

An information system for dropout prevention

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Abstract Reducing student dropout from school is one of the most important challenges faced by the education system. This study examines the effectiveness of a Local Authority Information Center (LAIC) that was developed in Israel to help prevent this phenomenon. The research population embraced 418 regular attendance officers (RAOs), educators dealing with students dropping out and with those who at risk of dropping out. The RAOs were divided into an experimental group, that executed its work using the LAIC, and a control group that accomplished its work manually. The research findings show that the use of an LAIC system reduced the dropout rate and raised the number of students studying to the school's satisfaction. This improvement even intensified 3 years later when the size of the experimental group was increased. The RAOs in the experimental group employ most of the LAIC's facilities and they present positive attitudes towards the LAIC's contribution to their work. The LAIC system seems to have a real and direct impact on reducing dropping out.

Keywords Preventing dropping out · Information system · Regular attendance officers · Students at risk · Information system in education

1 Introduction

1.1 Student dropout from school

The phenomenon of students dropping out of school is widespread in many countries. In Europe an average of 12% of the students dropped out in 2008, and in

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the member countries of the Organization for Economic Co-operation and Development (OECD) the figure stood at 14% on average; (OECD Education Database 2009). The United States reported an average dropout rate of 8% in 2008 (U.S. Department of Education and National Center for Education Statistics 2010) while in Israel the rate was lower and stood at 6% of the students, mainly in junior high and high school (Israel's Central Bureau of Statistics 2010). The dimensions of the phenomenon are a serious social problem that presents a concrete national challenge.

Dropping out is a key factor that feeds social disparity and the students' feeling of alienation towards the school and the environment, and impairs their development and their future (Richman et al. 1998). Children who are subject to neglect, to abuse or to an endangering environment are children at risk who are also in danger of dropping out of school (Dolev and Ben-Rabi 2002; Zionest and Tamir 2002; Azzam 2007). Moreover, the danger of dropping out of school increases with the transition from junior high school to high school due to the complexity of the associated factors (Jozefowicz-Simbeni 2008).

Apart from overt dropping out, bearing on formally leaving school, the literature recognizes the concept of school disengagement that typifies students at risk. From the administrative perspective students who disengage are in an educational framework, but they do not attain minimal academic achievements: they are frequently absent, constantly feel they are a failure, and they sense alienation from school which is not seen by them as a lever for real success (Cohen-Navot et al. 2001). The extent of disengagement is far greater than that of overt dropping out. About half the students in the USA do not complete their high school studies on time or do not complete them at all (Somers et al. 2009), a phenomenon that has tremendous social and economic implications (Tyler 2003). The method of coping with the problem of dropping out of school is perceived as a yardstick for social responsibility.

1.2 Coping with the problem of dropping out

The dramatic implications of dropping out have increased the importance of research dealing with its prevention. Prevatt and Kelly (2003) reviewed many articles published between 1982–2002 on the problem of regular attendance, failure in school and dropping out. Their main recommendations for coping with the problem pertain to diverse aspects such as, social support, advancing social and personal skills, monitoring and the early location of students at risk, mentoring, increasing parental involvement, greater involvement of the teachers, and support to advance the students' academic skills. Azzam (2007) in his study of the factors for dropping out amongst students also proposes several complementary strategies: reducing the size of the classes, recruiting teachers with high qualifications, paying personal attention to the students, increasing support of teachers, improving the connection with the parents and 'big brother' mentoring by someone whom the student trusts. The importance of ongoing mentoring needed by students at risk of dropping out must be emphasized. These mentors become a decisive factor in improving the percentage of students who complete their studies (Ziomek-Daigle and Andrews 2009; Jekielek et al. 2004). The main accompaniment for students at risk of dropping

out in Israel is performed by educators - regular attendance officers - trained specially for this.

1.3 Regular attendance officers

The main division that deals with the problem of dropping out in Israel is that of the regular attendance officers (RAOs). These are educators whose role is to assure regular attendance of students in schools and to prevent them from dropping out of the education system. Their work is based on the Israeli Compulsory Education Law, according to which every child must attend school till 12th grade.

The RAOs' work is extremely complex. Apart from the direct connection with the students under their care and their accompaniment, the RAOs are in contact with the school staff, the student's parents, the educational psychological service, and social and community services such as welfare services, the police testing services, youth advancement and so on. The RAOs must create real partnership, trust and appreciation between all those involved in the process of preventing students from dropping out - partnership that will construct a protective and strengthening educational and social envelope around the students.

The RAO's roles include:

1. Identifying and locating students at risk of dropping out, and reporting them to the Ministry of Education.
2. Prevention and treatment pertaining to:
 - a. Instructing and accompanying the students and their families to help them successfully integrate in the education system
 - b. Enforcing the Compulsory Education Law on the parents and the school.
 - c. Attending school staff meetings and professional committees that work in accordance with the students, guiding them and tracking their placement
 - d. Maintaining contact with all the entities that deal the student (social workers, psychologists, probation officers, youth advancement officers etc.) to determine methods of intervention and division of tasks
 - e. Integrating students who were not placed in suitable learning frameworks.
 - f. Initiating and operating unique intervention programs within the school, and programs outside school hours
 - g. Advising the educational staff on ways of treating students at risk of dropping out

Each RAO monitors and treats many students during the year. Their number depends on the size of the local authority in which the RAO functions and on the socio-economic situation of the students living within the authority's boundaries.

1.4 Information systems in education

Harnessing Information and Communications Technology (ICT) alters the face of education. It is recruited to many objectives, such as increasing flexibility in learning methods and curricula, enhancing assessment tools and tracking, strengthening connections between students and teachers, empowering the students, improving professional support of the educators and so on (Abbott 2001).

Assimilating ICT in education gradually leaves its mark on the organizational structure of schools, on patterns of functioning, and on methods of administration applied there (Telem, 1999). In educational administration, similar to other domains, the emphasis gradually moves from management information systems that deal mainly with gathering, storing, transferring and presenting the data, to knowledge management systems. The innovative concept therein is the transfer of the emphasis on gathering data to their use, i.e., their processing for drawing conclusions (Alavi and Leidner 1999; Maier 1997). A Decision Support System (DSS) is one of the ways of coping with the complex functioning of the education system, characterized by a large number of information consumers that make the level of monitoring and supervision difficult. It employs software, models for planning, development and control, data banks and devices that support the decision-making for solving a specific problem. The use of a DSS occurs when the problem depends on many variables and the information needed to determine the correct solution is hard to attain or use (Power 2008).

1.5 Local authority information center

The Israeli Ministry of Education established individual information systems for projects of national importance. One of them is the above-mentioned DSS for handling the problem of dropping out in Israel. The main factor affecting the decision to develop this information system is connected to the profusion of the data and its complexity regarding monitoring and handling students at risk of dropping out. The RAOs' work is so complicated that an effective information system is essential for their functioning. Furthermore, the RAOs' creative and effective solutions remain theirs alone, without the knowledge accumulated being inculcated to the entire system.

The information system was developed in 2000 by the Ministry of Education's Department of Regular School Attendance and the Prevention of Dropping Out. It was named the Local Authority Information Center, and abbreviated to the LAIC. The Center facilitates managing the knowledge, supports decision-making and invites cooperation and communications between the various consumers. Its assimilation by the RAOs began in 2003 in several local authorities; it has expanded to function in all the local authorities in Israel since 2009, and is used constantly by most of the RAOs to administer their work. The LAIC is intended to support the development of a multi-dimensional intervention program for coping with the problem of students at risk of dropping out.

The system concentrates all the information on students who are obliged to study according to the Compulsory Education Law from the data bases of the Ministry of Education and the local authority. The extensive information is managed according to four main modules:

1. Demographic and personal data that include information about the student
2. Lists of students who must attend school and their details
3. Lists of students actually studying in schools
4. Lists of students lacking status, who do not appear on the lists of those who should be learning

The LAIC system has unique capabilities for coping with complex problems and makes it a very powerful tool. It offers report generators that enable extracting statistical information at the locale level, the school level and the individual level, automatic mailing to school regarding the student's problems and ways of helping, administrative letters to the parents, to the local authority, and to the school staff. The LAIC also has a warning system that can identify regression of students at various behavioral attributes and in learning achievements, and sends out warnings on this problematic situation. The system thus suggests to the RAOs different methods of treatment, and proposes activities needed according to the student's current condition. It even initiates automatic notation in their diaries to arrange pedagogic staff meetings, home visits and so on.

Our research aims to explore the contribution of the LAIC system to reducing dropping out and to advancing the effectiveness of the RAOs' work with students at risk of dropping out.

1.6 The research questions and hypotheses

Five questions were posed:

1. Did the LAIC system reduce the number of students who dropped out of school? We hypothesized that the number of those dropping out from the experimental group monitored by the RAOs would be smaller in 2005 compared to 2003, while there would not be a difference between the number of drop outs between 2003 and 2005 in the control group.

2. Did the use of the LAIC increase the number of students studying to the system's satisfaction from those at risk of dropping out?

A student is defined as studying to the school's satisfaction according to four parameters: regular school attendance, academic achievement, behavior, and participation in social activities. Only if all the parameters are proper does the RAO define the student as above. The ranking of each parameter is determined according to the Ministry of Education's standards.

We hypothesized that the number of those studying to the system's satisfaction in the experimental group would rise in 2005 compared to 2003, while there would be no change in the control group.

3. Are the changes maintained consistently over time if the LAIC manages to reduce the number of those dropping out and to increase the number of students studying to its satisfaction?

We hypothesized that these changes would be retained 3 years later, or at most would decline slightly, due to the growth in the size of the RAO group using the LAIC

4. To what extent do the RAOs use the various components of the LAIC system?

We hypothesized that the RAOs who received instruction and technical support would employ most of the LAIC components to a moderate to considerable extent.

5. What are the RAOs' attitudes towards the LAIC's contribution to their work?

We hypothesized that positive attitudes would be presented regarding the LAIC's contribution to their work.

2 Methodology

2.1 The research population

The research population numbered 418 RAOs who agreed to participate in the study. They worked in 265 local education authorities around Israel and were divided into two groups:

1. An experimental group with 340 RAOs (81.3%) who used the LAIC to manage their work. This group began to assimilate the LAIC system in 2003, and, by the end of 2005, had mastered it.
2. A control group with 78 RAOs (18.7%) who managed their work manually between 2003–2005.

The distribution of the two research groups according to gender, seniority in their position and education are presented in Table 1.

The data were taken from the Ministry of Education's data files with the RAOs' permission. The attributes of the group that manages its work using the LAIC compared to the control group that manages its work manually are clearly similar both regarding the ratio of males to females in the groups and in the distribution according to seniority and education.

2.2 The research tools

The research tools employed in this study included:

1. The RAOs' reports for 2003, 2005 and 2009 were used to test research questions numbers 1, 2, and 3. During the academic year the RAOs send monthly reports to the Ministry of Education, that include information on the students being treated; an update of the school placement data, attributes of the problem, data regarding treatment and intervention, and the current educational status. The research data were taken from these reports. The reports for 2003 and 2005 were

Table 1 The distribution of the research population according to gender, seniority, and education

	Control group n=78 (18.7%)	LAIC group n=340 (81.3%)	Total n=418 (100%)
Gender	Females: 46 (59.0%) (41.0%) 32 Males:	Females: (69.1%)235 Males: 105 (30.9%)	(67.2%)Females: 281 (32.8%)Males: 137
Seniority	1–3 years: 25 (32.1%) 4–10 years: 29 (37.2%) 10+ years: 24 (30.7%)	1–3 years: 143 (42.1%) 4–10 years: 93 (27.3%) 10+ years: 104 (30.6%)	1–3 years: 168 (40.2%) 4–10 years: 122 (29.2%) 10+ years: 128 (30.6%)
Education	B.A.: 52 (66.7%) M.A. 15 (19.2%) PhD: 0 No academic degree: 11 (14.1%)	B.A.: 232 (68.2%) M.A.: 68 (20.0) (Ph.D.: 3 (0.9%) No academic degree: 37 (10.9%)	B.A.: 284 (67.9%) M.A.: 83 (19.9%) Ph.D.: 3 (0.7%) No academic degree: 48 (11.5%)

- compared to the data of RAOs who use the LAIC to manage their work, and to those of RAOs who manage their work manually (questions 1 and 2). The RAOs' 2005 reports for the entire research population were compared to reports for 2009 to check the consistency of the change (question no. 3).
- Following scrutiny of questionnaires that explore satisfaction with the information system and the extent of its use a 30-item questionnaire was designed. It was intended to examine research questions numbers 4 and 5 regarding the RAOs' use of the LAIC and their opinions of its contribution to their work. The questionnaire was compiled after scrutinizing questionnaires that explore satisfaction with the information system and the extent of its use (Scudder and Kucic, 1991). The responses followed the Lickert scale, ranging from 1 (indicating not at all) to 5 (indicating very considerably) and it was found to be of high reliability: $\alpha=0.89$. (The questionnaire is attached as an [appendix](#).)

2.3 The research array and data analysis

- The RAOs' reports: The data from the experimental group that were reported via the LAIC were gathered directly from the computer, and the data for the control group, that were reported manually, were entered. The latter were first compared to those for the experimental group for two points in time – for 2003, when the assimilation of the LAIC amongst the experimental group began, and in 2005, after 3 years of use of the LAIC. The data for 2005 for the entire research population were then compared to those for 2009, after the RAOs in the control group started using the LAIC. In 2009 the research population numbered 403 RAOs out of 418 participants sampled in 2005 (six RAOs retired and nine continued to work manually). The first stage was conducted in December 2005 and the second in April 2010. The variables examined were a) the number of students who dropped out of school; b) the number of students treated by the RAOs learning to the school's satisfaction. The following analyses were conducted for both these variables:
 - The averages and standard deviation for the two research variables, as well as a paired *t* test to examine the significance of the differences between the averages of the experimental group and the control group for the years 2003 and 2005. We also found Cohen's *d* values for the size of the effect.
 - Linear regression was conducted to predict students dropping out and students who study to the system's satisfaction. We defined each variable separately as the dependent variable, and the RAOs' the style of work management (as manual or using the LAIC) as the independent variable. Regression analysis was performed for each variable for the 2005 data.
 - We compared the data for the students and the drop outs for the entire 2005 research population to those for 2009 (bar that for 15 RAOs who retired). We processed the data as we did for item (a) above.
- Questionnaire: A pilot study was conducted at the first stage and the questionnaire was given to six RAOs (four females and two males) from the experimental group, in order to assess the difficulties expected and the time needed for its completion. In June 2005, the questionnaires were then sent, by the Ministry of Education's Department for Regular School Attendance to all the

340 RAOs from the experimental group. 230 questionnaires (67.65%) were returned to that department, encoded and analyzed.

Frequency, average and standard deviation were calculated for each question, and factor analysis was conducted through which four dimensions were identified as detailed in Table 2. The relationship between the dimensions obtained was examined using the Person correlation.

3 Results

3.1 Student dropout

Table 2 presents the comparison for 2003 and 2005 between the averages for students dropping out from the RAOs belonging to the LAIC group and for the control group. The LAIC group showed an average decline of 30% in the number of students dropping out between those years. This decrease is statistically significant ($t = -13.34, p < .001$). In contrast, the control group did not reduce the percentage of those dropping out; on the contrary, the average dropout rate in this group rose in 2005 compared to 2003.

This finding emphasizes the effectiveness of the LAIC. The system provides critical information in real time that pertains to intervention in the problems of students treated by the RAO. It warns and reminds the RAO to take various steps to deal with new problems that arise during the intervention. Furthermore, the system analyzes accumulated information on similar problems, and recommends the most effective modus operandi to the RAO. All this apparently reduces dropping out.

3.2 Students studying to the school's satisfaction

Every RAO treats many students who are classified according to their academic status into three groups:

- a) A student learning to the school's satisfaction. Students will be defined as such only if all the following four parameters are proper: regular school attendance,

Table 2 Comparison of the number of students dropping out

Year	Control group n=78			LAIC group n=340		
	<i>N</i>	<i>M</i>	SD	<i>N</i>	<i>M</i>	SD
2003	1,585	20.32	20.40	7,483	22.01	28.05
2005	2,150	27.57	28.09	5,549	16.32	20.35
<i>T test</i>	$df = 77$ * $t = 8.23$			$df = 339$ * $t = -13.34$		
<i>d</i>	0.94			0.74		

N = Number of students dropping out for all the RAOs in the research group

M = Average number of students dropping out per RAO

* $p < .001$

- academic achievements, behavior, and participation in social activities in school, as noted in the research questions.
- b) Students in danger of dropping out: Students for whom one or more of the four parameters is not proper. The degree to which each parameter is proper is determined by the school according to the Ministry of Education's standards.
 - c) Dropout students: A student who did not attend school for 45 days and is deleted from the school's register.

It is important to stress that students defined as “studying according to the school's satisfaction” are those formerly classified as being at risk of dropping out. After improving their academic and social functioning they were transferred to the status of the first group. The RAO continues to treat and track the students of the first group in order to assure further improvement in their functioning.

Table 3 compares the average of those learning to the school's satisfaction in the LAIC group and in the control group for 2003 and 2005. The LAIC group showed a statistically significant increase of 35% in the number of students studying to the school's satisfaction in 2005 compared to 2003 ($t=18.89$, $p < .001$). Calculating its size produced a strong effect reinforcing the significance of the improvement ($d=1.05$). In contrast, not only was there no improvement in the control group, but rather a decrease was observed in the number of students learning to the system's satisfaction in 2005 compared to 2003.

These data would indicate that the LAIC increases the transition of students from the status of students at risk of dropping out to that of students studying to the school's satisfaction

3.3 Predicting dropping out and learning to the school's satisfaction

Linear regression analysis was performed in order to assess the contribution of the RAOs' method of working (LAIC or manual) for predicting student dropout and learning to the system's satisfaction (see Table 4). The RAOs' style of managing their work, defined as the independent variable, was found to predict the two variables statistically significantly, with student dropout predicted best ($p < .001 = \beta, -.304$). The significance of the data is that a student's chances of dropping out of school are lower

Table 3 Comparison of the number of students learning to the system's satisfaction

Year	Control group n=76			LAIC group n=326		
	<i>N</i>	<i>M</i>	SD	<i>N</i>	<i>M</i>	SD
2003	1,900	25.01	19.61	8,446	25.91	24.77
2005	1,768	23.26	18.72	12,994	39.86	38.09
<i>T test</i>	$df=75$ * $t = -15.99$			$df=324$ * $t=18.89$		
<i>d</i>	1.83			1.05		

N = Number of students of all the RAOs in the research group

M = Average number of students per RAO

* $p < .001$

Table 4 Predicting student dropout and students learning to the system's satisfaction, according to the RAO's style of work

Dependent variable	B	SE	β	t	Sig.
Students dropping out	-17.09	2.68	-.304	-6.38	.000
Students learning to the system's satisfaction	17.83	4.45	.196	4.00	.000

if he was treated by the RAO who manages his work with the LAIC. Similarly, his chances of studying to the school's satisfaction increase if he is treated by an RAO who manages her work using the LAIC system.

3.4 Comparison of the data for 2005 and 2009

Students treated by an RAO who are classified as being at risk of dropping out or as students who study to the school's satisfaction were gathered into the category of students studying. Table 5 compares the number of those dropping out and the number of students studying treated by the same RAO for the years 2005 and 2009. The entire research population, bar 15 people, used the LAIC since 2005. Therefore this table presents the data for the research population, including that of the RAOs who used the LAIC since 2003 as well as those who began using it in 2005. The statistically significant decline of 34% in the number of students dropping out in 2009 is clear ($t=8.53$, $p < .001$). Furthermore, the average number of students treated by the RAOs rose by about 20% in 2009 compared to 2005 ($t = -6.61$, $p < .001$). Although the size effect of the data is not especially strong, one may affirm an improvement in the number of students dropping out and in the number of students learning during those years. Hence increasing the size of the research population not only maintained the improvement in the percentage of those dropping out, but even augmented it. Furthermore, the average total number of students treated by the RAO increased over the years. These data emphasize the LAIC's effectiveness and the system's potential in helping to handle the ongoing and complex processes.

3.5 The use of the LAIC and the RAOs' attitudes

The factor analysis conducted for the 30 questions produced four extremely reliable dimensions (domains), as described in Table 6. The first dimension represented the

Table 5 The number of dropouts and students in 2005 compared to 2009

Variable examined	(n=403) 2005			(n=403) 2009				
	N	M	SD	N	M	SD	t*	d
Students dropping out	6,816	16.83	20.74	4,467	11.03	13.30	8.53	0.42
Students learning	31,673	79.79	48.97	39,767	96.29	64.19	6.61-	0.32

The number of students learning includes those at risk of dropping out and those studying to the school's satisfaction

N = The number of students dropping out or learning for all the 403 RAOs

M = Average number of students per RAO

* $p < .001$, $df=402$

Table 6 Factor analysis for the RAOs questionnaire: The dimensions, reliability and averages

Dimension	Questions pertaining to the dimension	M	SD	α
1. LAIC contribution to the RAO's work	Q3,Q2,Q26,Q4,Q30, Q13,Q5,Q15	3.55	0.92	.88
2. Extent of RAO's use of LAIC components	Q12,Q11,Q9,Q10,Q14, Q6,Q7,Q24, Q1	2.95	1.06	.85
3. Pedagogic instruction	Q29,Q28	1.91	1.98	.92
4. Instruction and technical support	Q18.Q17,Q20,Q21,Q19	3.45	1.49	.85

1. The questions are presented in the [appendix](#)

2. Questions nos. Q16, Q23, Q27, Q8, Q22, Q25 were found to not belong

LAIC contribution to administering the RAOs' work and included eight questions, for which the average is relatively high (3.55) indicating the RAOs' positive attitudes regarding the LAIC's real contribution. These positive attitudes pertain to diverse aspects such as abbreviating the locating and reporting processes, good monitoring of the students, increasing the number of students treated and so on. The second dimension, with nine questions averaging 2.95, pertains to the extent of its use by the RAOs. Most of the RAOs generally use modules intended to treat students and handle the system's data. In contrast, they use the report generator and the automatic mailing system less. The use of the report generator is far more complex relative to the use of the other models, which seems to exacerbate matters for the RAOs. The third dimension received included two questions pertaining to the pedagogic instruction given to the RAOs. The relatively low average for the questions in this dimension (1.91) indicates that the instruction connected to the pedagogic aspects of the LAIC's work is insufficient and contributes little to the RAOs' work. This differs from the findings for the fourth dimension that represent the instruction and technical support afforded the RAOs for their work with the LAIC. This dimension included five questions for which the average was 3.45, indicating the satisfaction with the technical support and the instruction. Hence the technological assimilation of the LAIC was successful, while the pedagogic assimilation failed. The role of pedagogic instruction is to support the development of personal and group programs for students treated by the RAOs. Its purpose is to bridge the RAOs' knowledge and the new knowledge using educational methods and approaches. One of the reasons for the failure of pedagogic instruction is financial, since the budget allocated to technological assimilation is far greater than that allocated to pedagogic assimilation.

Examination of the correlation between the dimensions using the Pearson correlation (Table 7) finds a positive correlation with high significance between the dimension of the "LAIC contribution" and the "extent of use of the LAIC". The significance of this finding is that the LAIC has a direct contribution to the RAO's work. This finding indicates a significant statistical connection between the RAOs' attitudes regarding the two items. Similarly, a highly significant correlation was found between the dimension of "instruction and technical support" and the dimensions of "contribution to the LAIC" and "the extent of use of the LAIC". One may thus conclude that technical support affects the extent to which the LAIC is used as well as the LAIC's contribution to the RAO's work. One may thus conclude that technical support affects the extent of use of the LAIC, and its contribution to

Table 7 Pearson correlation between the dimensions

Dimension	1. LAIC's contribution	2. Extent of use by LAIC	3. Pedagogic instruction	4. Instruction and technical support
1. LAIC's contribution	—	.69**	.17 *	.32 **
2. Extent of use by the LAIC	.69**	—	.14	.27**
3. Pedagogic instruction	.17 *	.14	—	.13
4. Instruction and technical support	.32 **	.27**	.13	—

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

the RAOs' work. The dimension of "pedagogic instruction" was found to correlate with the dimension of "LAIC contribution" at a lower level of significance, but a correlation between this and the two other dimensions was not found.

4 Discussion

The Local Authority Information Center (LAIC) that was developed to confront one of the most important tasks of Israel's education system - the problem of student dropout - is central to this study. In a previous study we examined the effectiveness of the LAIC system, gradually assimilated since 2003, and found that the system improved the quality of the information. It provided a complete, up-to-date, reliable picture of students at risk of dropping out (submitted to International Journal of Information and Communication Technology Education - IJICTE). This study indicates that the LAIC also directly impacts the percentage of those dropping out, significantly reducing the rate by about 30%. The problem of dropping out is attended by such severe social and economic implications (Buckley et al. 2003) that even a decrease of a few percentage points in the dropout rate is a tremendous improvement. The many causes for dropping out, and the coordination needed between the various entities involved, make the problem more complex and hard to deal with. Moreover, locating and treating students at risk of dropping out as early as in junior high school, and even in elementary school, is more urgent since treating high school students dropping out is liable to be too late (Bowers 2010; Stearns and Glennie 2006).

The LAIC, as a smart system developed especially for dealing with the problem, increases the supervision of students at risk and improves the treatment process. The system is flooded with critical information on possible methods of action in diverse educational situations, and recommends taking the most effective method of action. The LAIC's recommendation is based on accumulated knowledge from the analysis of similar problems, methods of intervention, and their results. Moreover, the system mollifies the connection and coordination between the various entities that are connected to the problem, and thus leads to a significant decline in the dropout rate. The use of the LAIC, that enables the RAOs to present and to reflect systematic methodical information with exact segmentation and in real time, apparently increases their professional prestige in the opinion of the principal and the school

educational staff. The principal who is aware of the RAO's capability for immediate reaction and supervision cooperates and attempts to keep the students in school despite the problems that these students sometimes cause.

The impressive decline in the dropout rate is likely to raise the several questions. Might the RAOs working with the LAIC have personality traits that make them unique and increase the efficiency of their work, such as high performance ability or high motivation that contribute to the decline in the percentage of students dropping out? Did the RAOs in the control group not use the LAIC at the outset due to low motivation or lower performance ability? Although these aspects were not examined, the facts indicate this is not a reasonable proposition. The RAOs in the control group did not use the LAIC since 2003 as the local authorities in which they worked did not invest in the physical infrastructure (computer and communications) needed for the LAIC, and not because this was their choice. Therefore, we assume that the distribution of attributes such as motivation or skills in both the research groups would be similar. Similarly, there do not appear to be unique attributes for educational institutions or for educational areas in which the RAOs of one research group work. The RAOs in each research group are assigned to many and diverse local authorities. Each RAO is allocated to one local authority and works in the various educational institutions in that authority. Moreover, both the control and the experimental group had RAOs who belonged to the same authority. Therefore, it would seem unreasonable for the decline in the dropout rate to be substantially affected by the differences in the educational area or by the types of school in which the RAOs work.

Support for this assumption was provided by the data gathered in 2005 and in 2009, when the RAOs who worked manually began using with the LAIC. We found that the decline in the percentage of those dropping out, and, in parallel, the increase in the average number of students studying treated by the RAOs, intensifies after three years. We would have expected other results should there have been significant differences in personality traits, in educational institutions and so on, between the RAOs who worked with the LAIC from the outset and those who began using it at a later date.

In fact, once the entire research population used the LAIC to manage its work, a further decrease of more than 30% in the dropout rate was observed. These surprising and exciting results are contrary to the research hypothesis according to which the decrease in the dropout rate would be slight, or at the most, would remain unchanged. The hypothesis was that the gradual inclusion of more RAOs working with the LAIC would be an extended process, during which the percentage of those dropping out would be liable to rise relative to the data for the experimental group in 2005. The converse data received indicate that the process of assimilating the LAIC was efficient, and that the RAOs adopted the LAIC work approach. Support for these hypotheses was afforded by the RAOs' responses to the questionnaire that explored the locus of the LAIC in their work. The high correlation obtained between the dimension relating to the extent of use of the LAIC's diverse components and that connected to its contribution to the RAOs' work shows clearly their belief in the LAIC.

An equally exciting finding regarding the decline in the dropout rate is the significant increase in the number of students learning to the school's satisfaction.

The LAIC did not contribute only to more students remaining in school, but also to the improvement in the number of students functioning well there. The RAOs who used the system to manage their work, improved, in fact, the quality of their treatment of the students and raised the number of students in their care whose level of academic and social achievement was fairly good. It is important to note that students who are classified as studying to the school's satisfaction were previously classed as being students at risk of dropping out. When these students improve their functioning they switch to the first status. In fact, in addition to reducing the number of those dropping out the LAIC increases the transition of students from being at risk of dropping out to that of studying to the school's satisfaction.

The functioning of the students in school and its place, as seen by them, is a crucial factor in dropping out (Somers et al., 2009; White and Kelly, 2010). Therefore, the reduction in the dropout rate, together with the increase in learning, reinforces the conclusion that the use of the LAIC also decreases the rate of disengagement, that is far greater in scope than overt dropping out (Cohen-Navot et al. 2001).

As we have shown, the chances of a student dropping out of school when treated by an RAO who manages his work using the LAIC are smaller than those of a student treated by an RAO who works manually. Similarly, a student's chances of studying to the school's satisfaction, if he is treated by an RAO who uses the LAIC, are greater. The ability to predict academic status according to the RAO's work style emphasizes the need for the LAIC in helping to reduce dropping out and in increasing the perseverance needed to learn in school and realize achievements that meet the standard demands.

The unique contribution of the LAIC system contradicts the findings of various studies, such as that by Nunn (2001) that explored the impact of the computerized information system on the functioning of police stations. Nunn finds that the information system did not markedly improve the service to citizens. Another study that explored the affect of developing extensive technological systems in the American federal government emphasizes the conflicts between political and administrative considerations, and shows that the technological systems often do not attain their goals despite the tremendous financial and logistical investment (Klein, 2000).

What, in that case, are the main attributes of the LAIC leading to its success? In addition to the properties described in the introduction, the most important parameters are the cutting edge information, the great dynamism and the collectiveness of the system. The LAIC receives information from the Ministry of Education's information bank, which is constantly checked and updated by the RAOs. An RAO who discovers new methods of work for a given problem submits the information to the LAIC and thus also contributes to all the RAOs who use the system. Its development team constantly updates and adapts it according to the RAOs' demands. Furthermore, two mechanisms that help the optimal assimilation of the system contribute to its success. One is the technical support hotline, which all RAOs can access and from which they receive help solving technical problems within 24 h; the other is the group of those involved in assimilation whose role is to incorporate the use of the LAIC as a smart tool for managing the RAOs' work and not just as a reporting system.

Nevertheless these findings should be considered with suitable stricture. The reduction in dropping out is likely to also stem from the intervention of other factors in school or in the local authority, and not only due to the use of the LAIC. One may further assume that part of the contribution of the LAIC system is indirect. The information found therein is transparent to many entities, and therefore raises awareness of the scope of the problem, and directs the spotlight on students at risk of dropping out. It is reasonable to assume, for example, that the information available to officers in the Ministry of Education and the local authority is a pressure factor that encourages the school principals and educational staff to work vigorously to reduce the dropout rate in their schools.

The contribution of the LAIC system will be examined further to question the essence of the improvement in the quality of the RAO's treatment of students at risk of dropping out. Does the LAIC, as a system for managing knowledge and taking decisions, improve the RAOs' decision-making ability regarding the treatment of students at risk, and how?

Examination of the contribution of the LAIC system is at its height, although the system already seems likely to have a tremendous impact on the general coping with the problem of dropping out of school, which is one of the main problems of all education systems.

Appendix Questions relating to the place of the LAIC in the RAOs' work, according to their classification into dimensions

Question no.	Question	The dimension
Q2	To what extent is the LAIC system friendly and its operation easy and convenient?	LAIC contribution to RAOs' work
Q3	To what extent does the LAIC system meet your needs as an RAO?	
Q4	To what extent do you control the LAIC operation?	
Q5	To what extent does the use of the LAIC increase your control and monitoring of the students at risk of dropping out?	
Q13	To what extent does the use of the LAIC enable you to increase the number of students at risk of dropping out treated by you?	
Q15	To what extent does the use of the LAIC simplify/shorten the process of your locating and reporting on students "lacking current learning status"?	
Q26	To what extent does the use of the LAIC help you to locate students at risk of dropping out in real time?	
Q30	To what extent does the use of the LAIC improve the quality of the data reported on the students at risk of dropping out who are in your care	

Q1	To what extent do you use the LAIC system in your work?	Extent of RAO's use of LAIC components
Q6	To what extent do you use the "entire student body" model and the "students under the RAO's treatment model" in the LAIC system?	
Q7	To what extent do you use the "student location" model in the LAIC system?	
Q9	To what extent do you use existing fixed reports existing in the LAIC?	
Q10	To what extent are the data in the LAIC system useful in your work with the diverse factors in the authority?	
Q11	To what extent do you use the "report generator" in the LAIC system?	
Q12	To what extent do you use the direct mail in the LAIC system?	
Q14	To what extent do you use interfaces from the Ministry of Education that are part of the LAIC?	
Q24	To what extent are the instructions sent to you from the project administration clear to you?	
Q28	To what extent did the pedagogic instruction you received meet your work needs?	Pedagogic instruction
Q29	To what extent did the pedagogic instruction you received help you in your ongoing work?	
Q17	To what extent do your requests of the LAIC support center receive a suitable answer?	Instruction and technical support
Q18	To what extent do you produce reports from the LAIC system for inter-disciplinary discussions of students at risk of dropping out?	
Q19	To what extent do you receive individual instruction on the LAIC system?	
Q20	To what extent does the instruction you receive help you to use the LAIC system?	
Q21	To what extent does the instruction you received meet your work needs as an RAO?	
Q8	To what extent do you need the support services?	Found not to belong to any of the four dimensions
Q16	To what extent do you fear using the LAIC system in your work?	
Q22	To what extent do you need further individual instruction on the LAIC system?	
Q23	To what extent do you address questions to the project administration in Jerusalem?	
Q25	To what extent do your questions addressed to the project administration receive an answer?	
Q27	To what extent did you receive pedagogic instruction from the RAO guide?	

References

- Abbott, C. (2001). *ICT: Changing Education*. London: Routledge Falmer. Retrieved from http://books.google.co.il/books?id=sQkOAAAAQAAJ&printsec=frontcover&dq=ICT+in+education&hl=iw&ei=WLpiTdKEJ248gOQvqnxCA&sa=X&oi=book_result&ct=result&resnum=1&ved=0CCsQ6AEwAA#v=onepage&q&f=false
- Alavi, M., & Leidner, D. (1999). Knowledge management systems: Issues, challenges and benefits. *Communications of the Association for Information Systems, 1*(7), 2–36.
- Azzam, A. M. (2007). Why students drop out. *Educational Leadership, 64*(7), 91. Retrieved from <http://proquest.umi.com/pqdweb?did=1251647031&Fmt=7&clientId=47683&RQT=309&VName=PQD>.
- Bowers, A. (2010). Grades and graduation: A longitudinal risk perspective to identify student dropouts. *The Journal of Educational Research, 103*(3), 191. Retrieved from <http://proquest.umi.com/pqdweb?did=2117872951&Fmt=7&clientId=47683&RQT=309&VName=PQD>.
- Buckley, M., Storino, M., & Saami, C. (2003). Promoting emotional competence in children and adolescents: Implications for school psychologists. *School Psychologist Quarterly, 18*, 177–191.
- Central Bureau of Statistics. (2010). *Survey of Constancy and Dropout of High Schools during 2005–2009*. Jerusalem: Central Bureau of Statistics.
- Cohen-Navot, M., Ellenbogen, F. S., & Reinfeld, T. (2001). *The latent and formal dropouts among teenagers*. Jerusalem: Joint Brookdale Institute.
- Dolev, T., & Ben-Rabi, D. (2002). Convention on the rights of the child: Principles, rules and their application in Israel. *Social Security, 36*, 131–153.
- Jekielek, S. M., Moore, K. A., Hair, E. C. & Scarupa, H. J. (2004). *Mentoring: A promising strategy for youth development*. Retrieved 11/4, 2010, from <http://www.childtrends.org/files/mentoringbrief2002.pdf>
- Jozefowicz-Simbeni, D. H. (2008). An ecological and developmental perspective on dropout risk factors in early adolescence: Role of school social workers in dropout prevention efforts. *Children and Schools, 30*(1), 49–62.
- Klein, H. K. (2000). System development in the federal government: How technology influences outcomes. *Policy Studies Journal, 28*(2), 313. Retrieved from <http://proquest.umi.com/pqdweb?did=60914573&Fmt=7&clientId=47672&RQT=309&VName=PQD>.
- Maier, J. L. (1997). Rethinking strategic information systems. *Information Systems Management, 14*(4), 42. Retrieved from <http://proquest.umi.com/pqdweb?did=14062445&Fmt=7&clientId=47672&RQT=309&VName=PQD>.
- Nunn, S. (2001). Police information technology: Assessing the effects of computerization on urban police functions. *Public Administration Review, 61*(2), 221. Retrieved from <http://proquest.umi.com/pqdweb?did=71745221&Fmt=7&clientId=47672&RQT=309&VName=PQD>.
- OECD education database. (2009). *School drop-outs in 2008* Retrieved from http://www.oecd.org/document/55/0,3343,en_2649_34487_44666999_1_1_1_1,
- Power, D. (2008). Understanding data-driven decision support systems. *Information Systems Management, 25*(2), 149. Retrieved from <http://proquest.umi.com/pqdweb?did=1489516841&Fmt=7&clientId=47672&RQT=309&VName=PQD>.
- Prevatt, F. F., & Kelly, F. D. (2003). Dropping out of school: A review of intervention programs. *Journal of School Psychology, 41*, 377–395.
- Richman, J. M., Rosenfeld, L. B., & Bowen, G. L. (1998). Social support for adolescents at risk of school failure. *Social Work, 43*(4), 309. Retrieved from <http://proquest.umi.com/pqdweb?did=32206636&Fmt=7&clientId=47672&RQT=309&VName=PQD>.
- Scudder, R. A., & Kucic, A. R. (1991). Productivity measures for information systems. *Information Management, 20*(5), 343. Retrieved from <http://proquest.umi.com/pqdweb?did=1118027&Fmt=7&clientId=47683&RQT=309&VName=PQD>.
- Somers, C., Owens, D., & Piliawsky, M. (2009). A study of high school dropout prevention and at-risk ninth graders' role models and motivations for school completion. *Education, 130*(2), 348. Retrieved from <http://proquest.umi.com/pqdweb?did=1937522551&Fmt=7&clientId=47683&RQT=309&VName=PQD>.
- Stearns, E., & Glennie, E. J. (2006). When and why dropouts leave high school. *Youth & Society, 38*, 29–57.
- Telem, M. (1999). A case study of the impact of school administration computerization on the department head's role. *Journal of Research on Computing in Education [H.W.Wilson - EDUC], 31*(4), 385. Retrieved from <http://proquest.umi.com/pqdweb?did=43681746&Fmt=7&clientId=47683&RQT=309&VName=PQD>.

- Tyler, J. H. (2003). Economic benefits of the GED: Lessons from recent research. *Review of Educational Research*, 73(3), 369. Retrieved from <http://proquest.umi.com/pqdweb?did=434327651&Fmt=7&clientId=47683&RQT=309&VName=PQD>.
- U.S. Department of Education, National Center for Education Statistics. (2010). *The Condition of Education 2010* (NCES 2010–028), Indicator 20.
- White, S., & Kelly, F. (2010). The school counselor's role in school dropout prevention. *Journal of Counseling and Development: JCD*, 88(2), 227. Retrieved from <http://proquest.umi.com/pqdweb?did=1987542771&Fmt=7&clientId=47683&RQT=309&VName=PQD>.
- Ziomek-Daigle, J., & Andrews, P. (2009). Dropout prevention in the middle grades. *Middle School Journal*, 40(5), 54. Retrieved from <http://proquest.umi.com/pqdweb?did=1711520751&Fmt=7&clientId=47683&RQT=309&VName=PQD>.
- Zionest, Y., & Tamir, Y. (2002). Children in Israel. *Social Security*, 63, 5–34.

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