# ICT in Hebrew Speaking and Arabic Speaking Schools in Israel: Findings from SITES2006

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## Abstract

Values of equity and equality among all citizens are imperative for Israeli policymakers since the establishment of the state of Israel. Hence, closing gaps between sub-populations, particularly between Hebrew-speaking and Arabic-speaking schools, persists as a priority of Israel's education system. Where ICT is concerned, this goal refers to two major aspects: infrastructure and ICT implementation de facto, in teaching and learning. A secondary analysis of SITES2006 study findings portray a rather multifaceted state of affairs, in which on some issues, e.g. vision and goals, higher positive attitudes on ICT importance in general and as a lever for paradigmatic change in particular were found in Arabic speaking schools than in Hebrew-speaking schools. This is contrary to expectations, which took into account the inequality in allocation (mainly of infrastructure) between the two sectors. In addition, a difference was found between the two sectors with regards to ICT implementation in mathematics vs. science subjects: whilst Arabic speaking mathematics teachers indicate greater ICT usage in their target class, among science teachers in the Hebrew speaking sector report confirmed greater usage and vast influence on their pedagogy. Conclusions suggest that further effort is needed to close gaps between Hebrew and Arabic speaking schools. However, there is need for collaboration and exchange of ideas, information and educational experience between staff members from both sectors, as each sector may gain from points of strength of the other sector.

**Keywords:** secondary analysis, ICT in school, Arab speaking sector, Hebrew speaking sector, SITES

## Introduction

Minimizing gaps between the Hebrew speaking and Arab-speaking sub-populations in Israel in general and in schools in particular, is of high priority within the Israeli education system. ICT infrastructure and practice is referred to in this regard. Suppositions of educators and

policy makers as well as annual statistic data published by the Central Bureau of Statistics (http://www.cbs.gov.il), indicate inequality in ICT implementation between Hebrew and Arab speaking schools. SITES 2006 data offer a unique opportunity to examine these assumptions de facto. This paper focuses on ICT perception and implementation in Hebrew and Arabic speaking schools in Israel. Nevertheless, this particular case is examined within a wider framework encompassing examples of ICT integration processes into school within countries experiencing conflictive educational settings.

Israel's education system reveals cultural and ethnic diversity: About 20% of students from kindergarten to high school belong to the Arab, Bedouin, and Druze minorities (i.e. the Arab sector) and about 20% attend Jewish-orthodox schools. Just over 15% are newcomers who have immigrated to Israel in the last decade. The Arab and Jewish sector each have their own supervisors (Ministry of Education, 2007).

The Arab education system is largely a traditional one, influenced by social and political events since the establishment of Israel. It is affected by severe problems as a result of neglect, discrimination, lack of involvement within the Arabic speaking population and inferiority in terms of educational infrastructure and resources (Lavi, 1997; Sprinzak, Bar, Levi-Mazloum, & Piterman, 2003). Notwithstanding, Arab teachers were considered throughout the years an important component of the intellectual elite within the Arab population. Still, during the 1950s-1970s, most Arab teachers were uncertified; during recent years level of teacher qualification has rapidly grown (Israeli Central Bureau of Statistics, 2008).

More than ever the public education system is being called on to close the gap between both populations, e.g. equal budgeting of Jewish and Arab education based on uniform, differential per-student funding. According to recommendations, disparities between Hebrew-speaking and Arabic speaking schools should be eradicated, thereby reducing differences in educational processes, achievements and conditions (Dovrat Committee, 2005).

As for ICT, computers were introduced into the Arabic speaking sector a decade later than in the Hebrew speaking sector. Curricula were translated into Arabic and used in schools at the beginning of the 1990s, and a new curriculum was developed in the field of computer literacy. However, there is still shortage in ICT materials in the Arabic language, in spite of national and local efforts. According to the SITES 2006 findings, the student/computer ratio, calculated for schools participating in the study, showed great disparities, according to which there are almost twice as much students per computer in the Arabic speaking sector than in the Hebrew speaking sector: approximately 1:21 as opposed to 1:11.1 respectively. Data dealing with Internet connectivity was even more troubling (Nachmias, Mioduser & Forkosh Baruch,

2009). Hence, while the Internet could play a central role as means for facilitating ICT usage for pedagogical purposes, relatively low connectivity rates hinders this option for compensating for the lack of materials. Still, in the literature the term commonly used for referring to these differences, "digital divide", does not capture the complexity of the phenomenon (Warschauer, 2002).

The current approach regarding this issue is to redefine the divide in terms of "Digital Inequality" (Kvasny, 2006) considering access to hardware, but also the implications of equitable access to the benefits (cultural, social, economical, and educational) of digital technologies. In this sense, it is important to recognize the need to facilitate physical access to artifacts as well as the complex array of factors characterizing the particular population expected to adopt these technologies.

The secondary analysis of SITES2006 data presented in this paper addresses a comparison between Hebrew and Arab speaking schools. The main points of comparison refer to policy and goals for ICT usage; infrastructure; staff support and encouragement in ICT use for teaching; ICT usage patterns by teachers; and perceived ICT-related obstacles hindering schools' capacity to realize their pedagogical goals. Hence, we address two main research questions: *(a) What are the similarities and differences in ICT implementation between Hebrew and Arab speaking schools? (b) What factors contribute to the differences between the two sub-populations?*

## Methodology

The reported study is a secondary analysis of data from the SITES 2006 international study, examining ICT implementation in lower-secondary schools in general, and in 8th grade classes in particular, using questionnaires for Israeli school principals (N=380), ICT coordinators (N=380) and 8th grade science and mathematics teachers (N=2,038).

The framework of the study visualizes that teaching and learning at the classroom level and the use of ICT in the classroom is influenced by factors on the school and teacher levels, which in turn are influenced by external factors as well, e.g. policies, community, parents.

SITES2006 was designed as a survey, focusing on the overall situation of ICT implementation in pedagogical practices on the 8th grade level, as defined by the International Consortium (for details, see Law, Pelgrum & Plomp, 2008). Hence, three questionnaires were constructed: a principal questionnaire, a questionnaire for the ICT coordinator and a teacher questionnaire for mathematics and science teachers of 8th grade students; all these were defined and

constructed internationally. Questions addressed issues of ICT policy and practice, attitudes and ICT skills of teachers and students. Questions included items to be rated on a Likert scale commonly used in surveys. In most items, respondents were requested to grade their responses on a 4-scale continuum; some items required a yes/no reply, while in other items requiring reports of change the scale was a 5-point one, the middle value being no impact or no change.

Questionnaires were translated and adapted to the Israeli culture from English to Hebrew only, since: (a) all teachers in the Arab sector speak Hebrew; (b) all teachers would receive identical questionnaires, in terms of language as well; (c) the cost-benefit considerations were in favor of one translation only.

Data was collected in the year 2006. Questionnaires included different sets for each position holder: teachers (mathematics and science teachers received similar questionnaires), principal and technical coordinator. In the Israeli report, in concurrence with the structure of the international report, data extracted from the three questionnaires were compared between the Hebrew and Arabic speaking sectors.

Data was compared regarding several aspects of ICT implementation in schools between the two sectors, comparing means of ratings and responses of principals, ICT coordinators and teachers. The goal was to achieve further understanding about differences between the two main sectors in the Israeli education system and to use the conclusions to formulate policies aiming to narrow the gaps between the two sub-populations.

## Finding and Discussion

The results presented herewith are related to questions posed in the main study, dealing with policy and goals for ICT implementation, ICT infrastructure, support and encouragement of teacher's implementation of ICT, ICT actual usage by Math and Science teachers, and ICT-related obstacles affecting the overall attainment of pedagogical goals.

### *Policy and goals for ICT implementation*

In general, principals in Israel considered ICT implementation in their schools to be important, compared to the results of the international data. Table 1 details items for the question: *For each of the following, how important is the use of ICT at Grade 8 in your school?* When comparing the Hebrew and Arabic speaking sectors on these items, there are differences in the level of importance attributed by principals to each item with relation to ICT usage in the 8th grade. It seems that in a number of domains, principals in the Arab-speaking sector see greater

importance to ICT usage than their Hebrew-speaking colleagues, as displayed in Table 1.

[Take in Table 1 about here]

Items rated significantly higher among principals in the Arab sector were: *"fostering collaborative and organizational skills when working in teams"*, *"increasing learning motivation and make learning more interesting"*, *"acting as a catalyst in changing the pedagogical approaches of teachers"* and *"preparing students for the world of work"*. The latter two items entail notions of meaningful ICT usage as a lever for innovative teaching and future expectations for coping with an ICT saturated workplace. As for the item concerning *"satisfying parents and the community's expectations"*, this is considered of great importance, especially in the Arab sector, in which society is relatively traditional. As for effect size, there could be a very significant positive change in attitudes as well as infrastructure and ICT implementation de facto as a result of systemic actions, and even more so if the effect were growing over time, had this been measured. The inclusion of social considerations in light of the characteristics of the community is regarded, therefore, an important step towards meaningful and successful ICT implementation.

## ICT infrastructure

The issue of infrastructure is of vast importance, regardless of its relatively technical nature. Data was extracted from the principal questionnaire, thereby providing significant information regarding schools' infrastructure priorities; this information is important for policymakers within the Ministry of Education. Table 2 presents Israeli principals' priorities regarding ICT infrastructure. Principals were asked about priority levels regarding resource allocation in their school for promoting ICT usage in teaching and learning for 8th Grade students in their school. We measured principals' attitudes concerning resource allocation by sectors: Hebrew-speaking vs. Arabic-speaking schools, taking into consideration the ongoing gap in ICT infrastructure.

Findings indicate in general high priority for each of the 5 items, though the last item on the list was considered relatively less of a priority. Notwithstanding, differences are significant with higher marks for the Arab-speaking schools in 4 of the 5 items.

[Take in Table 2 about here]

The goal of decreasing the number of students per computer especially concerns principals in the Arabic speaking sector – probably as a result of the existing gap between the two sectors. Still, principals in the Arab speaking sector are not satisfied with increasing the number of

computers within their schools in itself. Rather, they clearly give priority – compared to their peers in the Hebrew-speaking sector – to ICT pedagogical implementation, by attempling to increase digital learning resources related to the school curriculum and to establish online learning support platforms to enhance ubiquitous learning and learning management. Hence, though when listing the priorities one sees a similar pattern in both the Arab and Hebrew speaking sectors, differences in rated levels of priority are significant and clearly in favor of the Arab speaking sector.

### *Support and encouragement of teacher's implementation of ICT*

Principals were asked to indicate to what extent the school's leading staff encourages ICT usage for a number of activities, on a four- point Likert scale. Items mostly dealt with collaboration and communication among students, as well as real life experiences, thereby reflecting school visions and goals. We performed a comparison between the Hebrew and Arabic speaking sectors on principals' responses to these items, shown in Table 3.

[Take in Table 3 about here]

Results show that principals consider encouragement of school staff to use ICT of great importance, and have confidence that their leading staff members encourage, de facto, ICT usage among staff members. Significant difference between the Hebrew and Arabic speaking sectors was found in all related items, all in favor of the Arabic sector. These findings were against all our expectations. In terms of teachers' encouragement to use ICT, Arab-speaking schools have a noticeable advantage over Hebrew-speaking schools. Despite support of leading staff provided for teachers in both sectors, encouragement given to collaboration within school and between school members and factors outside the school is more evident in the Arab sector. One explanation for these differences is the striving for progress within the Arabic speaking sector in spite of inferior infrastructure conditions and a more traditional education system in comparison with the Hebrew-speaking sector.

A crucial and relevant question presented to the principals referred to support for staff development: the extent to which 8th Grade Mathematics and Science teachers are required or encouraged to acquire ICT knowledge and skills. The issues examined were: (a) Do leading staff members encourage teachers to acquire ICT-related knowledge and skills for facilitating innovative pedagogical processes? (b) Are these accessible to teachers? When comparing the Hebrew-speaking and Arabic speaking schools on these issues, intriguing data arose from the principals' responses, according to which in all items, requirement and/or encouragement was higher in Arabic-speaking schools, as presented in Table 4.

[Take in Table 4 about here]

This significant difference, in all items, may be explained by the cultural differences that shed light on several disparities between these two societies, i.e. the Hebrew-speaking and the Arabic-speaking sub-groups. In the Arabic sector, the possibility to pose demands on teachers is much easier, since, as a relatively traditional society, it is more customary to follow the principal's orders. In addition, due to a feeling of discrimination and the awareness of gaps between the sectors, the notion among Arab principals is that teacher training on ICT-related issues is essential for advancing education in Arab-speaking schools (Khattab, 2003; Flum and Cinamon, 2006).

### *ICT actual usage by Math and Science teachers*

Teachers were questioned about ICT implementation in their pedagogical practice. Percentages of Israeli teachers reporting ICT implementation in their classes (i.e. ICT usage at least one time during the school year) was surprisingly low altogether: about 22% of the mathematics teachers and about 53% of the science teachers reported using ICT in their class. Also, the difference between mathematics and science teachers was quite outstanding. Here, the examination of this figure for each sector apart is presented in Table 5, displaying an interesting pattern of usage.

[Take in Table 5 about here]

Conclusion drawn from the data is that ICT is used twice as much among mathematics teachers in the Arabic-speaking sector than in the Hebrew-speaking sector (about 31% as opposed to less than 20%, relatively), though in both sectors it is not the majority of teachers. This is quite surprising in light of results mentioned earlier which concern ICT infrastructure being highly in favor of the Hebrew-speaking sector. In contrast, among science teachers, more teachers from the Hebrew-speaking sector use ICT compared to the Arabic-speaking sector (about 55% as opposed to about 46%, relatively).

Some insight concerning the relatively low usage of ICT may be extracted from teachers' reports on obstacles hindering their usage of ICT in teaching and learning. Twelve obstacles were presented to teachers, divided into three categories: school factors (school culture, resources), teacher factors (skills, self-confidence, time) and student factors (ICT skills, accessibility to ICT outside schools). Tables 6 and 7 present comparative data between the Hebrew-speaking and Arabic-speaking teacher samples regarding these obstacles. Table 6 presents comparative data for mathematics teachers, while Table 9 displays data for science teachers.

[Take in Table 6 about here]

The rows marked in grey indicate items for which percents of reported obstacles were higher among Hebrew-speaking mathematics teachers. The white rows indicate items in which percents of reported obstacles were higher among Arabic-speaking mathematics teachers. In mathematics, teacher-related obstacles were reported by more teachers from the Hebrew-speaking sector than from the Arabic-speaking sector. In contrast, school and student related obstacles were reported by more teachers in the Arabic-speaking sector. This may indicate that higher percents of mathematics teachers in the Arab sector feel confident with their ICT-related skills and ICT-related pedagogical skills, in trying new approaches, in allocating time to develop and implement activities and in applying ICT tools for teaching and learning.

When comparing figures of mathematics teachers to figures of science teachers, we see a slightly different picture, though the direction of the data is similar. Table 7 presents data reported by science teachers.

[Take in Table 7 about here]

An examination of obstacles encountered by science teachers by sector confirms that for most items a higher percentage of Arab-speaking teachers reported these as difficulties. Gaps are especially evident in school-related and student-related items. As with mathematics teachers, in teacher-related items the gaps are smaller. Moreover, in two items, relating to insufficient confidence to try new approaches and insufficient time necessary to develop and implement the activities, more teachers in the Hebrew-speaking sector reported difficulties than in the Arab-speaking sector (the rows marked in grey). Again, this indicates that the perceived source of obstacles in the Arab sector is to a lesser degree teachers' rather school and student aspects.

## Conclusion and Implications

This paper addresses issues concerning ICT-based pedagogical practices in Hebrew-speaking and Arabic-speaking schools in Israel. Our analyses is in reference to the conflicts arising from the encounter between the perception of ICT as a trigger for change and the character of the Arab education system as largely a traditional one. These two forces, i.e., the need to seek for innovation as well as to preserve traditional structures and methods, generate interesting

and dynamic processes within the schools, some captured in the collected data.

With regards to educational policies and their implementation, two contrasting circumstances coexist: the continuing social and economic disparities between the two ethnic populations on the one hand, and the special efforts made by the Ministry of Education in the last decade to improve conditions in Arabic-speaking schools, on the other hand (Zuzovsky, 2008). Inequalities between both educational systems were documented in published report over the years, e.g., Lavi, 1997, Sprinzak et.al, 2003, and are reflected in the Arab speaking educators' (teachers, principals) perceptions of the qualities of their educational system. The recent years' attempts to bridge the gap is also properly based and funded on policy decisions.

Concerning vision and goals, principals in Arabic speaking schools display higher positive attitudes than their colleagues in Hebrew speaking schools towards the importance of ICT usage within their schools. There is a significant difference between the principals' perceptions in the two subpopulations regarding ICT implementation as a facilitator of change in pedagogy and a means of promoting collaboration between teachers, both complying with novel educational paradigms. The Arab speaking schools principals' position is of particular interest. In the context of the above discussed disparities in all different areas of the educational system, the principals' perception of ICT as high priority issue for their schools and important lever for reaching their educational objectives is highly interesting. It seems that efforts made to empower Arab speaking schools beginning in the 1990s had caused school leaders to envisage their schools as change agents of the whole Arab subpopulation (Sprinzak et al., 2003).

Concerning actual implementation, Arabic speaking mathematics teachers indicate greater ICT usage in their target class (8th grade). Emphasis combines two rationales: the pedagogical rationale and the social rationale (Voogt, 2008). The combination of these two rationales plays an important role within the Arab-speaking schools: math, being one of the basic curricular subjects, is nurtured as a means of upgrading schooling within the sector, as well as a means of socially upgrading the Arab speaking sector in Israel.

However, amongst science teachers Hebrew speaking teachers indicate greater ICT usage in their target class. This may be the result of science being associated with collaborative learning, complying with an emerging pedagogical paradigm, which is found more within the Hebrew speaking sector compared to the Arab speaking sector (Nachmias, Mioduser, & Forkosh-Baruch, 2009). Also, the power of the Internet in modeling and visualizing scientific phenomena (Ernst & Clark, 2009) is limited among Arab speaking schools, due to lower connectivity to the Internet, in spite of the lack of differences between the means by which

traditional science is taught in the two subsectors, e.g. science labs (Nachmias, Mioduser & Forkosh Baruch, 2009).

Regarding perceived difficulties and obstacles for the implementation of ICT-based practices in both subpopulations, Arabic speaking schools indicate lack of sufficient infrastructure as a major obstacle hindering these practices, whilst in the Hebrew sector a main obstacle is lack of ICT skills among teachers. This state of affairs is a result of two main factors: (a) allocation-of-resources policy in the early stages of the Israeli computerization program for all schools (including Hebrew and Arab speakers) favoring the acquisition of infrastructure and equipment, and to a far lesser degree supporting implementation processes or the development of teachers' ICT skills (Mioduser, Nachmias, Tubin, & Forkosh Baruch, 2006); (b) a significant gap in terms of resources allocation by the Israeli relevant ministries between the two subpopulations. As a result, Hebrew speaking schools in possession of better infrastructures focus their attention on the teachers' incomplete formation, whilst Arab-speaking emphasize infrastructure issues.

Prospective lines of action for endorsing innovative practices using technology in both sectors may include a number of actions, in different areas. In terms of infrastructure, although there is some improvement altogether in the student-computer ratio in Israeli schools and in connectivity to the Internet, Arab schools are still behind, and the student-computer ratio is almost twice as much as in Hebrew-speaking schools. Closing the gap between sectors is one of the basic actions to be carried out as part of a general tendency to facilitate ICT implementation in schools in both sectors.

Policy within schools in both sectors encourages ICT implementation. In Arab-speaking schools, principals see ICT as a lever for lifelong learning and as a means of achieving progress within the school and beyond the years of formal education. This indeed reflects aspirations of equity and equal opportunity within the Arab sector in Israel – and certainly should be encouraged by policymakers on an equal basis in both sectors.

As for obstacles hindering the school's capacity to realize its pedagogical goals – this should be treated differentially in the Hebrew-speaking sector and in the Arab-speaking sector, emphasizing each sector's specific needs: infrastructure enhancement in schools in the Arab sector, and ICT skills in the Hebrew-speaking sector.

Notwithstanding, attempts should be made to close gaps between the two populations also by means of cooperation, collaboration, sharing of ideas and innovative models of ICT implementation, as well as knowledge and experience between policymakers and practitioners from both sectors. Efforts should be made in all schools to upgrade all aspects of ICT

implementation, especially in facilitating innovative practices and lifelong learning skills.

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**Table 1:** Average ratings of Israeli principals concerning the importance of ICT usage for achieving a list of targets, according to sectors (SD in brackets)

| Items | Sectors | | Effect size $r$ | Sig. level |
|---|---|---|---|---|
| | Hebrew-speaking (N=221) | Arabic-speaking (N=73) | | |
| To prepare students for the world of work | 3.31 (.87) | 3.51 (.63) | .011 | * |
| To improve students' performance on assessments/examinations | 3.27 (.78) | 3.44 (.60) | .010 | |
| To promote active learning strategies | 3.48 (.71) | 3.49 (.58) | .000 | |
| To individualize student learning experiences in order to address different learning needs | 3.42 (.73) | 3.41 (.72) | .000 | |
| To foster collaborative and organizational skills when working in teams | 3.22 (.80) | 3.49 (.63) | .023 | ** |
| To develop students' independence and responsibility for their own learning | 3.47 (.69) | 3.60 (.57) | .007 | |
| To do exercises to practice skills and procedures | 3.52 (.67) | 3.45 (.62) | .002 | |
| To increase learning motivation and make learning more interesting | 3.58 (.62) | 3.75 (.50) | .015 | * |
| To satisfy parents' and the community 's expectations | 2.99 (.79) | 3.32 (.75) | .032 | ** |
| To act as a catalyst in changing the pedagogical approaches of teachers | 3.30 (.76) | 3.60 (.55) | .033 | ** |

*: p ≤ 0.05  **:  p≤ 0.01

**Table 2:** Average ratings of Israeli principals' responses concerning priorities regarding ICT infrastructure, by sectors (SD in brackets)

| Items | Sectors | | Effect size $r$ | Sig. level |
| --- | --- | --- | --- | --- |
| | Hebrew-speaking (N=215) | Arabic-speaking (N=71) | | |
| To decrease the number of students per computer | 3.34 (.910 | 3.66 (.63) | .026 | ** |
| To increase the number of computers connected to the Internet | 3.60 (.82) | 3.76 (.57) | .008 | * |
| To increase the bandwidth for Internet access of the computers connected to the Internet | 3.36 (.91) | 3.42 (.75) | .001 | |
| To increase the range of digital learning resources related to the school curriculum | 3.29 (.85) | 3.58 (.67) | .023 | ** |
| To establish/enhance an online learning support platform and its management so that teaching and learning can take place an time, anywhere | 2.96 (.92) | 3.29 (.79) | .026 | ** |

*: p ≤ 0.05  **:  p≤ 0.01

**Table 3:** Average ratings of Israeli principals' responses concerning the extent to which the school's leading staff encourages teachers to use ICT for a number of activities, by sectors (SD in brackets)

| Items | Sectors | | Effect size $r$ | Sig. level |
| --- | --- | --- | --- | --- |
| | Hebrew-speaking (N=221) | Arabic-speaking (N=73) | | |
| Organize, monitor and support team-building and collaboration among students | 2.97 (.73) | 3.48 (.50) | .095 | ** |
| Organize and/or mediate communication between students and experts/external mentors | 2.75 (.80) | 3.15 (.82) | .044 | ** |
| Facilitate collaboration (within or outside of school) on student activities | 3.14 (.70) | 3.52 (.63) | .055 | ** |
| Collaborate with parents/guardians/ caretakers in supporting/monitoring students' learning and/or in providing counseling | 2.63 (.85) | 3.12 (.76) | .062 | ** |
| Provide students with experiences that show them how certain activities are done in real life or by experts | 3.08 (.77) | 3.36 (.68) | .026 | ** |

*: p ≤ 0.05  **:  p≤ 0.01

**Table 4:** Average ratings of Israeli principals' reporting requirements and/or encouragement of acquiring ICT-related knowledge and skills, by sectors (SD in brackets)

| Items | Sectors | | Effect size $r$ | Sig. level |
|---|---|---|---|---|
| | Hebrew-speaking (N=209) | Arabic-speaking (N=68) | | |
| Integrating Web-based learning in their instructional practice | 1.96 (.56) | 2.35 (.54) | .083 | ** |
| Using new ways of assessment (portfolios, peer reviews, etc.) | 2.05 (.61) | 2.28 (.62) | .026 | ** |
| Developing real-life assignments for students | 2.08 (.57) | 2.34 (.56) | .038 | ** |
| Using real-life assignments developed by others | 1.95 (.56) | 2.23 (.55) | .045 | ** |
| Using computers for monitoring student progress | 2.00 (.71) | 2.29 (.60) | .032 | ** |
| Organizing forms of team-teaching | 2.02 (.65) | 2.30 (.58) | .037 | ** |
| Collaborating with other teachers via ICT | 1.87 (.61) | 2.14 (.62) | .036 | ** |
| Communicating with parents via ICT | 1.40 (.56) | 1.68 (.72) | .039 | ** |
| Being knowledgeable about the pedagogical issues of integrating ICT into teaching and learning | 2.13 (.63) | 2.34 (.56) | .020 | * |
| Using subject-specific learning software (e.g., tutorials, simulation) | 2.02 (.64) | 2.22 (.60) | .018 | * |

*: $p \leq 0.05$  **: $p \leq 0.01$

**Table 5:** Percentages of Israeli mathematics and science teachers indicating ICT implementation in their class, by sectors

| Sectors | Mathematics teachers | | Total | Science teachers | | Total |
|---|---|---|---|---|---|---|
| | Hebrew-speaking (N=658) | Arabic-speaking (N=199) | N=857 | Hebrew-speaking (N=532) | Arabic-speaking (N=184) | N=716 |
| Percentage of ICT usage in teaching and learning activities | 67.2% | 32.8% | 100% | 77.7% | 22.3% | 100% |
| Percentage of ICT usage in teaching and learning activities from the total teachers of the sector | 19% | 30.7% | 21.7% (of all Israeli Math teachers) | 54.9% | 45.7% | 52.5% (of all Israeli Science teachers) |

**Table 6:** Percentages of Israeli mathematics teachers' responses concerning obstacles when implementing ICT in their teaching – total responses and by sectors

| | Mathematics teachers | Sectors | | |
| --- | --- | --- | --- | --- |
| | | Hebrew-speaking (N=630) | Arabic-speaking (N=193) | Total |
| School -related | ICT is not considered to be useful in my school. | 33.1% | 44.6% | 35.8% |
| | My school does not have the required ICT infrastructure. | 29.6% | 47.9% | 33.9% |
| | My school lacks digital learning resources. | 44.3% | 61.3% | 48.4% |
| | I do not have the flexibility to make my own decisions when planning lessons with ICT. | 27.1% | 31.3% | 28% |
| | I do not have access to ICT outside of the school. | 19.6% | 30.2% | 22% |
| Teacher-related | I do not have the required ICT-related skills. | 34.7% | 25.8% | 32.6% |
| | I do not have the necessary ICT-related pedagogical skills. | 35.1% | 31.1% | 34.3% |
| | I do not have sufficient confidence to try new approaches alone. | 27.8% | 13.8% | 24.5% |
| | I do not have the time necessary to develop and implement the activities. | 53.6% | 40.7% | 50.5% |
| | I do not know how to identify which ICT tools will be useful. | 33% | 29.9% | 32.3% |
| ated | My students do not possess the required ICT skills. | 25.4% | 45.8% | 30.3% |
| | My students do not have access to the required ICT tools outside of the school premises. | 23.6% | 46.9% | 29.1% |

**Table 7:** Percentages of Israeli science teachers' responses concerning obstacles when implementing ICT in their teaching – total responses and by sectors

| | Science teachers | Hebrew-speaking (N=512) | Arabic-speaking (N=186) | Total |
|---|---|---|---|---|
| | | **Sectors** | | |
| **School -related** | ICT is not considered to be useful in my school. | 24.1% | 41.9% | 28.8% |
| | My school does not have the required ICT infrastructure. | 29.8% | 45.2% | 33.9% |
| | My school lacks digital learning resources. | 47.7% | 61% | 51.3% |
| | I do not have the flexibility to make my own decisions when planning lessons with ICT. | 18.4% | 27.6% | 20.8% |
| | I do not have access to ICT outside of the school. | 15.6% | 29.3% | 19.2% |
| **Teacher-related** | I do not have the required ICT-related skills. | 23.7% | 31% | 25.6 |
| | I do not have the necessary ICT-related pedagogical skills. | 20.3% | 27% | 22.1% |
| | I do not have sufficient confidence to try new approaches alone. | 22% | 19.8% | 21.4% |
| | I do not have the time necessary to develop and implement the activities. | 51% | 39.2% | 47.9% |
| | I do not know how to identify which ICT tools will be useful. | 21.1% | 30.5% | 23.6% |
| **ated** | My students do not possess the required ICT skills. | 22.9% | 46.2% | 29.2 |
| | My students do not have access to the required ICT tools outside of the school premises. | 25.6% | 43% | 30.3% |