

# Chapter 17

## Community Engagement in Engineering Education: Needs and Learning Outcomes

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### ABSTRACT

*Engineers usually manage development projects such as dams, weirs, and bridge constructions. All of which require community engagement at least during the planning and construction stages of the project. All projects of this nature undertake mandatory or voluntary Environmental Impact Assessments (EIA) before commencing the on-ground activities. Therefore, an engineer is no longer just an engineer but also a development professional. They have to understand the role of the community in project development, and must understand the principles and processes of community engagement. Engineers need to be properly trained for community engagement during either undergraduate or post-graduate education or a similar standing of professional training. The purpose of this chapter is to give an outline of the key principles and processes of community engagement. It also highlights the need for community engagement components in curricula and its learning outcomes in engineering education.*

### INTRODUCTION

An engineering graduate's career path will often see them working as project manager for different stages of project planning, construction, operation, and maintenance. Engineering projects such as

dams, weirs and bridge construction, mine development, gas pipe line installations, road or highway development, power station development, wind power generation, railway installation, airport and tunnel construction, all require community engagement in both the planning and construction stages (Akbar, 2011a). Projects of this nature cannot commence without mandatory or voluntary

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Environmental Impact Assessments (EIA). An EIA examines the project scope and impacts before the project starts. Additionally, most public projects aim to deliver specific and cumulative benefits to the community; hence, it is imperative to engage the community in a manner that will incorporate their voice and knowledge into the project designs. This will ensure the project delivers the outcomes sought by the project proponents or government.

Engineers manage most development projects, for this reason, they require learning processes, principles and tools for community engagement. Engineers need to be adequately trained for community engagement as most undergraduate engineering programs do not have a dedicated course. The purpose of this chapter<sup>1</sup> is to give an outline of key principles and processes of community engagement; it also highlights the need for community engagement components in engineering education curricula and learning outcomes. The paper is structured to include firstly, an overview of meaning, principles, process and evaluation of community engagement. Next is a discussion about the challenges and benefits of community engagement in engineering project management. This is followed by an account of the need and learning outcomes of community engagement in engineering. Finally, the importance of community engagement content in engineering education and its future direction is discussed.

## **COMMUNITY ENGAGEMENT**

The word ‘community’ is a very broad term used to define groups of people, whether they are a social or business group in a certain geographic location (Adomokai & Sheate, 2004). A community includes both a geographical and a social component, its size varying over geographic scales and social bonds. The geographical component refers to a specific place such as a community bounded by a particular jurisdiction, for example

a tribe. The social component refers to relationships between people, including shared beliefs, customs and interests, and a sense of belonging. Characteristics of a community may be based upon ethnicity, gender, religion, or a mutually shared issue or value.

Community engagement involves communicating with a group of people and facilitating responses to encourage community members’ opinions. Community engagement therefore creates and demands a context conducive to public communication. The goal is to enable project proponents to make decisions that reflect representative opinions regarding social and civic benefits (Johnston, 2007). The core message of community engagement is generating interactions between people. These interactions include a variety of approaches, such as one-way communication or information delivery, consultation, collaboration in decision making processes, and empowered action in informal groups or formal partnerships (Cavaye, 2004a).

Community engagement ensures the needs of those directly affected by any development project are considered. In most cases, community input has been found to improve the final project outcomes. This is achieved by mitigating any undesirable effects, or by finding a compromise when there is competing interests. Hamstead, Baldwin, and O’Keefe (2008, p. 142) identified the following roles of community engagement in project planning and development:

- inform about process and resources,
- build capacity and awareness,
- gain local knowledge of resources and use,
- understand values, concerns, and aspirations,
- seek alternatives and solutions, test options,
- identify and agree on appropriate criteria,
- improve the decision or outcome,
- provide feedback on public input,
- influenced the decision,

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