Impact of Immersion on Task Performance, Satisfaction, Perceived Complexity and Knowledge Acquisition in Business Analytics Context

Emergent Research Forum Paper

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Abstract

As Business Analytics applications permeate across various industry sectors, employees need to be trained and upskilled to meet the challenge of understanding, developing and implementing the analytics methodologies. It is, therefore, critical to understand how and whether individuals immerse themselves when working on team-based analytics projects. This study builds a conceptual model that could be tested in an experimental setting on how focused immersion impacts task performance, perceived task complexity, knowledge acquisition and satisfaction.

Keywords

Business Analytics, Immersion, Task Performance, Satisfaction, Perceived Task Complexity, Knowledge Acquisition

Introduction

Business analytics (BA) has attracted increasing interest among both practitioners and academia due to its strong potential for effective decision making and improving performance (Dubey and Gunasekaran, 2015). According to a recent report, worldwide revenues for BA are projected to grow 50% over the next five-year forecast period (IDC 2015). Organizations have demonstrated an increased willingness to invest in building improved analytical decision-making capabilities, which is reflected through the revenue growth in the business analytics market. Therefore, organizations as well as higher education institutions need to retrain and upskill students and employees for advanced technical, and analytical and business skills (Halper 2015; Forfas 2014).

But, both corporate and academic training in BA are facing various challenges. Inappropriate use of technology at work leads to several detrimental effects such as information overload, diminished performance, etc. (Tarafdar et al. 2015) A majority of corporate BA training lacks emphasis on team collaboration and an immersive experience. As reported by DeSmet, McGurk, and Schwartz (2010), many employees are not engaged in corporate training events and behave as if they are prisoners (“I am here because I have to be”) or vacationers (“I don’t mind being here—it’s a nice break from doing real work”).
BA training that is offered is largely more focused on the functionality of BA tools and less on the specific training needs of employees. Trainers focus mainly on transfer and acquisition of skills at an individual level rather than on the collaboration among learners, through which enhanced learning outcomes emerge (Lim et al. 1997). These problems pose serious challenges to learning outcomes and knowledge acquisition as analytics requires engagement at various levels. Thus, the research question that we address in the proposed study is: Does an immersive experience in a collaborative analytics learning environment lead to an improvement in knowledge acquisition, satisfaction and performance?

**Literature Review**

Situated cognition, social learning, and goal setting theories provide theoretical foundations for developing a better understanding of the impact of immersion on performance and satisfaction in the context of BA learning. Focused immersion describes the experience of total engagement where other attentional demands are essentially ignored (Agarwal & Karahanna, 2000). It represents a state experienced by a person giving full attention to the task in which he or she is involved (Shin, 2006). Prior research has demonstrated that in the state of focused immersion, an individual may experience flow, which might lead to increased learning (Csikszentmihalyi 1990). Examples of studies that report such findings are Hoffman and Novak (1996), Ghani (1994), Webster et al. (1993).

Situated cognition theory views cognition as strongly tied to a specific context where a task or activity occurs (Vera and Simon 1993). Social learning theory emphasizes that three elements, individual learners, peers, and situations, potentially influence an individual's learning outcome. Individuals' observations and interactions with peers and situations affect their cognition and then behavior (Bandura 1977). Both situated cognition and social learning theories help understand how individuals' interaction with other learners and with a real-world context affect their cognition (i.e. focused immersion) in a collaborative analytics learning environment. Goal setting theory indicates that affect (satisfaction) is caused when an individual perceives that an object facilitates or hinders the attainment of his/her goal (Locke and Latham 1990). This theory is used to illustrate the relationship between focused immersion and task satisfaction, which is generated when an individual perceives that an object facilitates the attainment of goals (Locke and Latham 1990).

A collaborative analytics learning environment refers to a setting where (1) BA learners participate in small-group data analytics projects, (2) learning is active and BA learners should take responsibilities for their learning, (3) BA learners are stimulated to reflect on their own thought processes of how to address a data analytics problem, (4) team and social skills are developed through give-and-take consensus building, and (5) the BA trainer behaves more like a facilitator in a training course (Kirschner 2001).

**Theoretical Background and Hypotheses Development**

Figure 1 describes the proposed research models for the study.

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**Control Variables**
- Gender
- Task Motivation
- GPA

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![Diagram of research models for the study](image-url)
Figure 1. Research Model

Focused Immersion and Task Performance

An individual experiencing focused immersion focuses on stimuli relevant to the current pursuit (Lowry et al. 2013). This implies that an individual’s attention will be focused on completing the task at hand. Any distracting stimuli in the environment that may divert attention from the task might be ignored in the presence of high immersion. As such, the attentions do not have to be narrowed to balance the focuses on the task and distracting stimuli. Instead, focused immersion brings attention to both central and peripheral cues of the task, thus generating better task performance. This brings us to the following hypothesis:

H1: Focused immersion is positively related to task performance in a collaborative analytics learning environment.

Focused Immersion and Perceived Knowledge Acquisition

Perceived knowledge acquisition refers to the learning of concepts, principles, issues, and facts presented in a learning situation (Alavi et al. 2002). Once immersed, an individual assimilates information gathered through interactions with the environment and others within the environment into his/her own mental model. When the refinement is complete, the individual’s knowledge structure is changed, thus learning occurs (Alavi et al. 2002). Therefore, we propose the following hypothesis:

H2: Focused immersion is positively related to an individual’s perceived knowledge acquisition in a collaborative analytics learning environment.

Focused Immersion and Perceived Task Complexity

Perceived task complexity refers to the level of task complexity perceived by individuals (Li et al. 2011; Wood 1986). Task complexity describes the relationship between task inputs–distinct acts required to be executed in performing the task-- and distinct information cues that need to be processed in the performance of the acts (Wood 1986). The intrinsically motivated state of focused immersion creates a lower perception of cognitive burden because immersed learners are willing to invest more efforts in the task itself (Deci and Ryan 1985), and fewer attentional resources are expended on thinking about the task performance. This reduces the perceived amount of actions and information cues executed by learners. Hence, we hypothesize that:

H3: Focused immersion is negatively related to perceived task complexity in a collaborative analytics learning environment.

Focused Immersion and Task Satisfaction

Task satisfaction consists of two dimensions: process satisfaction and outcome satisfaction (Reinig 2003; Dennis et al. 2001). Process satisfaction is concerned with the extent to which participants are content with the procedures, deliberations, and methods used by the group throughout the task (Reinig 2003) while outcome satisfaction relates to the overall attitude about task output, including whether team members agree on the decisions they made, and whether they think the results are effective (Chidambaram 1996).

Goal setting theory indicates that satisfaction with both process and outcomes is caused by the perceived net goal attainment (PNGA) (Reinig 2003). Positive PNGA results in a positive amount of satisfaction, while a negative PNGA results in negative amount of satisfaction. Once mentally immersed in a BA task, learners will focus attention on assimilating newly obtained information from the context and refine their prior mental model. Once such refinement happens, learning occurs (Goel et al. 2010). Since learners are said to have learned, we believe that the PNGA is positive as the benefits (e.g., acquire new knowledge) of fulfilling the goal exceed the costs (e.g., time, information search) of attempting to fulfill the goal (Reinig 2003), which leads to satisfaction with the task. We propose:
H4a: Focused immersion is positively related to process satisfaction in a collaborative analytics learning environment.

H4b: Focused immersion is positively related to outcome satisfaction in a collaborative analytics learning environment

Research Method
A collaborative analytics learning environment was designed to facilitate a real-world data collection. The experiment was executed in partnership with a local city government agency. 184 undergraduates in an introductory BA course participated in the experiment and were randomly divided into 66 groups. The students worked in small groups with 2-3 group members to complete a real-world task that includes all phases of an analytics-driven project starting from data acquisition to data analysis. During the experiment, students were free to discuss issues with their group members and search for relevant resources to complete the task. The BA instructor was only responsible for organizing and coordinating the experiment. After completing the experiment, students were asked to fill out a questionnaire constructed to evaluate their learning experiences. Quantitative data measuring the variables in the research model were collected using this questionnaire and ratings used by the instructor were also collected. In the future, this data will be analyzed using a structural equation model.

Variable Operationalization and Controls
The perceived task complexity construct is measured by 4 items adopted from Maynard and Hakel (1997). Focused immersion is measured by five items adapted from Agarwal and Karahanna (2000). Task performance is measured by the actual scores students received from the instructor after completing the analytics task. Perceived knowledge acquisition is measured using three items adapted from Alavi et al. (2002). Process and outcome satisfaction were operationalized based on the work of Green and Taber (1980). All items are measured on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). We also included three control variables: gender, GPA, and task motivation.

Future Research
This is research in progress. The model is being tested with data collected from the experiment across two semesters. We plan to report the results, findings, and implications in the future.

REFERENCE
Impact of Immersion in Analytics


