and values. The project as a whole was relatively time-intensive, with large amounts of time required to research upon each of the different pieces of equipment, before going down to the actual Makerspace room in Hwa Chong (even during holidays) to individually film, direct, and edit each video. Through this project, we have learnt how to manage our time well as well as to find time to contribute towards it, even in very busy periods. We have also learnt the value of perseverance and persistence, where even though things may have seemed tough, we were able to work together as a team to overcome these challenges and reach greater heights.

6 ACKNOWLEDGEMENTS

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