BAR-ILAN UNIVERSITY

Science & Technology in Alternating Learning Environments: Traditional and 1:1 Computing -

Instruction, Students Diversity, Motivation, and Self-Efficacy in the Arab Sector

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Abstract

The technology revolution taking place in recent decades has changed our lives and how we consume information and culture, communicate with other people, learn, and create and manage our daily lives.

Many recently published studies and position papers indicate that in the near future, wherever and whenever activities relating to work, studies and leisure will all become intertwined. This trend has a tremendous influence on every aspect of our lives, including how we learn today.

One of the important preconditions for developing self-learning is the ability to make proper use of computerized databases, tools to organize and manage knowledge, and collaborative tools. Mastery of such tools enables us to gather, sort and process information, and generate new knowledge from it. These processes support investigation and discovery learning.

The importance of this research lies in its aim - to study and analyze the contribution of the integration of ICT into teaching and learning in science and technology studies in classes in two schools in the Arab sector in the center of Israel. More precisely, the research seeks to examine what aspects of the integration of 1:1 laptops for all students in the class contributes to the diversification of teaching methods in science and technology lessons, and in how the lessons are planned. To what extent does the integration of 1:1 laptops for all students in the class cater to the diversity among students and enhance their motivation and sense of efficacy in science and technology lessons. The uniqueness of the study derives from its target population, students and teachers in Arab schools integrating ICT into teaching and learning. ICT in schools in Israel in general, using the 1:1 model (one laptop per child), is a question that has been the object of little research in general, and among Arabic speakers in particular. Hence, the uniqueness of the study - turning the spotlight on the analysis of the contribution of technology and ICT in middle school classes in the Arab sector of Israeli society. Another unique aspect of this study is its setup, in which the integration of ICT is being researched by the same teachers, in the science and technology lessons: two lessons integrating laptops using the 1:1 model and two lessons with no ICT. This setup enables a comparison between the teaching and learning in science and technology lessons using the 1:1 method, and the traditional model of lessons with the same teachers in the same classes.

The research population consisted of science and technology teachers working in two schools in Grades 7 and 8 in the Arab sector. The two schools are situated in the center of the country and serve elementary and middle school students (Grades 1 through 8). There were two teachers from each school (four teachers in total), all of whom teach regular lessons and ones where the same children each have a laptop.

The study also included the 7th and 8th grade students of these teachers – a total of 101 students, 45 boys and 56 girls aged 12-13 from three 7th grade classes and one 8th grade class.

The study applied a mixed methodology, using the qualitative tools of non-participatory class observation and semi-structured in-depth interviews with the teachers and a quantitative tool – a student questionnaire. The interviews were designed to clarify attitudes, teaching strategies, perceptions of the teacher's role, and lesson preparation for the science and technology lessons with and without the use of laptops in class.

The science and technology lessons observed were documented by video: four observations for each teacher, two in regular lessons and two in lessons using laptops 1:1, a total of 16 observations. The student questionnaire was designed to examine attitudes, motivation to learn and the sense of self-efficacy regarding learning with an individual laptop. In frontal lessons, learning is mostly not independent; the students are not required to think critically or creatively, as opposed to a computer-based lesson that enables them to think, act independently, and understand processes through critical thinking.

Frontal lessons do not cater to all students, as opposed to the computer-based lesson which may enable assistance according to the needs of different students.

The main findings show that the integration of laptops for every student contributes to the diversification of teaching methods in science and technology lessons compared to lessons with the same teacher without the use of laptops.

From the findings we may conclude that the integration of laptops for every student caters to diversity among students and enhances their motivation and sense of self-efficacy. Computer-based learning arouses students' interest and curiosity: since it is diverse, interactive, colorful, vocal, varying and accessible, it generates more interest and curiosity among students who need stimuli and encouragement to learn. The results of regression tests show that the frequency of computer use for learning purposes significantly contributes to predicting students' motivation to learn and to the

perception of the students' level of skill in working on computer for learning, which includes how well they can recognize the need for information, assess its quality, scope and how to obtain what is needed to attain a certain goal.

Furthermore we may conclude that the integration of laptops in science and technology lessons using the 1:1 method has the potential to enhance teaching and learning in these disciplines in the Arabic-speaking sector and thereby help closing digital, academic, and social gaps in the Israeli society.