

Original Paper

The Impact of ICT Integration on Learning Achievements: The Future of Standardized Tests in Assessment

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Abstract

The present article discusses the impact of the ICT integration in teaching and learning upon students learning achievements in the context of assessment challenges following the shift in curriculum for the 21st century skills, having introduced the interdisciplinary pedagogy and subsequent new demands for evaluation. In particular, the author relates to the recent abolition of the Meitzav State Examination in Israel. The abolition of the exam, which was extensively criticized in the Israeli media, which marked a significant shift in attitude towards standardized examinations and challenged the accuracy of assessing learning achievement on the national level, as compared to international criteria and standards (OECD/PISA). The author addresses further challenges of assessing the 21st competencies of interdisciplinary and project-based learning, while juxtaposing them to the formal traditional ways of assessment, such as Meitzav.

Keywords

learning achievements, ICT integration/e-learning, interdisciplinary learning, 21st century competencies, standardized tests, assessment

1. Learning Achievements and Standardized Examinations – Meitzav State Examination

Educational achievements constitute one of the major school goals: the public still perceives the academic content as the main school purpose, measuring success or failure in that domain by achievements. An additional reason for the importance of measuring achievements consists in offering accessible data to make conclusions and perform evaluations. In Israeli educational system and discourse, the information regarding learning achievements is mainly extracted from the Meitzav tests (Measurement of School Growth and Efficiency), as well as from the results of the international tests, such as TIMSS or PISA) (Blass, 2018).

The standardized tests have long been criticized for the high testing mechanism costs, for being

influenced by stakeholders with conflicting agendas on educational policy in a given country, and, most importantly, for creating the culture of “studying for the test” which harms honesty and fairness and devaluates the importance of education (Alexander, 2010).

The Meitzav tests, introduced in 2002 by the Israeli Education Ministry for primary and middle school, have not been an exception. The tests are performed at the second, fifth, and eighth school grades covering four subjects: language literacy (Hebrew in Jewish schools and Arabic in Arab schools), mathematics, English, and science. In addition, the tests measure school climate and pedagogical aspects (Feniger, Israeli, & Yehuda, 2016). According to the Israeli National Authority for Measurement and Evaluation in Education, (RAMA, in Hebrew), the main purpose of the Meitzav exams is “assessment for learning” (Beller, 2006). However, as many have demonstrated, the purpose is far from accomplishment. Teachers complained that the test have turned into a driver of the educational system, instead of serving their initial purpose, evaluating the performance of the system (Fortus, 2016).

In particular, the Meitzav tests emphasize learning material “for the test” only; moreover, the preparation for those tests creates an enormous pressure upon schools – principals and teachers alike, as they are expected to show high achievement levels. Moreover, often times, teachers tend to assist students to perform better during the tests, or, conversely, discourage weaker students from participating (Blass, 2018). As a result, students’ motivation for learning decreases (Fortus, 2016). It is no wonder then, that on the international tests, Israel has always displayed one of the widest achievement gaps between its strongest and weakest students (Blass, 2017; Ben-David, 2011), thereby reflecting the achievement gaps existing on the national level, in particular, wide achievement gaps existing between Hebrew and Arab education (Blass, 2017).

In the meantime, the very concept of learning achievement has dramatically changed, as significant shifts occurred in the 21st century in the curriculum. From the regurgitation of memorized information, the value of knowledge has moved to the learner’s capability to apply interdisciplinary skills (or, otherwise defined as 21st competencies), among which communication, inquiry and problem-solving, critical and creative thinking, and citizenship (Drake & Reid, 2017). The new pedagogy is interdisciplinary, while the learning is project-based. The performance is assessed through cross-curricular and rich assessment tasks (Drake, Reid, & Kolohon, 2014). Despite immense benefits of the interdisciplinary learning and pedagogy, the assessment remains a challenge (Drake & Reid, 2017). The ongoing debate regarding the ability of both national and international tests to provide an accurate reflection of students’ level of knowledge and skills, has questioned the ultimate reliability of those tests (Blass, 2018).

The recent abolition of the Meitzav State examination in Israel has marked a significant and far-reaching shift in conceptualizing and designing tests for measuring learning achievements on the national level, as compared to the international criteria and standards.

2. Learning Achievements and ICT Reform –Multi-year Trends According to the Meitzav

The Israeli educational system is found in a process of adjusting itself to the 21st century's requirements, by introducing various digital technologies with the purpose of developing research skills and critical thinking, enhancing digital literacy and thereby making the school a more relevant place for the students (Peled, Blau, & Grinberg, 2015). Implementing ICT technology in the Israeli education system is a change aimed to maintain Israel's position in the world as a technological superpower. The ICT integration calls for correcting flaws in the existing teaching methods, which make education system obsolete and cumbersome; it is designed to help improve teaching methods and increase the teachers' status (Kozma, 2008; Elgali & Kalman, 2011).

In the eighties of the last century, it was recommended that the curriculum include introduction of computers, equipping the Israeli education system with computers, training teachers in computer skills, and using computers as teaching and assisting tools for practicing students, in addition to guidance in the field of assessment. In 1986, a five-year plan was approved to promote ICT and use of technology as a means and not as an aid for learning/teaching (Elgali & Kalman, 2011). In 1990, the Minister of Education, at that time Zebulon Hammer, appointed a committee of 16 researchers, charged with the mission to explore the situation of the education system regarding science and technology teaching in Israel. In 1992, a report of the high committee for scientific and technological education "Tomorrow 98" was submitted to the Minister of Education Shulamit Aloni, as described below.

3. "Tomorrow 98" and "Reform 2000"

These two reforms – "Tomorrow 98" and "Reform 2000", emerged out of the belief that comprehensive science and technology education constitutes a foundation for development and success in various fields, such as industry and security, nutrition and health, communication and environmental issues. The report strives for making 1998, the jubilee year of the State of Israel, a year of excellence and significant achievements in these fields. The Committee recommended the writing of a report to implement its findings and also included the computing process of the education system. The policy of the Ministry of Education sought significant achievements in technology in schools, and it has been designed to allocate budgets and pedagogical resources for computerizing the system. This change had a major influence in changing the educational philosophy of the school system.

The convincing amount of studies support the effectiveness of ICT-based learning. The empirical evidence has shown that technology significantly improves student achievements (e.g., Coffman, 2009; Hudson, Kadan, Lavin & Vazquez, 2010). Hudson, Kadan, Lavin, & Vasquez (2010) distributed tests for all groups prior to and following the use of technological tools in the teaching of basic concepts in mathematics. They found that the use of technology raised student scores significantly after repeated learning using various technology tools, and most received scores of above 70%. The findings also indicated that the percentage of spelling errors of children with special needs who used laptop in language learning decreased significantly (Eden, Frechtman, & Shamir, 2010). Those children were

highly motivated to write, which helped them to improve their writing in general.

However, the research findings have not been unequivocal; thus, for instance, on the subject of reading, Ackerman's findings reported (2009) that students prefer to study printed texts, despite attempts to improve the subjective experience of learning a text on the screen. Using meta-cognitive approach, the differences between written teaching methods e-reading were analyzed, with respect to the learned vocabulary and memory. The academic performance of students who used e-reading was lower than those who learned from books. It may be advisable further to explore the way of integrating ICT in teaching methods while preserving the benefits of the "old" education and creating a synergy of methods (Ackerman, 2009).

3.1 Multi-year Trends

3.1.1 PIRLS Tests

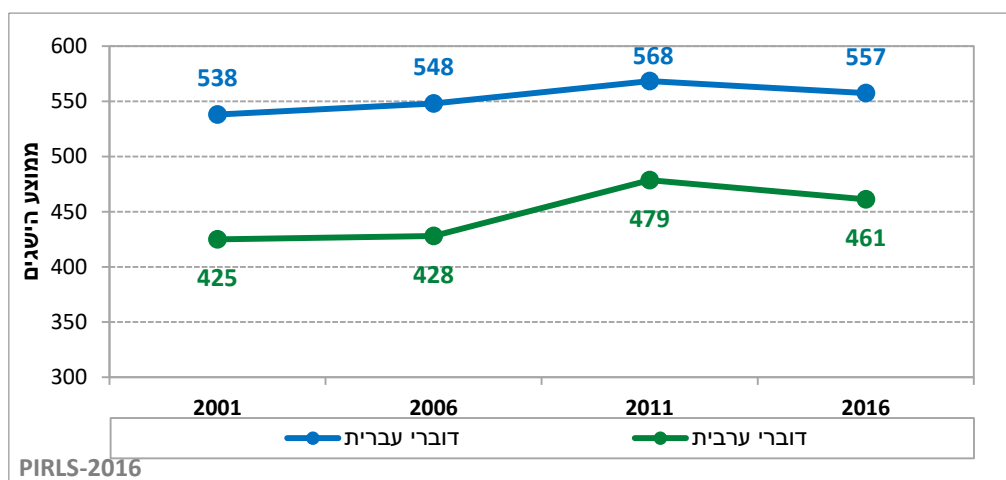


Figure 1. Israeli Reading Achievements for Four PIRLS Research Cycles, 2001-2016

The data in the figure represents the general score for reading in Israel for the years 2001-2016 for three groups using PIRLS research, sectorized according to their native language: Hebrew versus Arabic. The graph shows improvements of reading achievements over the years. One should pay a particular attention to the considerable improvement amongst students in Arabic-speaking schools between the 2006 group and the 2011 group (51 points, about half the standard deviation) within five years. The absence of change in achievements between the years 2001-2006 among Arabic-speaking students shows a reduction in the disparity between the groups- from approximately 120 points in 2001 and 2006, to approximately only 90 points in 2011. This is a reduction of about 25% of the disparity existing formerly between the two groups. Thus, although the disparity between them still exists, it is declining. However, It is important to track the data in the following PIRLS cycles and see if the trend continues.

4. The Meitzav Results

4.1 The Tests in Arabic as Mother Tongue

4.1.1 5th Grade

The Meitzav tests in Arabic as a mother tongue for 5th graders were designed to assess the level of mastery of the language education of Arabic-speaking students in 5th grade. Over the years, the students' reading comprehension skills, written expressive ability and their linguistic knowledge were examined. Texts of different types (in 2016 the genres were narrative text and information text), were accompanied by questions representing different dimensions of understanding. The dimensions of understanding were: (a) understanding of the obvious meaning in the text; (b) understanding the hidden meaning of the text; (c) interpretation, merger and application of ideas and information; (d) evaluating the content and identifying the role of the linguistic and textual components. Further details on the test content are presented in the test specification (see: RAMA, in "School Assessment" regarding "shelf tests").

Table 1. Averages and Standard Deviation in 5th Grade Arabic

5th grade Arabic	Arabic- speakers		
	N	Average	S.D.
2007	5,597	496	103
2008	6,097	500	100
2009	6,058	533	95
2010	6,882	539	95
2011	6,659	571	84
2012	5,931	560	83
2013	5,786	574	78
2015	7,304	560	92
2016	8,320	573	79
2017	7,525	592	71
2018	7,026	602	68

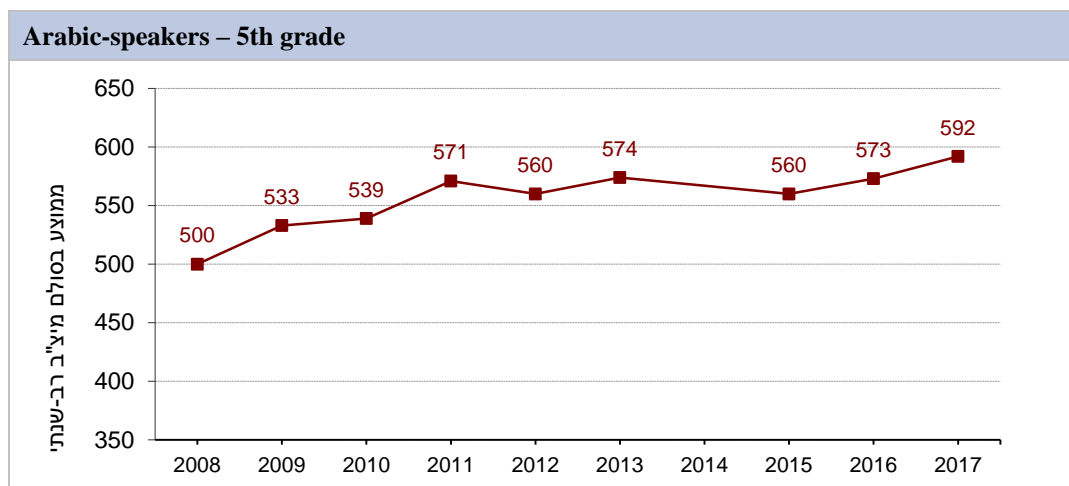


Figure 2. Multi-year Average in Arabic Grade 5th

In a multi-year perspective, there was a significant increase of 71 points in the students' achievements between the years 2008-2011. However, the trend ceased, and recent years have seen fluctuation in the grades, while achievements in 2011 were similar to those recorded in 2016.

4.2 The Mathematics Tests

4.2.1 5th Grades

The Meitzav test in mathematics for 5th graders examined their mastery of the curriculum and the mathematical principles that appear therein, such as: integers, fractions, geometry and measurements including questions such as graphs, charts, and tables. The questions combined thinking skills at various levels: knowledge and identification, algorithmic thinking, process-process thinking, process-thinking, insight, and open search.

Table 2. Averages and Standard Deviation in 5th Grade Mathematics in Schools in General and According to Language Sector

Mathematics	All schools			Hebrew-speaking			Arabic-speaking		
	N	Average	S.D.	N	Average	S.D.	N	Average	S.D.
5th									
2007	19,826	490	98	14,184	508	93	5,642	445	96
2008	19,825	500	100	13,884	521	93	5,941	450	97
2009	19,681	508	98	13,642	526	93	6,039	465	95
2010	21,040	529	93	14,164	548	84	6,876	487	99
2011	22,060	546	82	15,352	558	78	6,708	520	86
2012	18,936	542	88	13,218	556	82	5,718	511	91
2013	19,181	549	86	13,433	562	82	5,748	518	89
2015	26,711	545	85	19,008	559	80	7,703	511	86
2016	28,464	554	77	20,103	566	74	8,361	524	77

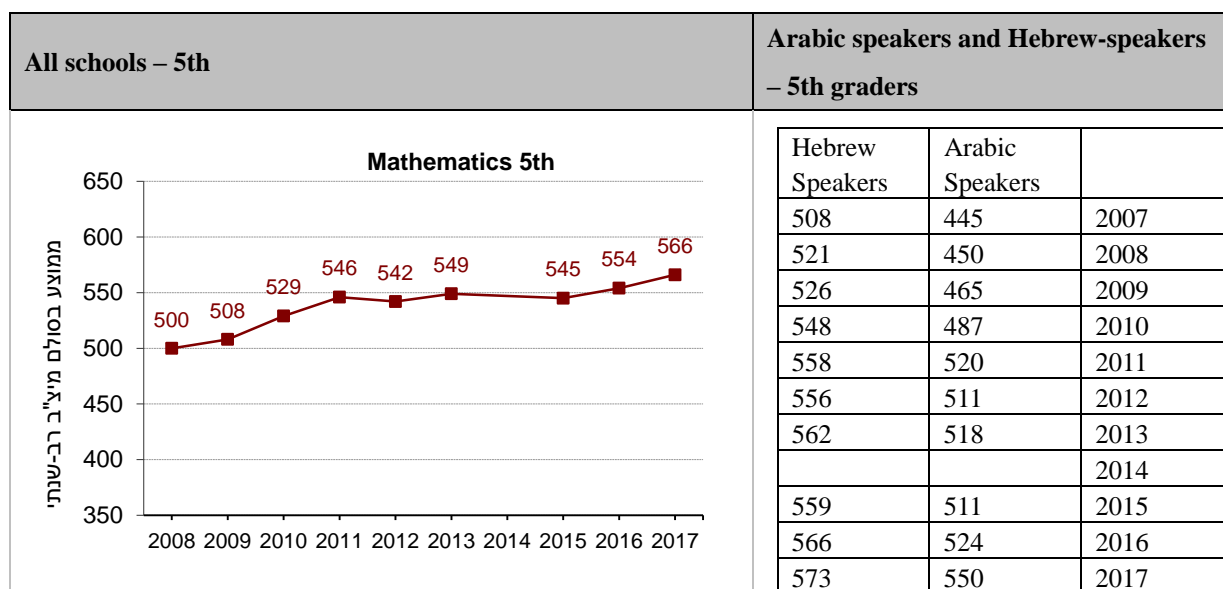


Figure 3. Multi-year Average in Mathematics in Schools and by Linguistic Sectors

The multi-year perspective shows a significant increase of 64 points in student achievement between the years 2008-2011. Most of the increase occurred between the years 2008-2011 (56 points), with a slight increase in 2016.

4.3 The English Tests

4.3.1 5th Grade

The English Meitzav test for the 5th grade students examined their mastery of English according to the level expected by the curriculum, as well as the students' comprehension skills, dimensions of understanding, understanding the open meaning, the ability to integrate information, heating, and expressing personal opinion. More details about the test content are specified in RAMA (see RAMA, in the "School Assessment" section regarding "shelf tests").

Table 3. Averages and Standard Deviation in English for 5th Graders in all Schools and According to Language Sector

Eng. 5th grade	All schools			Hebrew-speaking			Arabic speaking		
	N	Average	S. D.	N	Average	S. D.	N	Average	S. D.
2007	18,457	491	103	12,925	499	100	5,532	471	106
2008	21,334	500	100	14,408	509	96	6,926	478	107
2009	21,085	507	100	14,986	517	97	6,099	483	104
2010	19,348	508	99	13,436	519	95	5,912	481	103
2011	19,953	525	91	13,680	532	92	6,273	511	85
2012	20,005	535	90	13,824	545	89	6,181	514	89

2013	20,493	534	90	14,726	542	88	5,767	518	91
2015	26,400	524	95	18,832	530	96	7,568	508	92
2016	28,537	542	91	20,113	544	92	8,424	538	88
2017	28,312	539	89	20,710	539	91	7,602	540	85

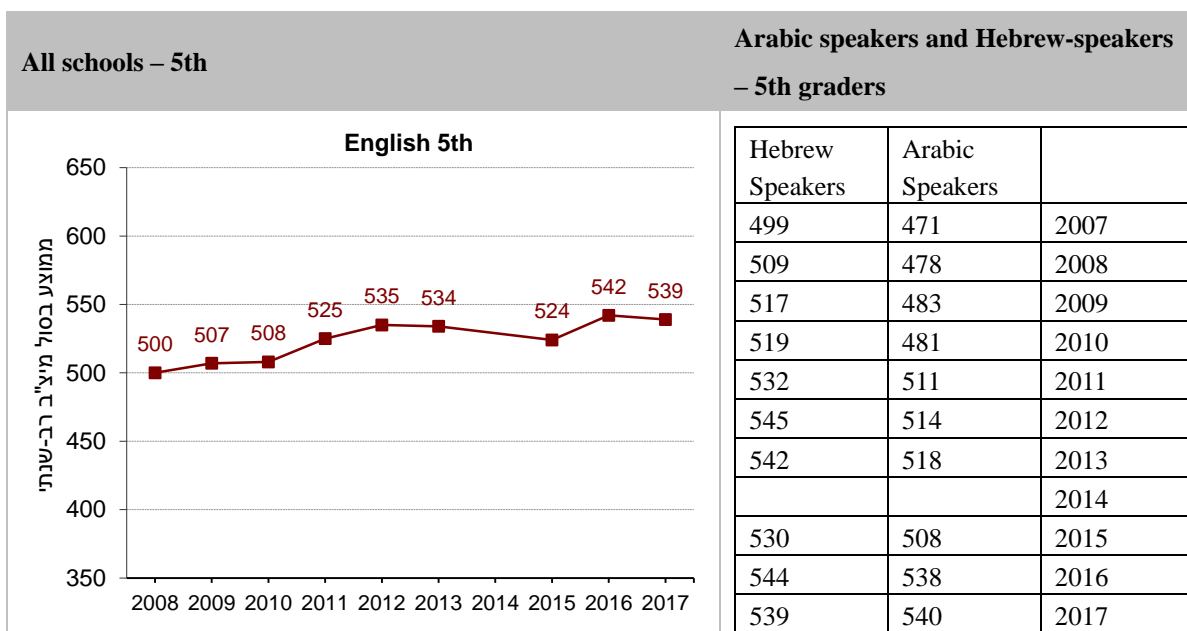


Figure 4. Multi-year Average in English in Schools and by Linguistic Sectors

Just as with other subjects, we can see a significant increase in results between 2008-2012, followed by slight fluctuation and eventual stagnation – the grades as of 2012 and 2017 respectively remain the same, with a light decrease in 2015 (Note 1).

5. Conclusions

In the context of the 21st century competencies and multidisciplinary paradigm of learning, the reliability of standardized state examinations, such as Meitzav, becomes more and more dubious. In other words, the major question one should ask is whether the grades obtained in the Meitzav test indeed reflect the improvement in learning achievements following the integration of ICT in teaching and learning. Other questions that arise are: do the test designers indeed address competencies such as active learning, critical thinking, collaborative investigation, media literacy, and self-directed learning? How much do the skills tested by the Meitzav correlate with the 21st century expectations from the learner (Voogt, Knezek, Cox, Knezek, & ten Brummelhuis, 2013)? How much the criteria for achievements comply with the requirements stated by OECD in international testing?

The research has shown that the standardized state tests such as the Meitzav might do more harm than good to the educational system (Blass, 2018); the controversial nature of standardized examinations

highlights the importance of further developing alternative assessment methods via ICT integration; it also emphasizes the need for individually tailored ways of learning assessment and measuring achievement.

However, despite all that, those are the only tests available nowadays that enable comparisons between groups of learners, both at a single point in time and along different point in time (Blass, 2018). In addition, there are many factors that complicate the assessment of the 21st century competencies: among them large variations in both formal and informal environments and the forms of assessments possible, lack of coherence across levels of education systems; lack of methods for designing 21st assessments (Scardamalia et al., 2016).

To conclude, the assessment for the 21st century competencies needs the coherent framework, based on the agreement on the definition of those competencies and their component knowledge, skills, and techniques. Furthermore, the task of designing tests on international and national levels requires cultural flexibility, commitment to educational pluralism and individual differences, yet balance between various forces, policies, and stakeholders.

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Note 1. All the examination data were extracted from the site of the National Authority for Measurement and Assessment in the educational field (RAMA, 2017). The report aims to present a comparative view between the students' work in diverse subjects with a comparison of before and after the assimilation of the national ICT program in 2010. The data collected for the math and English test for grades 5 in year 2018; 2019 does not comply with the required quality and validity rules and are not presented in the current report (see RAMA, in the "School Assessment" section regarding "National Meitzav reports"). No external Meitzav tests were conducted in 2014.