"Current is the one that's mean": The development of engineering student trajectories of identification

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Abstract: The role of identity construction in learning to become an engineer is explored through the examination of ethnographic interviews over the course of four years and video data from group-work in engineering senior design projects. Focusing upon engineering students' identity development within the figured world of engineering we trace the development of trajectories of identification. We focus upon what can be traced over time along trajectories of identification in becoming an engineer.

Introduction

Our poster describes identity development along trajectories of identification (Wortham, 2006) of engineering students in the context of learning to become an engineer. Through the examination of ethnographic interviews across four years and discourse analysis of video transcripts, we trace the trajectory of identification of two engineering students, Colin and Simon. In our analysis we highlight some features of talk focusing upon the content of responses to questions, and some themes that we can trace across students' trajectory of identification. We argue that becoming an engineer involves appropriating the behaviors within the figured world (Holland et al., 1998) of the occupation of engineering, and developing a sense of individual agency within that figured world.

Methodology

The present analysis is drawn from data derived from the Academic Pathways Study (APS), a multi-year, multi-method study that spanned four academic institutions in the United States. The ethnographic aspect of the Academic Pathways Study has worked with 16 engineering students on each of the four campuses involved in the study. Of the 16 students on each campus, 8 students (4 female and 4 male) were selected to be involved with more intimate ethnographic work involving observations of classes, study groups, and other on-campus activities. In a few cases we were able to obtain video and/or audio data from engineering students' work on their senior design/capstone projects. The APS has used a variety of ethnographic methods in a variety of engineering education contexts: ethnographic interviews and focus groups with engineering students; the observation of engineering spaces and engineering activities within the College of Engineering on campus (e.g. career fairs, meetings about the application process); ethnographic observations both in and out of class; and the analysis of official and unofficial texts from the College of Engineering (e.g. handouts about the application process, course syllabi, guides on getting through the major produced by students). The present study works with two aspects of this methodology – longitudinal ethnographic interviews and video data from senior design and capstone projects.

Identification

An important part of our ethnographic work on the APS project is how identity develops over time. The approach we follow for identity development is similar to Wortham's (2006) discussion of trajectories of identification, which enables one to consider how identification is a process that develops across events, contexts, and timescales (Lemke, 2000) in conjunction with academic learning. This developmental approach enables us to focus upon how students within our study become engineers along divergent trajectories and to consider identity as an on-going process. Some questions we consider are how/when do students maintain an engineering identity (O'Connor et al., 2007; Garrison et al., 2007)? What makes up and influences that identity (Stevens et al., 2005)? What experiences outside of the curriculum have fostered the growth of such an identity? We have focused our attention on the double-sidedness of identification: the identity one projects and the identity as perceived through such projections by others.

Holland et al. (1998) have argued that in a similar manner to how nation-states create imagined communities (Anderson, 1983), other aspects of lived experience are also imagined. In this case we are referring to the occupation of engineering as a figured world – socially and culturally constructed spaces where meanings are attributed to social actors and value placed on certain actions. Engineering students engage in and appropriate from instructors, mentors or internship supervisors, the behaviors of their future occupation during coursework, internships or co-ops, and most importantly working with their peers on group projects during a senior design project or capstone course. Through such interactions they develop identities that involve such practices as constructing circuit boards for an amplifier or designing an aircraft.

Case One: Colin

One of the features of Colin's trajectory of identification that emerges over time is his use of technical language during ethnographic interviews. Here we emphasize that over time, as we follow the emergent trajectory of identification in Colin's engineering education, he reaches a point where he can *talk engineering*. By *talk engineering* we are referring to his use of scientific technical jargon in order to explain electrical engineering concepts. Over time we notice that Colin's ability to talk engineering is enhanced through his use of anthropomorphic referents such as *mean*, *hungry*, and *eat* in discussing technical electrical engineering concepts.

Case Two: Simon

In terms of Simon's trajectory of identification we also notice that his ability to *talk engineering* emerged more significantly over time. However, the context through which this developed in Simon was different. Whereas Colin learned talk engineering through coursework, Simon had the advantage of working in an engineering lab on campus where he performed actual engineering work, working alongside both engineering students and professional engineers. We also observe how his navigational practices (the various practices involved in navigating through an engineering program) perform an important role in creating networks that we can trace along his trajectory of becoming an engineer.

In tracing the trajectories of identification of two engineering students we note some of the differences that emerge in both their discourse and their actions. Colin's trajectory emerged with his ability to *talk engineering* in two disparate contexts, the ethnographic interview and lab interaction amongst his electrical engineering peers. Simon's trajectory of identification was also marked by his ability to *talk engineering*. Yet while his use of scientific jargon was present in interaction with his peers, his trajectory was also marked by his developing navigational practices, e.g. working in an engineering lab on campus. Trajectories of identification enable us to perceive how the figured worlds that students aspire to be a part of are highly relative. That is, while there are similarities, the differences in both discourse and action reveal how figured worlds are imagined.

References

Anderson, B. (1983). *Imagined communities*. London: Verso.

Garrison, L., Stevens, R., Sabin, P., & Jocuns, A. (2007). Cultural models of the admission process in engineering: Views on the role of gender. *American Society for Engineering Education Annual Conference*, Honolulu, Hawaii.

Holland, D.C., W. Lachiocotte, D. Skinner, and C. Cain. (1998). *Identity and agency in cultural worlds*. Cambridge, Massachusetts: Harvard University Press.

Lemke, J. (2000). Across the scales of time: Activities, artifacts, and meanings in ecosocial systems. *Mind, Culture, Activity*. 7, pp. 273-290.

O'Connor, K., Amos, D., Bailey, T., Garrison, L., Loshbaugh, H., Jones, M., Seward, D., Perhamus, L., & Stevens R. (2007). Sponsorship: Engineering's tacit gatekeeper. *American Society for Engineering Education Annual Conference*, Honolulu, Hawaii.

Stevens, R. & Hall, R. (1998). Disciplined perception: Learning to see in technoscience. In M. Lampert & M. L. Blunk (Eds.), *Talking mathematics in school: Studies of teaching and learning* (pp. 107-149). Cambridge, UK: Cambridge University Press.

Stevens, R., Amos, D., Jocuns, A., & Garrison, L. (2007). Engineering as lifestyle and a meritocracy of difficulty: Two pervasive beliefs among engineering students and their possible effects. *American Society for Engineering Education Annual Conference*, Honolulu, Hawaii.

Stevens, R., O'Connor, K., & Garrison, L. (2005). Engineering student identities in the navigation of the undergraduate curriculum. *Association of the Society of Engineering Education Annual Conference*, Portland, Oregon.

Wortham, S. (2006). *Learning identity: The joint emergence of social identification and academic learning*. New York, NY: Cambridge University Press.

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