


Incremental Learning in a Capstone Project: Not All Mature Students Are the Same

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ABSTRACT

Organizations are moving away from rigid planning to a more incremental style of planning and execution in projects. There is a growing acceptance of the effectiveness of incremental change, both in industry projects and in student projects, as a development method and as a learning approach. This, though, may not bring a universal benefit to all students. As enrolments in information systems degrees decrease, an increase in the number of mature students has the potential to counter this decrease in enrolments, but mature students need a different learning and teaching approach. This paper examines the impact of the adoption of an incremental, or iterative, approach in a capstone project for mature students. In the same way that there is not a single type of mature student, there also is no common set of impacts on mature students through the use of an incremental approach to learning and development.

KEYWORDS

Capstone Project, Incremental Learning, Mature Students, Self-Direction, Teacher-Dependent

INTRODUCTION

Short iterations, where a project is worked on incrementally, is referred to as emergent planning or rolling-wave planning. It starts with a high level plan, the details of which are filled in as learning increases in the project (Collyer, Warren, Hemsley, & Stevens, 2010). The learning process and knowledge creation is analogous to the software development process (Rajlich & Xu, 2007), where knowledge is built incrementally. Wynn and Eckert (2017) make the pertinent point that iterative projects allow continuous learning and prevent the problems seen in non-iterative projects, when it is too late to learn when the project is over.

In a university setting, the concept of iterations is also relevant when it comes to students' learning. Incremental learning involves creating new learning by building on existing learning (Nkhoma, Lam, Richardson, Kam, & Lau, 2016). This is also referred to as incremental gains in knowledge (Tao, Yeh, & Hung, 2015). While the benefits of building in increments in a learning context are now recognized, what is not clear is if these benefits apply to all types of students. In their review of research on generational learning, Oh, Ricciotti, and Cianciolo (2018, p.349) make the argument that differences between generations "necessitates continual reconsideration of educational practices." The purpose of this paper is to examine if the benefits of an iterative approach apply to mature students

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in the same way that existing research argues that it benefits traditional students. This is done by examining a final year development project which changed to an iterative approach.

BACKGROUND

Software development methods such as Agile evolved from the principles of Lean manufacturing which create an environment of continual improvement, adapting to change, and learning from mistakes (Mor, Singh, & A, 2016). These techniques are now taught to university students and its benefits to learning have been demonstrated. Harris (2016) used a simulation of manufacturing practices in a class of mature students, and this experiential learning was found to be effective. The concept of iterative software development evolved from manufacturing and promotes continuous learning through short iterations, feedback, and frequent change (Poppendieck & Cusumano, 2012). Projects using short iterations have benefits for student learning in technology-based university courses. There is an assumption, though, that all students doing projects will benefit from this iterative approach; this paper examines and challenges that assumption.

Mature Students

Current research into education in the information systems domain would typically be on traditional students [although this term is becoming more of a misnomer with Chung, Turnbull, and Chur-Hansen (2017) arguing that it is difficult to define exactly what non-traditional means]. What would be described as a “typical student” is a student who progressed from their second level education (high school or secondary school depending on the country) straight into an undergraduate degree. Non-traditional usually refers to mature students and are differentiated from traditional in that their path to university did not follow this traditional path of entering university (Cantwell, Archer, & Bourke, 2001; Cullity, 2006; Iloh, 2018). In this paper, we follow Heagney and Benson (2017) and Dawborn-Gundlach and Margetts (2018) definition of a mature student as a student over the age of 25.

Most developed countries are seeing a new grouping of students who, for a variety of social, economic, and cultural reasons, may not have previously applied for universities (Hassel & Ridout, 2018; Scheutze & Slowely, 2002). There have been huge increases in the number of mature students attending higher education (Forbus, Newbold, & Mehta, 2011; Hassel & Ridout, 2018; Justice & Dornan, 2001). This does not come without challenges. While mature student modes of entry to university give students a second chance (Cantwell et al., 2001), this is creating new difficulties for universities in how to meet their education needs (Scheutze & Slowely, 2002).

For example, some commonly agreed problems facing mature students include:

- Attrition rates in mature students are still higher (Hassel & Ridout, 2018), so teachers need to take into account that there will be differing learning styles between traditional and mature students (Faulkner, Fitzmaurice, & Hannigan, 2016; Kenner & Weinerman, 2011). It is worth noting that learning styles is under-researched in information systems education (Cegielski, Hazen, & Rainer, 2011) and there is even debate as to whether there is adequate evidence that learning styles can be applied in assessments (Pashler, McDaniel, Rohrer, & Bjork, 2008).
- An adult entering university usually constitutes a major life change. This, along with the additional stress of applying, enrolling, and attending classes, can lead to mature students feeling worried and unsure as they confront the new changes (Hardin, 2008).
- Mature students will often have a limited formal education and less opportunity to develop test-taking skills (Merriam, 2001) than traditional students who have taken tests for the majority of their life.
- Many mature students have existing responsibilities as parents and partners and the addition of their student responsibilities can be stressful. Additionally there may be an increase in financial

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