**Thesis Abstract**

**Analysis and Evaluation of Context-Based Learning in the Sciences, Integrating the Use of Cell Phones**

**Research Subject and Goals**

This study examines context-based learning in the sciences integrating the use of cell phones. This type of learning combines two methods: the use of mobile devices (such as smartphones, tablets, PDAs, laptops, and other devices) for learning and the connection of study content from academic subjects to the outside world and to the student’s own life.

The research described here will relate to the development, design, implementation, analysis, and evaluation of an intervention unit to be developed specially for this research. The intervention unit will include learning in the field of chemistry for students in post-elementary schools (7th grade) on the subject of “Energy, Temperature, and States of Matter.” The research will also examine the impact of the intervention unit on the development of skills required by learners in the twenty-first century: to learn to know (meta-cognitive skills) and to learn to learn (lifelong learning skills).

The intervention unit will include the integration of technology, learning through video clips, computerized activities, and face-to-face sessions. The difference between this teaching strategy and traditional methods lies in the “how” – the manner in which the content is conveyed – rather than in the “what” – the content itself. The same content appears in the 7th grade syllabus on the subject of “Energy, Temperature, and States of Matter.” However, in this context, the content will be related to real life phenomena and issues in the students’ own world, together with the integration of technology in the learning process. The intervention unit will be accompanied by a “travel log” in which the students will be asked to document any action they perform related to chemistry that includes the use of a mobile device. The students will be asked to submit a written reflection at the end of their experience.

A distinction should be made between two types of context-based activities integrating mobile devices that can be undertaken by students: dedicated activities planned in advance by the teacher and generic activities initiated by the students themselves. The travel log and the documentation it will provide will accompany the student at three distinct points in time: before beginning the intervention unit (two weeks), during the intervention (three weeks), and after the intervention (two weeks). The activities found in the travel logs will be analyzed in accordance with the research framework for characterizing mobile context-based learning and a tool developed in accordance therewith (Ezra, 2017); although this tool was developed for Chinese-language teaching in Israel and Taiwan, it will be adapted to chemistry. The research will also examine the development of three skills required by learners in the twenty-first century: A) “To learn to learn” skills – learning lifelong study habits, to be examined by measuring the impact of the dedicated activities on the generic activities. B) “To learn to know” skills, to be examined by gauging the level of understanding of the content, by means of an analysis of the computerized tasks the students will be asked to solve. C) Metacognitive skills, to be examine by means of an analysis of the reflections written by the children.

**Theoretical and practical importance of the research** – since the 1980s, a large number of studies have been undertaken around the world, including in Israel, on the subject of context-based teaching and learning in the context of the sciences in general (Bennett et al., 2007; Solomon & Aikenhead, 1994) and chemistry in particular (King, 2012: Middlecamp et al., 2015). Most of the studies examined the impact of this approach on motivation, interest, attitudes, profound understanding of content and phenomena, and the creation of meaningful learning for the learners (Parchmann et al., 2006; Stolk et al., 2016; Bennett & Lubben, 2003; King, 2012). Similarly, many studies have been undertaken concerning the impact of the integration of mobile devices in learning on the students’ interest, motivation, understanding, and achievements (Shih, Chuang, & Hwang, 2010; Hwang, Lai, & Wang, 2015). However, there is a notable lack of studies which combine these two approaches and focus on context-based learning in chemistry integrating the use of mobile devices (Crompton et al., 2016). Accordingly, this research will make a significant theoretical contribution to the existing research on context-based learning in the field of chemistry, including a characterization of this area and its implementation in the field.

The research described here may also make a practical contribution by providing data and tools for the development and planning of teacher training and for the development of new structures and content adapted to the learners’ needs that promote the development of some of the skills needed by learners in the twenty-first century.

**Research Description**

In light of the importance of context-based learning to chemistry teaching, and in light of the unique characteristics of mobile devices and their potential to empower mobile context-based learning (Ezra, 2017), the goal of the proposed research is to investigate and characterize context-based learning activities in the field of chemistry and integrating mobile devices. The research will attempt to quantify the extent of contextuality of the activities.

Mobile learning can enhance, empower, and improve context-based learning in chemistry. Bearing in mind this important potential, the research goals are: A) To characterize mobile activities in the field of chemistry performed by the students, whether on their personal initiative or as activities made accessible to them by the teachers; B) To examine the extent of contextuality of the activities; C) To raise the students’ awareness of the connection between chemistry and the real world; D) To raise the teachers’ awareness of dedicated context-based activities integrating mobile devices and their inclusion in their teaching methods. The research goals will be secured by means of the development, design, implementation, and evaluation of learning.

This research may empower the teachers and students in context-based learning integrating mobile devices and may raise their awareness.

**Research Questions**

1. What are the characteristics of the context-based activities in chemistry integrating mobile devices?

A. What are the characteristics of the generic activities?

B. What are the characteristics of the dedicated activities?

2. How do the dedicated activities – i.e. the activities in the intervention unit – influence the generic activities? In other words – how does the intervention unit influence the development of “to learn to learn” skills and lifelong learning habits – searching for information, being curious, and participating in the online knowledge domain – separately from homework set by the teacher?

3. How do the dedicated context-based activities integrating mobile devices influence:

A. The development of “to learn to know” skills, essentially reflecting context-based learning (to know)?

B. The development of metacognitive skills?