article:2315

An Investigation of the Presence and Development of Social Capital in an Electrical Engineering Laboratory

The purpose of this paper is to investigate social capital in an electrical engineering laboratory through in-depth observational and interview qualitative research techniques. Social capital has been studied extensively in fields outside of education, including sociology, economics, business, and political science. The definition utilized in research is as broad and diverse as the fields in which it has been applied. Nearly all definitions of social capital include three aspects: networks, norms, and sharing of resources. Networks are connections among individuals, norms are informal rules of engagement within a group of people, and resources are valued assets that can be mobilized through the networks and facilitated by the social norms. Of the three facets of social capital, the most contention regarding definition and role is social norms. Francis Fukuyama believes that norms are fundamental to social capital in his partial definition, instantiated informal norm that encourages cooperation among individuals. Others argue strongly that norms are either an input or result of social capital, but not inherent in social capital. In other words, norms can be a catalyst or inhibitor of social capital, and interact with social capital, but are not social capital. For purposes of this work, social capital includes networks and resources and utilizes the framework put forth by Nan Lin, “Resources embedded in social networks that are available and accessed by members of that network.”

The resource of interest in this research is information. In the business setting, access to information is vital to productivity and competitive advantage. Studies have shown that employees are much more likely to go to each other than a non-human source for information important to completing a project. For this work, the resource of interest is information that is useful in learning concepts and completing laboratory assignments in a junior-level electrical engineering course. Social capital has been studied extensively in education and found to be positively associated with retention and academic achievement in both secondary and post-secondary educational settings. Social capital theory has not been applied in an engineering education laboratory setting and in-depth qualitative methods have not been used to investigate social capital in this setting.

Two research questions were investigated. Is social capital present in this research setting, as indicated by the presence of students accessing information through social interactions? What factors encourage or discourage the formation of social capital in the laboratory setting? Data collected includes a student survey measuring social capital and sense of community, student laboratory assignments, observations of students over the course of the term in the laboratory setting, and student interviews. This combination of data was analyzed using the constant comparative method, an iterative process where interpretations are constantly developed, tested, and refined, until the author is convinced that the data supports a specific interpretation

more than other interpretations investigated.

The research was conducted in a land-grant institution in the northwest United States. The course studied is a junior level electrical engineering design course where students utilize a student-constructed robot that they program and modify to do pre-determined tasks. Social capital was clearly present in the laboratory setting as evidenced from extensive interactions that were largely relevant to completing the laboratory assignments. The presence of social capital was further validated through student interviews reporting that information sharing was prevalent and vital to completing the required assignments. Factors that appeared to contribute to the development of social capital include the nature of the assignments and equipment and the availability of information relevant to completing these assignments. The students were working with a self-constructed robot prone to problems, resulting in a consistent need for troubleshooting. Additionally, the laboratory assignments were challenging, open-ended, and contained multiple unclear aspects and mistakes. Students required information to complete these assignments, but this information was not available online or in the laboratory handouts. Also, generally speaking, the teaching assistants provided little specific guidance. As a result, information sharing was necessary among students to successfully complete the laboratory assignments.

The transferability of these results is largely based on the user and it is up to the user to determine if their context and setting are comparable to the one in which this research was conducted. Future work could apply this model to other settings and determine if it is valid in when some of the factors are different. For example, are student interactions commonplace in a challenging open-ended environment with good teaching assistant resources?

Author 1: Shane Brown; shanebrown@wsu.edu
Author 2: Larry Flick; flickl@science.oregonstate.edu
Author 3: Terri Fiez; terri@eecs.oregonstate.edu

Article Link: http://www.asee.org/jee

: Back to 2009 Spring/Summer Issue Vol. 4, No. 3

: Back to List of Issues

: Back to Table of Contents