Work in Progress - The Affordances of Photo Elicitation as a Research and Pedagogical Method

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Abstract - **This research explores the research method of photo elicitation, where participants take photos that are later used to promote conversation in interviews and focus groups, as both a research and a pedagogical tool in an engineering education context. Different methodological implementations are investigated as research methods, and its potential use as a pedagogical tool to promote active group learning in the classroom is explored. Findings from a preliminary analysis are discussed, in addition to opportunities for future research.**

Index Terms – learning, pedagogy, affordances, photo elicitation, research

INTRODUCTION

Photographs are artifacts of what people see and experience. They can be powerful representations of not only the physical world, but also deep personal or collective accounts of experiences, settings, and beliefs. One research method that takes advantage of the deeper meaning behind photos is photo elicitation. In photo elicitation studies, participants are given a guiding question and asked to take pictures in reference to that question. After taking pictures, they participate in semi-structured interviews where they are asked to describe the meanings they associate with their photos.

This paper presents preliminary work on the affordances of photo elicitation as a research tool to explore conceptions of engineering as well as a pedagogical tool to engage learners in a collaborative setting in deep discussions on the nature of engineering. In the following sections we define what we mean by "affordances" in reference to photo elicitation techniques, describe the study, and highlight emergent findings.

AFFORDANCES AND PHOTO ELICITATION

The theory of affordances was first introduced by Gibson [1, 2], who defined it as "a specific combination of the properties of its substance and its surfaces taken with reference to an animal." This ecological perspective on the interface between physical objects and people can be extended to the study of events, where affordances are defined by their perception as such by participants in an activity [3]. Affordances are "action possibilities," dependent on the capabilities of the actors within the environment. For example, an environment affords food and shelter in relation to the animals in the environment, but only if the animals perceive what the environment provides as being food and shelter.

Photo elicitation is a qualitative inquiry approach that can be used to elicit "thick description" [4] through the use of photographs in research interviews. Photos have a variety of advantages based on how people think visually. They serve to "evoke information, feelings, and memories that are due to the photograph's particular form of representation" [5], in addition to stimulating latent memory, reducing areas of misunderstanding, eliciting longer and more comprehensive accounts of ideas, making more visible interpretations that are based on otherwise-invisible assumptions, eliciting values and beliefs, and connecting to core definitions of the self to society, culture, and history. In a similar way, photo elicitation may also have affordances as a pedagogical method. Here the technique is used to guide collaborative or individual inquiry into the meaning of a particular phenomenon.

RESEARCH OVERVIEW

This study was guided by the following research questions: how can photo elicitation (1) enable research on the conceptions of engineering held by people with different backgrounds? and (2) be used as a pedagogical tool to guide the development of conceptions on the nature of engineering?

GROUP	DESCRIPTION	PARTICIPANTS
1	Pilot group	Undergraduate and graduate students in engineering N = 3 (1 man, 2 women)
2	Shared design experience	Undergraduate students in a multidisciplinary service-learning engineering design program in engineering and health sciences N = 5 (2 men, 3 women)
3	Mix of majors and shared design experience	Undergraduate students – some in a service-learning multidisciplinary engineering design program, some in a technology major N = 4 (1 man, 3 women)
4	Shared major (technology)	Undergraduate students majoring in technology N = 3 (2 men, 1 woman)

TABLE 1: PARTICIPANTS

As shown in Table 1 this study includes 15 participants across four groups. Participants went through a three-part data collection process. Part 1 consisted of individually collecting at least 5 pictures that answer the question, "what

is engineering to you?" followed by an individual interview to discuss the pictures. Part 2 consisted of a focus group interview, where participants were asked to critique both their and others' photos in a group photo elicitation format designed to encourage active group learning. In part 3 of the study, students participated in individual reflection-based post-interviews.

RESULTS - AFFORDANCES

Photo Elicitation as a Research Tool

Our data brought out several affordances to using photo elicitation as a research tool in the engineering context. Photo elicitation:

- Is resilient to diverse backgrounds, experiences, disciplines, and motivations – and is highly effective in eliciting rich data.
- Is extensible to different technologies – digital cameras, pictures previously taken, search engines, etc. provided participants with multiple ways to share their ideas.
- Affords multiple perspectives – photos provided multiple avenues to describe engineering with real objects or metaphors; from pictures that were very personal to those devoid of people; from the process of engineering to the products of engineering; from beliefs and values to ways of thinking.

Photo Elicitation as a Pedagogical Tool

As a pedagogical tool, several affordances emerged during our pilot study. Photo elicitation focus groups:

- Provided participants with opportunities to reflect on what engineering means to them, regardless of whether or not they were able to articulate this from the beginning of the study.
- Afforded significant discussion around variations in the photos that participants brought (e.g., freshmen vs. seniors, abstract vs. detailed)
- Facilitated discussions of visual and artistic photos and their associated engineering-related metaphors. Participants discussed their photos in the context of themselves as engineers, themselves as people, themselves as future engineers, and what the future of engineering should be.
- Allowed participants to explore multiple perspectives on their and others' photos through the shared history and stories.

CONCLUSIONS AND FUTURE WORK

Photo elicitation presents many affordances as both a research and a pedagogical tool. Initial analysis shows that as a research tool, photo elicitation is useful regardless of background, experience, or discipline among participants. Photos can be collected in any manner and still elicit deep, meaningful conversation surrounding the many avenues for thinking about engineering. This method brought into focus a number of ideas around engineering.

As an instructional tool, photo elicitation afforded participants an opportunity to reflect on engineering. The photo elicitation focus group interviews provided participants excellent opportunities to discuss their views on engineering, as well as reveal parts of their identities and how engineering is a part of them. Some participants learned new things through the discussion of both their photos and others' photos, making it a valuable experience.

The ultimate affordance from this study is the collection of new opportunities for future research revealed. Perhaps photo elicitation could be used as an assessment tool by professors interested in whether or not students understand the most important learning messages in a course. Some participants majoring in technology indicated that they had started in engineering; could photo elicitation be used in predicting success and retention? Photo elicitation could also be used in exploring boundaries between the disciplines of engineering and technology.

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