PTOOLKIT a Digital Tool for Persuasive Design Ideas: A Design Knowledge Transfer Experienced

Aeni Zuhana Saidin¹, Nassiriah Shaari², Asmidah Alwi³, Catriona Macaulay⁴ and Nick Hine⁵

¹,²,³Universiti Utara Malaysia (UUM), Malaysia, aeni@uum.edu.my, nasiriah@uum.edu.my, asmidah@uum.edu.my
⁴,⁵University of Dundee, Scotland, catriona@computing.dundee.ac.uk, nhine@computing.dundee.ac.uk

ABSTRACT
To design effectively a designer requires both know-how and a specialized design knowledge. The specialized design knowledge transfer attempts were commonly utilized the face to face methods involving both specific domain experts and designers. The new technologies which enable this knowledge in digital form and online approach is still limitedly explored. Therefore, we developed the PToolkit as a digital knowledge transfer tool to transfer the specialized design knowledge. This paper explains the experienced in transferring this knowledge from the academic community to the design community.

Keywords: Knowledge transfer, persuasive design, specialized design knowledge, digital tool, design community, design evaluation.

I INTRODUCTION
Design is an interdisciplinary discipline of art, sciences and technology, which recently has been discovered as a central driver of social and economic innovation (Jonas, 2007). Ideally, design involves a creative problem-solving activity, necessitates the making of decisions in order to fulfil certain objectives. These decision making activities require the people involved (designers) to acquire an adequate knowledge and apply it wisely.

A specialized design knowledge on the other hand is any knowledge that will help designers design any product effectively. Specialized knowledge, usually resides in other domain knowledge and provides additional value to the design if applied wisely. For example, the designer can use theoretical knowledge of the persuasion domain to design the interactive application in persuading people to change. Most of this specialized knowledge does not need to retain in the designer knowledge repository (as the know-how design knowledge), and can be forgotten after the design activities. Later on whenever requires, this specialized design knowledge can be referred again if necessary.

In the design activity there are few better approaches that widely used in the knowledge transfer, namely paired work (Rejab, Omar, Ahmad, & Ahmad, 2012), training, coaching and mentoring. These methods involved more than 50% face to face situation which requires both domain expert and designer to attend in a specific session (Dreyer-Hadley & Kathleen Maurel, 2001). These approaches are not new and have been well adopted in various institutions and firms.

Knowledge transfer activities have also impacted by the recent advancement of information technology (ICT). According to Kahtawala & Wilgen, (2004) The transfer of knowledge through technology is becoming increasingly important. ICT technologies offers advantages such as enable virtual knowledge sharing session (Ardichvili, 2008) (Mancuso, Chlup, & McWhorter, 2010) (Hansen, 2008), and reduced learning cost (Zhang & Nunamaker, 2003) (Kahtawala & Wilgen, 2004). Additionally, knowledge also can be put into a digital tool for allowing wider access (Kahtawala & Wilgen, 2004). The digital tool here can be defined as any digital application that contain knowledge to help users gain access to the knowledge digitally such as e-book and wiki. For example, in software engineering fields, the design process has been recorded in this manner for reuse and training purposes (García, Amescua, Sánchez, & Bermón, 2011) (Chau & Maurer, 2005).

Although knowledge transfer activities which utilizing the ICT technologies have been recognized, the number of the digital design repository is limited (García et al., 2011), it is even more limited mainly in sparking new design ideas for persuasion purposes in the early design ideation phase. Therefore, there are few challenges faced with this situation:

• To define knowledge transfer process to allow a digital tool to spark persuasive design ideas and facilitate learning of the theoretical persuasion knowledge.
• Then we applied the knowledge transfer process defined for agile development of the digital tool containing the specialized design knowledge.

In the regards of fulfilling this gap, we were exploring ways on how to transfer the specialized design knowledge to designer in developing a persuasive application. This work has brought us into developing a digital persuasive design tool and afterwards validating the knowledge transfer process used in guiding the development. The digital tool is
known as PToolkit and this research has taken nearly three years.

This paper, is an attempt to share our experienced in transferring specialized design knowledge using a digital tool. This paper is organized as follows. Section 2 presents works related to the development of PToolkit as a digital tool containing persuasion knowledge. Section 3 describes the evaluation process, its results and discussion. Finally, in Section 4, the authors present their conclusions.

II KNOWLEDGE TRANSFER PROCESS: FOR TRANSFERING DESIGN KNOWLEDGE

Blogs, e-book and wiki (to name a few) have been used for disseminating information for various purposes. However, a digital tool for transferring and disseminating design knowledge to spark an early design ideas is limited. Therefore, PToolkit has been developed for such purposes specifically aims for transferring the persuasion knowledge for the design community.

The development of PToolkit has adapted the knowledge transfer process approach which we highlighted as the process in transferring the specialized design knowledge. The process contains four activities and has been implemented throughout our research. We believed this activity is important to ensure that the knowledge can be transferred effectively. Therefore, we offered this process as a guideline for the academic community that have any interest in transferring a specialized knowledge to other communities.

This paper describes each of these activities (that have also published in other conferences) and later validating the stated activities to humble closing the gap in transferring knowledge using digital tool. Please refer to figure 1 to have a closer look for the stated activities.

![Investigate the knowledge resources and understand the target community.

Figure 1. Specialized Design Knowledge Transfer Process.

Investigation of the knowledge resources. The knowledge that aimed to be transferred to the designers is the persuasion knowledge (specialized knowledge to designer). We have chosen this knowledge as recently the development of interactive application that aim to influence people has increased dramatically. However, the availability of this knowledge for quick access and understanding is quite limited. We were examining the knowledge using literature gathered from various online databases. This task was done in order to understand what knowledge will be needed by the designer (while not all knowledge is appropriate) in designing any persuasive product or application. These literatures, then were analyzed and organized properly to reveal in depth about persuasion knowledge used in prior researches and become the basis on bow this knowledge should be properly transferred to the designer. During this phase we had:

i. Developed the appropriate persuasion knowledge to designer.
ii. Modelled the knowledge for easy understanding and learning purposes.
iii. Mapped the persuasion knowledge accordingly to easy knowledge acquisition (Saidin, Macaulay, & Hine, 2012).

Understanding the target community. The persuasion knowledge gathered in the previous activity is targeted to be given to the designer. Therefore, understanding designer and design activity are very crucial in this phase. Designers are mostly living in active mode (practical) and the design process usually deals with ill-structured design problems. This has led us to investigate a completely different working sets. As a result, we decided to employ two qualitative data gathering methods to address the situations.

To gather the data, where have used two data collection methods; (i) interview sessions to gain insight into the designer’s personality and working nature, and (ii) a series of design workshops to help us understand the design process and how the persuasion knowledge (specialized knowledge) is used and impact the overall designer’s experienced (Saidin, Macaulay, & Hine, 2011). Refer to figure 2, to view some of our activities during this phase.

![Figure 2. Workshop Design Sessions.

The tasks have made us understand a few things, especially on how design ideas are generated, the design process and their understanding towards other knowledge needed in the design. At the end of this
phase, we were also developed the persona and scenario to represent designers.

Create the digital tool. Persuasion knowledge toolkit (PToolkit) is an attempt to transfer the persuasion knowledge to designer and assist them in the persuasive application design. This tool contains the complex knowledge of persuasion that can be used in assisting the early stage of design ideation. This tool also supposedly inspires designer in their design idea and provide the appropriate persuasion knowledge to them (Saidin, Macaulay, Alwi, & Shaari, 2013). Refer figure 3 for the PToolkit application.

![Figure 3. PToolkit Application.](image)

There are few elements of software design that were emphasized in the development of PToolkit:

i. Information architecture. In PToolkit the persuasion knowledge contains three important elements, namely target behaviour, persuasion strategy and persuasion technique for influence purposes. The information was structured in such a way to make it more understandable.

ii. Experience design. The user experience is very important for acquiring user understanding and engagement. Therefore, elements such as navigation, interface and colour coding for each knowledge element is carefully designed to provide the best experience.

iii. Navigation design. The navigation structure has to be made easy for the user not only for navigating but also to understand the structure of the persuasion knowledge.

iv. Information design. Persuasion knowledge elements are the core components of the influence factors. Therefore, these elements need to be carefully identified, obviously seen and understand. Information was designed either in textual form, visual form, and extended information and explanation.

Evaluate the knowledge transfer process. There are two evaluation studies have been done in the PToolkit evaluation phase. This evaluation is supposed to reveal the ability of the designer in designing a persuasive application assisted by PToolkit. We have conducted pre and post evaluation activities for enabling us to claim that any results gathered in post activities were influenced by PToolkit usage.

The evaluations were done with the commercial designer (expert designer) and also with the young designer (novice designer). These target users represent the real user (designer) that will get the benefit when using the PToolkit in assisting the design of persuasive application. Please refer to figure 4, to view the framework of the evaluation phase.

![Figure 4. Evaluation Framework of PToolkit.](image)

Our main aimed in this evaluation work is to find out whether PToolkit able to spark design ideas and improve design decision. Any positive results gathered from these activities would then validate the activities taken in guiding the development of the digital tool to transfer design knowledge.

III TRANSFERING THE DESIGN KNOWLEDGE

To understand either the design knowledge in PToolkit can successfully be transferred to the designers the evaluation phase is conducted. We have conducted two types of evaluations both with expert designers and novice designers. However, this paper will only reporting part of our experienced in transferring the design knowledge to the novice designer.

A. Methods and procedures

Participants. Participants were recruited among the final year of multimedia design students. There are 47 students, which were agreed to involve in this study. The students have an adequate design skill and knowledge which can be used as a basis of design work. The skill and knowledge were required during taking various subjects such as multimedia design, human computer interaction, game design, human centred design and few more subjects.
**Design Workshop Procedures.** We have conducted a pre-test (phase 1) and post-test (phase 2) evaluation method. During the phase 1, the students were given a scenario in which they need to design a web page (in sketch or wireframe) that encourages a healthy lifestyle among professionals. They were then divided into 10 groups to accomplish the task. They were also provided with design materials such as papers, pencils, colours and markers to help them make some illustration and necessary drawing. They were encouraged to discuss among the group members and apply any knowledge of persuasive design. After one and a half hour they were asked to stop and submit their design work.

The post-test, then conducted after a 15 minute break. All groups were provided with the link to access PToolkit, and were asked to redesign the web page sketches again (if necessary). The second session took about two hours. At the end of the session they were required to submit the sketch to the moderator.

**B. Results**

During the first session, only three website designs were able to be collected. Other designs were not ready as the students feel some confusion on how to produce the persuasive website. Refer figure 5 for the early sketch. The early sketch showed some limitation in composing early design ideas.

![Figure 5. Early Design Sketch Ideas.](image)

During the second design session, after they were given the link of PToolkit application, 10 designs of website were produced. All groups were able to design the website in two hour time.

Then we were analysing the sketches gathered from the evaluation activities. The sketches were examined by looking at the explicit evidence on the usage of specific target behaviour, persuasion strategies and persuasion techniques. The explicit evidence is noted by looking at how these persuasion knowledge has been used in creating the persuasive website that encourage people to exercise.

**Clear Target Behaviour.** Eight design sketches have made clear on their target behaviour either for the specific type person, specific exercise regime or specific health related conditions. Two other sketches were not specifically clear on the target behaviour and design for general health. Refer to figure 6 to look at the sketches of specific health condition.

![Figure 6. Sketch for Specific Health Condition.](image)

**Persuasion using specific strategy and techniques.** PToolkit is a digital information tool that suggest on the used for specific strategy and techniques for persuasion purposes. The sketches have shown that the novice designer adapt the persuasion knowledge and able to come out with new ideas of other persuasive situation. Therefore, these sketches have suggested that the novice designer used specific strategy and techniques to persuade the user to embark on an exercise regime for a healthier lifestyle. For example figure 7 shows a sketch that encourages user’s skill using suggestion technique.

![Figure 7. Skills are encouraged by using the Suggestion Techniques.](image)

**C. Discussions**

The results of post-test has suggested that PToolkit able to generate persuasive design ideas among novice designer. In the bigger perspectives the evaluation work suggests other possible situations that will be explained in the following section.

**Knowledge transfer process.** This research is an attempt to transfer the specialized knowledge in digital form to the design community using the knowledge transfer process. The ability of novice designers composed the early design ideas during the evaluation exercised have suggested that the attempted was successful. The specialized knowledge in digital form can be transferred using the knowledge transfer
process and its related activities. Therefore, other researchers who’s interested in transferring a specialized knowledge from one community to another community can adopt this process to guide the development of their digital tool.

**Design understanding.** The novice designer is multimedia students that are quite well versed in the design of web and application. Before PToolkit was given to them, they are not really sure on how to design a persuasive website, even though they are allowed to review on any resources that they think able to help them with the design tasks. However, it is clearly observed that they were able to sketch the persuasive website after being given the PToolkit. This situations proposed that the novice designer has gained design understanding when dwelling with PToolkit application.

**Design Ideas.** The sketches have proposed to us that the design ideas can be sparked by learning and understanding the content of PToolkit. PToolkit contain the simplified theoretical knowledge about persuasion and how it can be used in the persuasive technology design. The novice designer has acquired this design knowledge and ability to apply the persuasive design ideas in different situation.

**Knowledge acquisition using simple information.** We have also discovered that although PToolkit contain simple explanation the novice designer still able to acquire that knowledge and apply into the current design. This situation might contradict with other research results that provide the rich information for the knowledge transfer to ensure that the understanding took place (Chau & Maurer, 2005). This direction might suggest for future research on the nature of design knowledge should ideally be given.

**Transfer of Design Knowledge.** We believe that the results gathered from the design workshop have shown that design knowledge has been transferred to the novice designer. The common methods of transferring design knowledge using face to face now can be extended towards using the digital tool.

**IV CONCLUSION**

The previous years in making sensed of transferring design knowledge have been both very fascinating and challenging. We have more than agreed that working which involved human intervention is challenging and sometimes requires quick decision when situations were different from what we were expecting. In our case, recruiting designers to get involved during the evaluation phase were the toughest one which resulted in having few expert designers. Therefore, conducting work with some numbers of novice designers would also retain the validity of this research.

In short, novice designer is usually considered as having lack skill and inexperience in design work. In the real design situation, they are usually assisted by senior designer during the design work. This situation is quite obvious in the first session as the participants were left alone to discuss among themselves. The participants keep on asking the moderator to provide more information to help them in the design task. However, after providing with the PToolkit, the designer starts to understand what elements needed to be included in designing the persuasive web. The website sketches have shown the novice designer able to generate design ideas for some health related persuasion scenarios. Therefore, we can conclude from the workshop alone the PToolkit has increased the designer's knowledge, thus inspire the design ideas of a persuasive website.

There are also results from focus group activities that were conducted after the design workshops. We have not critically analysed the data yet, however, we believed that the results will further help us gain a significant understanding on how to successfully transfer the design knowledge for the design community.

Our other task is to analyse the data gathered from the evaluation work done by the expert designers. We were conducted a similar design scenario, however in an individual working environment. Initially, the data has shown that the PToolkit able to improve the design idea during the design ideation phase. However, we still yet further analyse the data and would share our experienced later.

**ACKNOWLEDGMENT**

A special thanks to the multimedia student of UUM who have participated in the design workshop and focus group session in collecting the necessary data for this research. This research also has been funded by Universiti Utara Malaysia’s Leads Grant.

**REFERENCES**


