

# Bridging the Social Gap Through Educational Technology

## *Using the Time To Know Digital Teaching Platform*

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This article describes the educational effects of the Time To Know Digital Teaching Platform used with low socio-economic status (SES) students' in learning mathematics, Hebrew, and English as a Foreign Language (EFL) in Israel. The study described in the article is based on the assumption that one of the possible solutions for bridging the social gap between low-SES students and others can be based on narrowing the "digital divide," particularly by bringing a 1:1 computing social-constructivist learning environment to the low-SES students. The subjects were 49 fifth-grade students of a low-SES, who joined a Time To Know program in Israel, and 42 fifth-grade students who learned in a traditional setting. Findings indicated that learning with the Time To Know program significantly enhanced students' mathematics, Hebrew, and EFL achievements. In addition, the findings showed that as a result of learning in the Time To Know environment, the knowledge and skills gap between the students was significantly narrowed. The authors discuss the nature of the unique impact of educational technology on low-SES students and suggest practical implications of their research findings.

### Introduction

Educational technology can play a significant role in enhancement of educational systems to address knowledge and skills needed for the 21st century. However, despite high efforts and significant investments of resources, educational technology programs have revealed relatively low effects (Bernard, Abrami *et al.*, 2009; Cuban, 2001; Donovan, Green, & Hartley, 2010; Greaves & Hayes,

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2006; Weston & Bain, 2010). Lessons-learned from past research show that mainly student-centered, appropriately implemented, technology-rich learning environments can more effectively promote educational goals, such as learning motivation, teamwork, and higher-order thinking skills, in comparison with traditional teaching and learning (Rosen & Salomon, 2007). Furthermore, student background can play a significant role in the effectiveness of educational technology programs.

Recognizing the limitations of the "digital divide," attributed most commonly to socio-economic status (SES), it is possible that educational technology can play a social role in bridging the achievement gap among students (e.g., Jackson & Biocca *et al.*, 2006; Warschauer, 2003; Warschauer & Matuchniak, 2010). Access to new technologies, whether at home or at school, is critical to the development of new abilities and skills, such as collaboration, critical thinking, creativity, and information literacy, needed in the information age.

The growing role of information and communications technologies in the economy and society serves to highlight their important role in education, and especially in promoting educational equity. It is widely believed that effective deployment and use of technology in schools can help balance the unequal access to technologies in the home environment and thus help narrow educational and social gaps.

A comparative study of technology use at schools in high- and low-SES communities found that the low socio-economic neighborhood schools tended to have less stable teaching, administrative, and IT support staffs, which made planning for technology use more difficult (Warschauer, Knobel, & Stone, 2004). High-SES schools tend to invest more in professional development, hiring full-time technical support staff and developing communication among teachers and administration that promote robust digital networks. This encourages more widespread use of new technologies by teachers. In comparison, the low-SES schools have achieved less success in creating the types of support networks that make technology effective.

One of the most recent studies on learning in technology-rich environment revealed positive results regarding the potential of educational technology programs for alleviating inequity in Israeli schools (Manny-Ikan & Berger-Tikochonski, 2010). The study examined the possible effects of a 1:1 computing learning environment, focusing on low-SES. More specifically, the study explored the effects of learning in the Time To Know program on mathematics, Hebrew, and English as a Foreign Language (EFL) achievements of low-SES students, as compared with learning in a traditional setting.

### Time To Know Digital Teaching Platform

The Time To Know teaching and learning environment consists of five main components (Walters, Dede, &

Richard, 2009; Weiss & Bordelon, 2010):

- **Infrastructure:** 1:1 laptop environment with a workstation for the teacher.
- **Interactive year-long core curriculum:** Recommended sequences of interactive learning activities that are aligned with state standards. Teachers can modify these sequences by uploading their own “best practice” materials directly into the lesson flow.
- **Digital Teaching Platform (DTP):** A platform that enables the teacher to plan and conduct a lesson, and receive formative and summative assessment reports during and after the lessons.
- **Pedagogical support:** Every teacher who joins the program takes part in a professional development course and receives ongoing guidance from a Time To Know coach who has specialized in the field of knowledge in which the teacher is working.
- **Technical support:** There is technical support during all classroom hours in every school where the program is in operation.

The Time To Know program contains a structured mathematics, Hebrew, and English language arts curriculum of guided learning sequences for elementary schools that include open-ended applets and discovery environments, multimedia presentations, practice exercises, and games. For example, in mathematics, the teacher opens the lesson with an animation which is used as a trigger for a specific learning topic, such as fractions. Next, a class discussion on the topic increases the curiosity of the students who then explore the topic and perform guided experiments individually using the fraction applet. The students then submit their work to the class digital gallery, where the teacher projects the work and engages the students in a discussion.

Another example is the use of the Live Text applet to explore written text in a language arts context. The student can highlight and emphasize different parts of the text, such as words and paragraphs. The student can also use the textual navigator, which automatically emphasizes different units, such as verbs, pronouns, and emotions. The student can then review pre-defined “hot words” in order to view additional explanations or information about those words.

Time To Know was designed to present differentiated materials to different groups simultaneously and to support diverse learning levels for the same topic. The class may be divided into homogenous groups of students with similar mastery levels on a given topic. In this way, every student works according to his or her own ability.

When looking at the advantages of the program for low-SES groups, it can be seen that there are a number of unique aspects contributing specifically to students with learning difficulties. Unlike programs offering a partial answer to the students’ difficulties, Time To Know encompasses the entire learning, teaching, and evaluation process and gives the learner a complete experience

and a comprehensive response to his or her needs. The uniform learning environment to which the student is exposed in the core subjects offers a familiar and safe platform and helps to cultivate learning habits and learning strategies that will accompany him or her in other lessons. From our considerable experience with students with special needs from weak populations, we have chosen to present a number of particular examples:

- Developing content at different levels makes the text accessible to the learner and provides “crutches” in the process of reading and comprehension.
- The interactive nature of the learning environment makes it possible to provide immediate feedback adapted to the student’s output in real time.
- The wide diversity and dynamism of the learning resources, and their illustration by interactive video clips, game tasks, and mini-applications affording practical experience and study, increase interest and enjoyment.
- The learning process is accompanied by many teaching aids intended to mediate the tasks for the student: the hint, the aid, the narration, and the ability to influence the visual aspect of the text (enlarging, emphasizing, copying, etc.).
- This mediation provides the learner with practical experience in more autonomous learning, and frees the teacher to accompany those students who need help personally.
- The teacher’s ability to provide a rapid and good-quality response to the particular needs of each student is increased by means of regular evaluation reports on the students’ performance.

All these create a customized and unique environment, making the content available to the learner and maximizing personal abilities.

### Research Findings

Our study participants were fifth-grade male and female students (ages 10–11) from two low-SES Israeli elementary schools. Gender distribution was almost even. Experimental schools were selected on the basis of two criteria: their participation in the Time To Know program and a similar SES background, while the comparison schools used the traditional teaching and learning approach (without intensive use of educational technology). In all, there were 91 students who participated in the beginning and end of year test on math, Hebrew, and EFL (49 Time To Know and 42 comparison students). Both schools that participated in the study are inner-city public schools located in an underprivileged neighborhood in Tel-Aviv. The schools’ principals were driven by intense ideology and faith, combined with a strong desire to make a difference in the lives of the students, but the reality they encountered was harsh. The teachers mainly wanted the students to sit in the classroom, even if they didn’t engage in a meaningful

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## About Time To Know

Time To Know (<http://www.timetoknow.com>) was founded in 2004 as an Israeli educational technology philanthropic endeavor by an experienced business person who is also an education advocate, in response to the many challenges facing schools in Israel and worldwide and the lack of what was seen as meaningful change in education practices. Based on positive feedback around the globe, a for-profit company was later formed to take Time To Know to market. The Time To Know solution is made up of an interactive core curriculum and a digital teaching platform, designed specifically for one-to-one computing classrooms. It is currently available for fourth and fifth grade math and reading/language arts. An online platform with teaching and learning tools provides a teacher-centric solution combined with a curriculum that meets state standards and engages students in learning. After officially launching its Digital Teaching Platform in 2007, Time To Know is now being implemented in 150 classrooms in Israel and 120 classrooms in Texas and New York, USA. Time To Know was also chosen to participate in New York City's Innovation Zone (iZone) program. The company consists of several hundred experts in pedagogy and computer based-learning; creative professionals in video, animation, and music; and writers, academics, and engineers.

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learning experience. In many cases, the teachers didn't even ask the children to accomplish learning tasks.

Findings indicated that learning with the *Time To Know program significantly enhanced students' learning achievements in all three domains*. In addition, the findings showed that as a result of learning in the Time To Know environment, the knowledge and skills gap between the students was significantly narrowed. The principal of the school which implemented the Time To Know program described this effect as follows: "When the school adopted the Time To Know program, suddenly the academic aspect also became relevant and interesting to the children, and the teachers began to expect academic achievements. Today we want a lot more than children who merely sit in the classroom, and much of it is due to Time To Know. Today we also want students to leave here with academic accomplishments."

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## Practical Implications

Our study sheds light on the importance and effectiveness of bridging the social and educational gap via innovative teaching and learning in a constructivist 1:1 computing environment. The introduction of an attractive and prestigious program to an environment with low-SES characteristics arouses emotional aspects that have an impact on the students' motivation. Research studies offer considerable evidence of the connection between the learner's enjoyment and improved achievements. It is clear that the school in question is a classic example of the effect described above. From the responses of the students

and teachers in this school, it can be seen that the fact that all the students were given a personal laptop computer produced a sense of *gratitude and appreciation, and the desire to prove that they too could succeed*. The act of choosing this particular school created a *sense of equality and being given an equal opportunity* to prove that even a so-called weak population could make optimal use of the program. Feelings of deprivation and frustration were replaced by a sense of pride at joining the prestigious circle of laptop users, in many cases as the students' first direct encounter with a telecommunication environment. With regard to assimilation, many efforts were made to encourage the students to *increase their hours of use* also for preparing their homework. The school management also joined this effort and opened the computer lab in the school library in the afternoons.

The Time To Know program works in a unique way and is based on the world of multimedia, what we believe to be an innovative, dynamic, and interesting world that appeals to all the learner's senses. The interactive program gives students a sense of enjoyment, interest, and motivation. In this way, it also appeals to groups of underachieving learners, people with learning difficulties, with diverse learning styles, with problems of motivation, and to frustrated students who have *experienced failure* in the past.

It is noticeable that the new experience in the Time To Know environment makes it possible for learners who have had negative learning experiences to enjoy positive experiences and to start again in a cycle of success. Moreover, the digital platform through which teaching, learning, and evaluation takes place contains considerable "scaffolding," helping learners to move safely through the learning processes. These make the learning process easier and reinforce the student's self-confidence—for example, the hint, aid, narration, use of mini-applications as part of the trial and error process, use of live text for design and font emphasis, etc.

One of the main supports in the learning process relates to the ability of the computer to provide students with *immediate, quick, and personal feedback*. We know that students with difficulties find it hard to delay gratification and need frequent direct and personal responses from the teacher. The Time To Know system is an excellent substitute for reducing feedback cycles and allows the students an independent learning experience. Another central principle in the Time To Know pedagogic approach relates to responses adapted to differences between students in the class. *The digital content is adapted* to a number of levels and learning styles, and the digital teaching platform makes it possible for students to learn at their own personal rate. *Learning in an environment like this increases the sense of self-efficacy, maximizes the students' abilities, and reduces the emotional pressure of the traditional environment*.

The unique partnership between the student and the computer creates a new learning space: *an intimate and*

*personal environment* shared with the new learning partner—the computer. This intimacy makes it possible to receive personal messages from the teacher without sharing them with the entire class; allows trial and error in a protected space; and makes it possible to work on different content at a different pace without coming up against the mockery and scorn that are sometimes directed at those who have difficulty. *The personal-private space contributes a great deal to students with a low self-image*, who not infrequently experience embarrassing public comment that affects their motivation to learn and reduces their chances of success.

There is considerable evidence relating specifically to the experience of success and high achievements *in the subject of EFL*. It is known that students with learning difficulties experience coping with English as an obstacle to their learning process. The complicated accent, the linguistic poverty that they bring from home, their limited exposure to hearing spoken English—all these limit their ability to cope with this challenging subject. With Time To Know, learning becomes a pleasurable experience, making it possible to *reduce the gaps from previous years*, thanks to the different levels adapted to the students, and the possibility of listening to the material studied over and over again until it is absorbed. The learning experience as described will contribute in the future to the social mobility of these groups, helping them to break through the “glass ceiling” and giving them a better chance of joining the labor force and becoming productive citizens.

When coming to evaluating student achievements, it is important to emphasize that the students in our study began the academic year with very low achievement in the three subjects, mathematics, Hebrew, and English. This low starting point left considerable room for improvement, hence the significant and dramatic progress in the students’ achievements.

The teaching processes in the Time To Know environment also play a central role in the process described. Smart teaching and evaluation tools developed as part of the platform enhance and improve the teacher’s ability to deal with populations from a poor socio-economic background. The available and accessible evaluation reports have an important place in *providing reliable and rapid information* for the teacher on the situation of the students, allowing the teacher to provide an adapted and professional response to their specific needs. This information is of central importance with regard to weak students, who are *in need of support and accompaniment*. In the Time To Know environment, fewer students “fall between the stools” and *their unique needs are brought out and highlighted* for the teacher on an immediate basis.

Another aspect, perhaps the most important of all, relates to the *degree of availability of the teacher—the significant adult in the classroom*, without whom the learning process is very limited. The adapted program and the structured learning sequence make it possible

for the stronger students to move forward themselves and *reduce their dependence on the teacher*.

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## Conclusion

Educational technology programs are more challenging to implement in low-SES schools. Schools recruiting students of lower socio-economic status often tend to create school environments of low aspirations and support for academic learning (Creemers & Kyriakides, 2008). Students in low-SES schools mostly have less home computer experience, and thus take more time to adapt to using technology. Teachers in low-SES schools tend to be less experienced, and parents are less able to guide their children on effective use of technology (Creemers & Kyriakides, 2008). However, the findings of this study showed high potential of appropriately implemented educational technology programs among low-SES students.

These findings are consistent with the results of previous studies, showing the high potential of 1:1 computing learning environments in general and Time To Know particularly, compared with a traditional learning environment (e.g., O’Dwyer, Russell, Bebell, & Seeley, 2008; Rosen, in press-a, in press-b, 2011-a, 2011-b; Rosen & Livshits, in press b; Scott, Rockman, Kuusinen, & Bass, 2011; Zucker & Light, 2009). Would the same findings emerge in a large-scale implementation or when other disciplines are examined? It is essential that similar studies be carried out to examine the effectiveness of different technology-rich environments in large-scale settings involving other disciplines and a variety of pedagogical support models. □

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# Educational Technology Research Journals

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## *Educational Technology Research and Development 2001–2010*

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This article examines 10 years (2001–2010) of journal articles from *Educational Technology Research and Development (ETR&D)* to determine trends in article topics, key contributing authors, citation patterns, and methodological trends. The analysis identified several unique characteristics of this journal over the past decade, including a balance between theory, research, and design, as well as a commitment to international perspectives.

### Introduction

*Educational Technology Research and Development (ETR&D)* uniquely focuses on both research and development in educational technology (as stated in *ETR&D's* Aims and Scope). It is divided into two sections. The research section includes original, rigorous, qualitative, quantitative, and mixed-methods educational studies with a focus on technology application or instructional design. The development section examines instructional technologies and learning environments with an emphasis on planning, implementation, evaluation, and management (*ETR&D*, nd.). The journal uses a blind review process and also includes book reviews, international review