

# DEVELOPMENT OF A COLLABORATIVE PROCESS MAPPING ACTIVITY TO IMPROVE STUDENTS' BIM PROCESS MAPPING UNDERSTANDING

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## 1 BACKGROUND AND IDENTIFICATION OF PROBLEM /KNOWLEDGE GAP

Even though BIM education is common, one of the major issues observed is a lack of understanding of strategic BIM implementation (Wu et.al 2013). In academic settings, BIM is often recognized as simply digital design, which does not directly incorporate learning tasks related to developing a BIM process for implementation on a project (Wang 2014). Thus, enhancing the students' understanding about the BIM process has the potential of adding real and measurable value to the students' professional career. This work focuses on enhancing the learning process of BIM Project Execution Planning (PxP) through an activity related to process mapping.

## 2 RESEARCH AIM AND METHODOLOGY

A fourth-year project management course, "CON 453 – Project Management 1" offered at Arizona State University (ASU) was utilized for this study. Students from both Construction Management and Construction Engineering disciplines comprised the student body of CON 453. The curriculum of this course integrates BIM planning and execution with multiple construction delivery methods to develop the managerial capabilities of the student. In recent years, BIM Project Execution Planning (PxP) (CIC, 2010) was added to the course curriculum to enable students to define processes to support successful BIM implementation. Various teaching methods were introduced to enhance the students' understanding of BIM PxP development over the course of several years (Beauregard et. al. 2016). The previous method had no significant impact on students' perception of their own learning process. Additionally, it was observed that the students often did not demonstrate their ability to use Business Process Mapping Notation (BPMN) symbols. The activity was implemented as follows:

1. Pre-Activity Lecture
2. Pre-Activity Assessments
3. Process Mapping Activity

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#### 4. Post-Activity Assessments

The data analysis was based on students' perception about their own knowledge and based on the observations made by the authors. A two-tail probability distribution approach was used to find the statistical significance of the data.

### 3 RESEARCH FINDINGS

A p-value less than 0.05 for the paired question 'Rate your ability to create process maps' indicates significance at the 95% confidence level that the students perceived a positive impact on their ability to create Process Mapping Dialogue Box after participating in the process mapping activity. No significant perception shift was observed from among the other paired questions. The created process maps were analysed by considering the usage of BPMN.

Table 1: Evaluation Summary for Collaboration Activity (Spring 2016)

Questions	Level 1	Level 2
Use of BPMN notations	75%	83.33%
Mentioning stake holders	91.66%	50%
Communication across the swim lanes	50%	75%

From pre- and post- questionnaires, it was observed that the students felt that their ability to create a process mapping dialogue box increased upon completion of the activity. No significant perception shift was observed from other paired questions. The main observed points led to the conclusion that students found it hard to participate in this activity as they may not have understood the process mapping language.

Future studies will be conducted to address the educational shortcomings with the findings of this work. A process mapping activity can be conducted for other BIM uses or other processes that are more easily understood by students. This may help students to grasp process mapping better before trying to plan for complex BIM tasks. Finally, a consistent grading rubric will be developed for analysing the process maps to evaluate shifts in students' abilities during different semesters.

