ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

Paper ID #24809

Measuring the Conceptualization of Oppression and Privilege

Rachel M Johnson, University of Minnesota

Rachel Johnson is a PhD student in Biomedical Engineering at University of Minnesota. Her research interests are cardiac tissue engineering and biopreservation. She earned her BS at Oregon State University in Bzioengineering.

Michelle Kay Bothwell, Oregon State University

Michelle Bothwell is an Associate Professor of Bioengineering at Oregon State University. Her teaching and research bridge ethics, social justice and engineering with the aim of cultivating an inclusive and socially just engineering profession.

Dr. Devlin Montfort, Oregon State University

Dr. Montfort is an Assistant Professor in the School of Chemical, Biological and Environmental Engineering at Oregon State University

Kali Furman, Oregon State University

Kali Furman is a PhD student in Women, Gender, and Sexuality Studies at Oregon State University. Her research interests are in social justice education and feminist pedagogies.

Measuring the Conceptualization of Oppression and Privilege

Abstract

Many campus programs seek to enhance students' and faculty's capacities to engage issues of inclusivity, equity and social justice. While there are quantitative assessment tools that measure constructs such as "cultural competencies," we are not aware of any that measure understanding of social power and oppression. Our approach builds on conceptual change research where students' understanding is investigated through semi-structured interviews about relevant analyses or problems. In particular, we developed a realistic and relatable vignette centered on gender dynamics that explores four broad themes of understanding: social construction of gender and masculinity, systems of power, gender roles, and cooptation and power dynamics. Our team recorded, transcribed, and analyzed five pilot interviews using an adaptation of the constant comparison method. Preliminary analysis focused on developing spectrums of understanding across which to compare conceptual understanding of oppression and privilege.

Introduction

Many engineering departments are seeking to diversify their communities and establish a climate of inclusion and collaboration. College-wide efforts at the authors' institution have been previously described [1], and include initiatives to enhance students' and faculty's capacities to engage issues of inclusivity, equity and social justice. Associated faculty development programming and curricula reform at both undergraduate- and graduate-student levels are pushing beyond multicultural awareness/cultural diversity, or growth in cultural competency, towards understanding intersections of institutionalized systems of power, privilege, and inequity. These educational opportunities center theories of systems of oppression, provide a forum to critique particular ideologies central to engineering culture that hinder authentic professional discussion and reflection on the political, social and ethical dimensions of science and technology, and present participants with particular examples where systems of power have interlaced with engineering science and design such that access to opportunities, resources and goods have been stratified across various social identity groups. Having the ability to measure an individual's growth in conceptualization of oppression and privilege would be instructive for the individual and for measuring success of programs designed to promote this learning. The lack of such an instrument provided motivation for this study.

An effective assessment instrument needs to access participants' actual thinking about the relevant content rather than their stores of knowledge, which can be memorized or stated without being truly internalized. There are many instruments available to measure cross-cultural competency, but these do not address participants' thinking about the concept of power dynamics, either cross-culturally or within one culture [2]. Existing instruments are mainly quantitative, and provide results by tallying certain responses or groups of responses into pre-defined categories. However, quantitative assessments do not give the participant the chance to explain their reasoning, expand on a thought, or return to a point with further elaboration. They also do not typically allow a participant to use their own vocabulary, which can be an indicator of understanding. For example, as a student gains a deeper understanding of physics, they begin

to reason using words specific to the discipline, such as "accelerates" instead of 'goes faster' [3]. This change indicates an increased understanding of Newtonian physics because Newton's laws relate forces and accelerations, not velocities. Both statements are technically accurate, but research shows that physicists and successful students relate gravity to acceleration (rather than velocity). Similarly, using the word 'identity' rather than the phrase 'who they are' when discussing social justice content indicates greater familiarity with and a higher understanding of the concepts being discussed. Qualitative assessments can consider these factors.

Instrument Format. Our approach draws from previous work on conceptual understanding in engineering and the physical sciences. Landmark studies in physics education used semi-structured interviews with students describing their thinking about physics problems [3]. Similar interviews have been used in engineering and other physical sciences to get an authentic picture of students' understanding of various concepts ranging from motion to electromagnetism [4, 5]. Early applications of this research focused on student "beliefs" and "misconceptions," assuming that students reasoned from coherent, consistent theoretical models of physical phenomena and that instruction designed to specifically contradict these naïve models would be effective [6]. These studies led to quantitative survey instruments intended to measure student conceptual understanding (see, for example, [7]), similar to the instruments about "cultural competency." More recent research on conceptual change has highlighted the sensitivity to context, however, and now focuses on identifying common patterns of student reasoning as well as the contexts in which they typically arise [8, 9]. Our work here follows this more situated approach to conceptual understanding by using semi-structured interviews and thematic qualitative analysis that seeks patterns in the participants' responses, rather than assuming predefined categories.

The problem-based, semi-structured interview approach used by Halloun and Hestenes [3] can be used to assess conceptual understanding of systems of oppression, privilege, and power structures. Our first challenge, then, was to develop a "problem" that included phenomena related to systems of oppression, privilege, and power structures. Stories involving these phenomena are very common, so the challenge actually turns out to be choosing which stories would be most productive in an interview setting. To make these choices we drew on conceptual change literature concerning "ill-structured problems." The common definition of an ill-structured problem is one in which "reasonable people reasonably disagree" about a solution [10]. In an ill-structured problem this disagreement can be caused by differing interpretations of evidence, lack of evidence, differing criteria for evidence or different definitions of the problem [11]. Most social, political, and economic problems are ill-structured because they have many different solutions and require complex implementations of those solutions. We use scenarios involving systemic differences in power (called a vignette in this paper) as ill-structured problems for our participants to evaluate and explain.

Investigating conceptual understanding using ill-structured problems requires semi-structured interviews to allow each participant comparable opportunities to respond to the problem through the use of predesigned prompts [10] as well as leaving flexibility to explore nuance and individual differences through more improvisatory follow-up questions [12]. Although there is not a single correct answer to the systems of oppression, privilege, and power structures presented in the vignette, participants' responses and explanations will be based on their understanding of social interactions. In this context, "high" conceptual understanding means the

participant used concepts, vocabulary and reasoning consistent with expert descriptions of the relevant systems of oppression, privilege, and power structures. Note that in physics or other STEM content areas, the "consistent with expert descriptions" criteria is often simplified to "correct."

Methods

The research team invited conversations with professors and graduate students from Women, Gender, and Sexuality Studies (WGSS) who are scholars in the area of oppression and privilege. Through these brainstorming sessions, possible subjects for the vignette were generated, most of which had to do with the treatment of individuals with identities outside of the dominant paradigm (e.g., women's experiences in engineering, racial or cultural insensitivity in a social setting, and gender as a social construct). A vignette format was chosen because it could be easily constructed to elicit responses around several different underlying concepts believed to be important indicators of an understanding of oppression and privilege. The input from the WGSS experts also guided the vignette towards a situation that would be familiar and unremarkable to the public eye, which means that even identifying the underlying problem in the scenario would require some knowledge of oppression and privilege.

The concept that was ultimately pursued for the vignette was based on a recent personal experience of one member of the research group. The personal experience was rooted in the social construction of gender and masculinity and was adapted and edited to create the final vignette. In particular, the phrasing of the vignette was edited to neutralize the interactions, to not bias a participant's interpretation of the events. It was also divided into four separate sections, each specifically constructed to elicit responses to underlying facets of knowledge relevant to systems of oppression and privilege. Finally, probing questions were generated for each section of the vignette to encourage deeper thought and analysis about the scenario.

Pilot Testing of Instrument. Interviews were conducted with five OSU students (see Table 1 for demographic data). Students were recruited through use of a flyer, and participation was voluntary. The interviews were conducted in person and in a quiet environment. Printed handouts of each section of the case study were provided for participants to read silently before answering questions pertaining to that section. The same main questions were asked of each participant, while follow-up questions were asked at the discretion of the interviewer, to clarify or expand on any topics mentioned but not fully explored in the initial response to the main question. The handout containing the subsequent section was not provided until questioning and discussion about the previous section was completed. Each interview was recorded and transcribed for analysis. Note that participants and their associated transcript were assigned a code (S1-S5) in order to protect confidentially.

Analysis of Pilot Results. The constant comparison method [13] was used for analysis. This method consists of working methodically through sets of data and creating codes to tag 'incidents' (in this case, phrases or patterns of thought). The codes are then compared and generalized to create categories. The theory is consistently revised as more codes are created; however, as it progresses the process begins to evolve and incidents are eventually coded based on the properties of the categories that have been developed [13]. In this study, common

Table 1. Demographic data of participants

Assigned code	Gender	Race	Major
S1	Woman	Asian	Bioengineering
S2	Man	White	Bioengineering
S3	Man	White	Tourism, Recreation and Adventure Leadership
S4	Woman	White	Women, Gender and Sexuality Studies
S5	Man	White	Kinesiology

dimensions of understanding were identified and then used to inform where an individual lies on a spectrum of knowledge and understanding of oppression and privilege.

Results and Discussion

There are two main products of our study: (1) the instrument itself; and (2) the analysis and conclusions generated from the pilot interviews. Each is discussed below.

The Instrument. The vignette involves four college-aged students (two men and two women) facilitating an engineering summer day camp for middle school students. As mentioned above, the vignette was divided into four sections and each section was worded carefully to elicit responses to specific underlying facets of knowledge relevant to systems of oppression and privilege: (i) social construction of gender and masculinity, (ii) systems of power, (iii) gender roles, and (iv) co-optation and power dynamics (see Table 2.).

The vignette is based on interactions experienced by members of the research team to ensure authenticity and credibility. The individuals are explicitly assigned gender to clarify the gender-related power dynamics in the scenario. For some participants, Anushka's gender may not be implied in the first part of the vignette, but this is clarified in the second part when she and Holly are referred to as "the two women." Names were chosen with the intention of providing participants a chance to reflect on or discuss the potential importance of race or ethnicity on the socially constructed concepts at play in the scenario. In addition, the purpose of the research requires that the ill-structured problem (vignette) represents multiple, equally valid perspectives. To achieve this while maintaining the important contrast between Brett and the other characters, we prioritized using factual or neutral language (for example using "said," or "responded" in place of more descriptive language like "claimed" or "whined"). By saying that Brett "ended up" between his colleagues and door, or saying that Anushka "raised her voice to match Brett's" we were able to present the interaction while leaving room for interpretation.

Analysis of Pilot Results. The five participants in the pilot interviews generated a wide range of responses to the vignette and questions. Our analysis focused on characterizing the differences between participant responses rather than identifying correct or incorrect answers. We did this by defining the dimensions along which participant responses varied. This analysis is ongoing, but three of these dimensions are: the depth of knowledge of systems of power, individualism versus systems of power, and having the correct vocabulary to describe each of the previous

Table 2. Excerpts from each of the four sections of the vignette and the correlating concept being explored.

Four sections of vignette	Focus
Anushka, Holly, Jake, and Brett are college students who work as a team to facilitate summer STEM camps … Anushka and Brett were joking around by stopping in front of each other and lightly pushing each other around. One of the campers asked if they liked each other, because she had been told that boys are mean to girls when they like them… Holly and Anushka commented to each other that it was disappointing that kids were being taught that boys express affection through roughhousing…	Social Construction of Gender and Masculinity
… the two women brought the subject up again, citing some research on masculinity and its link with violence, and that teaching kids these patterns could have implications on the way they engage relationships later in life. ... Brett, however, was upset and felt that his coworkers were confusing innocent playfulness with violence…	Systems of Power
Anushka raised her voice to match Brett's. "Violence against women is so engrained in our culture that we don't see it as … Brett looked around the room and then back at her. "Don't get upset. And you really shouldn't raise your voice, we're in front of the students and need to set an example for them."	Gender Roles
… When they moved their conversation, Brett ended up between the door and the other coworkers. Later, Holly and Anushka mentioned the situation to their supervisor, explaining they had not felt completely safe... Brett responded that their accusations made him feel unsafe, and said, "That was just because we had to move out of the way to not disturb the students. Also, I didn't yell at you. Trust me. If I was yelling, you would *know*."	Co-optation and power dynamics

dimensions. Each of these three dimensions will be further described below, along with examples from the five transcripts to explain how the dimensions can be used to pinpoint strengths or weaknesses in knowledge and understanding.

The first dimension that emerged during analysis was the depth of knowledge of systems of power. The research group mainly identified where individual responses fell within this dimension by the extent of accurate examples of systems of oppression the individuals provided. For example, in clarifying their answers, S1 offered multiple examples of the systems involved in maintaining social hierarchies and power structures: family, media, industry, education, and engineering. They consistently went back to how media can contribute to the social construction of difference and interpersonal relationships. On the other extreme, S5 cited no examples of social systems or power structures and did not ever acknowledge the influence of systems of power on this interaction.

The spectrum between an individualistic framework and a systems approach to understanding social, political and economic power distribution was the second dimension identified by the research group during analysis of the pilot transcripts. S4 directly identifies the use of individualistic and systemic frameworks while discussing the different perspectives Holly and

Brett bring to the situation after reading the second section of the transcript, and refers to it throughout the rest of their response.

> We're looking at dynamics of power too, right, and systems of power, systems of privilege and oppression and marginalized people's lived experiences, right? So I'm thinking she's approaching it from – they're both approaching it from a lived experience but just different experiences of those daily lives.

They go on to talk about how Brett seems to move through life with a lot more privilege and is speaking from his own experience, while Holly seems to have a bit more perspective about how systems of power work. S5 did not discuss systems of power at all, which indicates a very low level of awareness and knowledge of this topic.

S2 represents a mid-level knowledge by moving back and forth between individualistic and systemic frameworks for discussing power. They show a deep understanding that Brett is not considering larger systems or patterns at all:

> ...it definitely feels like Brett is really only concerning himself when they talk about the culture as a whole, like the fact that things like hair-pulling and bra snapping are things – it sounds like he only considers or thinks that 'I don't do this so we should stop talking about it.'

However, at some points in the interview they don't seem to grasp the larger cultural lens that is necessary to analyze these concepts, instead focusing on essentialism and the fact that they know people who go against the patterns:

> I think another follow up to Brett's last comment is boys are, well, in my experience girls can be like that too, sometimes boys instigate it more but I think sometimes the joking around or pushing each other around can come in many forms and it's not always just physically pushing each other around, it can kind of be like a mental push around too. Girls and guys can have different levels of experience or strength in either of those.

From this analysis, the spectrum for this dimension is a little more nuanced than the previous two. Understanding of systems of power necessitates the identification of the individualistic framework Brett is operating from in the scenario, while examining the scenario itself from a systems framework (such as in S4's response). Lower levels of understanding would entail an identification of both frameworks but an inconsistency in which they use those frameworks to perform their analysis (as is evident in S2's transcript), while the lowest level of understanding would analyze the situation from an individualistic framework while not acknowledging the larger systems of power (S5).

Another dimension identified by the research team to be important in qualitatively benchmarking an individual's conceptualization of oppression and privilege is the language they use to describe topics of social justice. Understanding the topics without having the correct succinct language to describe them is similar to describing an object moving in physics without knowing the vocabulary 'velocity' and 'acceleration.' The language used to talk about these concepts can

inform how well they are actually understood and internalized. The spectrum for this dimension is fairly clear: the research team mainly looked for vocabulary including the concepts and frameworks introduced by social justice scholars [14-16]. At the high end of understanding, individuals consistently identify and correctly use specific vocabulary related to the concepts they are discussing. This was demonstrated by S4, who consistently and correctly used vocabulary such as white supremacy, power dynamics, systems of power, privilege, microaggressions, marginalized, social construction, binaries, among others. On the other end of the spectrum, S5 does not really get the opportunity to use any pertinent vocabulary because they do not identify the key concepts playing into the vignette.

Conclusion and Recommendation

The vignette and guiding interview questions that were developed hold promise to evolve into an effective instrument to assess an individual's conceptualization of oppression and privilege. Analysis of responses to the vignette provide many insights that would not be possible to get from a survey or questionnaire. The instrument needs to be administered across a broader group of individuals in order to ensure data saturation and instrument validation. In addition, the instrument would be enhanced by adding probes and making slight adjustments to the vignette itself (for example, giving the fourth coworker a gender-neutral name (like Taylor, Sage, Alex) and removing pronouns attached to them so that participants could assign gender to this person). Further, creation of one or more additional vignettes could be developed to explore concepts other than gender and masculinity, or to target particular contexts such as engineering education and practice or a business situation.

Acknowledgements

We acknowledge the support provided by the National Science Foundation through grant EEC 1519467. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

References

[1] M. Bothwell, P. Akkaraju, J. McGuire, T. Tran and A. Zigler, "Advancing the College of Engineering Strategic Goal of Becoming a National Model of Inclusivity and Collaboration," *Proceedings of the Collaborative Network for Engineering and Computing Diversity Conference*, 2018.

[2] D. Matsumoto and H. C. Hwang, "Assessing cross-cultural competence: A review of available tests," *Journal of Cross-Cultural Psychology*, vol. 44, no. 6, pp. 849-873, 2013.

[3] I. Halloun and D. Hestenes, "Common sense concepts about motion," *American Journal of Physics*, vol. 53, no. 11, pp. 1056–1065, 1985.

[4] R. Streveler, S. Brown, G. L. Herman, and D. Montfort, "Conceptual change and misconceptions in engineering education," in *Cambridge Handbook of Engineering Education Research*, A. Johri and B. Olds, Eds. Cambridge: Cambridge University Press, 2014, pp. 83-102.

[5] R. Streveler, T. A. Litzinger, R. L. Miller, and P. S. Steif, "Learning conceptual knowledge in the engineering sciences: Overview and future research directions," *Journal of Engineering Education*, vol. 97, no. 3, pp. 279-294, 2008.
[6] P. S. Steif, "An articulation of the concepts and skills which underlie engineering statics," *Proceedings of the IEEE Frontiers in Education Conference*, 2004.
[7] Foundation Coalition, [Online]. Available http://www.foundationcoalition.org/ [Accessed Dec 3, 2018].
[8] M. Limón Luque, "The role of domain-specific knowledge in intentional conceptual change," in *Intentional Conceptual Change*, G. M. Sinatra and P. R. Pintrich, Eds. Mahwah, NJ: Lawrence Erlbaum Associates, 2003, pp. 133-170.
[9] R. Säljö, "Concepts, cognition and discourse: From mental structures to discursive tools," in *New perspectives on conceptual change*, W. Schnotz, S. Vosniadou, and M. Carretero Eds. Bingley, UK: Emerald Group Publishing Limited, 1999, pp. 80-91.
[10] P. M. King, and K. S. Kitchener, "Reflective judgment: Theory and research on the development of epistemic assumptions through adulthood," *Educational Psychologist*, vol. 39, no. 1, pp. 5-18, 2004.
[11] K.S. Kitchener, "Cognition, metacognition, and epistemic cognition," *Human Development*, vol. 26, no.1, pp. 222-232, 1983.
[12] P. C. Beatty, and G.B. Willis, "Research Synthesis: The Practice of Cognitive Interviewing," *Public Opinion Quarterly*, vol. 71, no. 2, pp. 287–311, 2007.
[13] B. G. Glaser, "The constant comparison method of qualitative analysis," *Social Problems*, vol. 12, no. 4, pp. 436-445, 1965.[14] M. Adams, W.J. Blumenfeld, C. Castañeda, H.W. Hackman, M. L. Peters, and X. Zúñiga, Eds., *Readings for Diversity and Social Justice* (Third edition.). New York: Routledge Taylor & Francis Group, 2013.
[15] A. G. Johnson, *Privilege, Power, and Difference* (Third Edition). New York: McGraw-Hill Education, 2018.
[16] P. Hill Collins, "Toward a new vision: Race, class and gender as categories of analysis and connection," *Race, Sex and Class*, vol. 1, no. 1, pp. 25-45, 1993.