Chapter 3
Towards a Flipped Classroom Based on a Context-Aware Mobile Learning System (FC–CAMLSS)

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ABSTRACT
The approach proposed in this chapter called flipped classroom based on context-aware mobile learning system (FC–CAMLSS) aims to provide learners with an adapted course content format based on their feedback and context. The latter has a significant influence on multimedia content in adaptive mobile learning. The contribution was applied in the context of the flipped learning in order to manage the heterogeneity of context imposed by this approach. Firstly, the authors present a quantitative analysis by means of structural equation modeling to analyze the causal relationships of knowledge, skills, and motivation with students’ satisfaction. Secondly, they confirm that the proposed flipped classroom has positive effects on students’ knowledge, skills, and motivation. Finally, the research provides useful results that the use of the context dimensions and learner feedback in adaptive mobile learning is more beneficial for learners especially in the flipped classroom.

INTRODUCTION
Traditional lecture-based teaching approaches are a rather passive form of education in which teachers transfer knowledge to students (McLaughlin, Roth, Glatt, Gharkholonarehe, Davidson & Griffin et al., 2014; Stuart & Rutherford, 1978). In traditional teaching approaches, the expertise of teachers might not be used effectively (van der Vleuten & Driessen, 2014; Wittich, Agrawal, Wang, Halvorsen, Mandrekar

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& Chaudhry et al., 2017), as students are capable of reading and acquiring information on their own (Bergmann & Sams, 2012; McLaughlin et al., 2014). Fully understanding information and applying knowledge in new situations or in assignments is more difficult. In these situations, the presence of a teacher is crucial, because teachers can support critical thinking and show students how to solve problems (Anderson, Rourke, Garrison, & Archer, 2001). In the flipped classroom model, students acquire foundational knowledge for example through watching web-lectures and reading study books (Bouwmeester, de Kleijn, ten Cate, van Rijen & Westerveld, 2016), before deepening and applying this knowledge during in-class assignments such as analyzing case studies and undertaking collaborative group work (Bonnes, Ratelle, Halvorsen, Carter, Hafdahl, Wang et al., 2017; McLaughlin et al., 2014; Moffett, 2015; Prober & Khan, 2013). While some studies indicate that flipped classrooms offer many positive educational outcomes, other studies draw attention to limitations associated with flipped classroom. For example, the majority of flipped classroom challenges are related to out-of-class activities, such as students’ limited preparation prior to class (Sayeski et al., 2015), the students’ need for guidance at home (Hwang et al., 2015), students’ inability to get immediate feedback while they study at home (Cummins et al., 2016; Fautch, 2015; Hardin & Koppenhaver, 2016) and little research has focused on students’ learning outcomes, such as: Students’ in-class activities, teachers’ in-class activities, and students’ workload.

The remainder of this paper is articulated as follows, section 2 presents a theoretical framework to introduce the basic concepts in the field of flipped classroom and context awareness. Then, the design of the proposed model is provided in section 3. In Section 4 we present the main characteristics defining the teaching experience that was carried out, describing in detail the procedure followed, the development of the measurement scale, and the method used to test the scale empirically. Finally the paper concludes in Section 5 with a discussion of the theoretical and the limitations of the study and future research directions.

RESEARCH BACKGROUND

Students’ Motivation in Flipped Classroom

One of the underlying mechanisms contributing to increased performance in flipped classrooms is the intrinsic motivation of students (Persky & McLaughlin, 2017; Sergis, Sampson & Pelliccione, 2018). Following cognitive evaluation theory (a sub theory of self-determination theory), motivation can be enhanced through fulfilling the need for autonomy and competence (Deci & Ryan, 1980). With regard to flipped classrooms, autonomy might be supported by the freedom to choose from different study materials when preparing for class and planning these activities in students’ own time and pace (Bouwmeester et al., 2016). However, the short timeframes in which students need to prepare might hamper this autonomy (Deci & Ryan, 2000; Street et al., 2015).

With respect to competence, formative testing can be implemented in flipped classrooms. Formative testing with extensive feedback as part of pre-class preparation could stimulate student confidence, because the feedback can provide students with insight into their own strengths and help them determine gaps in their knowledge (De Kleijn, Bouwmeester, Ritzen, Ramaekers & Van Rijen, 2013). Other ways to enhance competence is to provide students with positive feedback and acknowledge their contribution during in-class activities (Deci & Ryan, 2000; Persky & McLaughlin, 2017).
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