

Evaluating the Effectiveness of Instilling 21st Century Skills in Graduates of Public Versus Private High Schools

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Abstract

This research examines the effectiveness of instilling 21st century skills in graduates of public versus private schools. The five skills that were examined are information literacy, critical thinking, interpersonal communication, self-regulated learning and the use of information and technology (ICT). No significant average difference was found between graduates of public and private schools regarding their command of the five skills. Nevertheless, several factors have been found that are related to students' individual backgrounds: Among women, graduates of private schools were found to have a large advantage over female graduates of public schools regarding their command of information literacy skills and use of ICT. It was also found that among men, men who attended private schools had an advantage over those enrolled in public schools in terms of control of critical thinking skills. Further, among students who achieved a score of up to 650 on the Psychometric Test, those that attended a private high school had an advantage in their use of ICT. Among students whose fathers' highest level of education was high school, an advantage was found for students in private school in their control of information literacy as opposed to students whose fathers had an academic degree. For the latter, an advantage in the same skill was seen for public school graduates. Educators must recognize these 21st century skills and the variables that affect the command of them, in order to plan effective quality policies for education, which will take into consideration the gaps between different student populations.

1. Introduction

The Israeli educational system is leaned on a strong public base. Nevertheless, for about thirty years a privatization trend has existed, and the input of parents, associations and business entities in this development is increasing and strengthening. In Israel, the private educational system is different

than that existing in other countries. Hundreds of unique schools, set up by parental associations and educational networks, are defined as "recognized non-formal schools" (private) and are given budgets by the government that are 60-90% of those allocated to formal schools (public) [1]. The question, accordingly, is whether the type of school determines its quality.

2. The Israeli educational system

The Israeli educational system can be viewed according to four main cross-sections. 1) by age: Early childhood education – ages 3-5; primary school education – grades 1-6 (ages 6-11) or grades 1-8 (ages 6-13); post-primary education – middle school: grades 7-9 – ages 12-14 and high school: grades 10-12 – ages 15-17; post high school and academic studies – ages 18 and above. 2) by legal status: formal education – state and state-religious educational institutions owned by the state or by local authorities; recognized but not formal education – institutions that are not owned by the government but that have agreed, to a higher or lower extent, to be supervised and budgeted by the state to a degree less than that given to formal educational institutions; exempt institutions – ultra-orthodox educational institutions that the educational system recognizes as institutions exempt from having to fulfil the general requirements of the educational system, and for which special conditions exempting them from fulfilling the core curriculum law have been instituted. 3) by type of supervision: State – institutions that are not religious in the Jewish and non-Jewish sectors; state education and state-religious education provided by the state is independent of any political, ethnic etc. bodies and is overseen by the Ministry of Education; state-religious education – Jewish, religious-Zionist educational institutions. This is state education whose institutions are religious in lifestyle, curriculum, teachers and superintendents; "other" supervision – Jewish-ultra-orthodox educational

institutions. 4) By sector: Jewish; non-Jewish – Arab, Bedouin, Druze, Circassian [2].

In the present study, to make the sample as uniform as possible, we examined high schools from the Jewish sector that are state supervised.

2.2. The Israeli private educational system

Every type of institutionalized education, administered by non-governmental agencies, is deemed to belong to private sector education. Within this sector, we must distinguish between private education in the exact and narrow definition of the word “private” and supported private education, which is financed by public funds.

In Israel, the private educational system is different from that existing in other countries. Hundreds of unique schools, set up by parental associations and educational networks, are defined as “recognized non-formal schools” (private) and are given budgets by the government that are 60-90% of those allocated to formal schools (public)

Accordingly, we can say that within the educational system in Israel there are schools that can be defined as supported private educational institutions (in this study, we refer to such schools as “private”).

3. The skills required by high school graduates in the 21st century

The role of schools is to prepare the young generation for the future.

The school must recognize the world of today’s adolescents and know what will be required of these young people as they mature. Among its obligations, the school must provide its students with the tools necessary for them to cope successfully with the challenges expected to face them as adults.

Dr. Uzi Melamed and Ami Salant [3] conducted a global review of researchers’ and educators’ opinions regarding the question of the skills schools should provide adolescents in the 21st century. They found nine skills, with five being present in the majority of sources they reviewed: information literacy skills, critical thinking skills, interpersonal communication skills, self-regulated learning skills and use of information and communications technology tools skills.

4. Research rationale and hypotheses

4.1. Overall Difference

Dronkers and Robert [4] analyzed the differences between educational achievements in public and private schools in 22 countries. The researchers evaluated the impact of these sectors, while

controlling for different sociological characteristics of the students and their parents, the schools’ population, learning conditions in the schools and the perceptions of students and headmasters regarding the climate of their schools. The main explanation found for the different educational achievements was the better social composition in the private schools. These differences in educational achievements among students in the public and private sectors are identical among different nations, despite the differences in the various educational systems’ pasts.

The central research question examined the command of 21st century skills by public and private school graduates, owing to their school studies.

Accordingly, we propose the following hypothesis: H1: Undergraduate students who graduated from private high schools will have better control of the five 21st century skills: Information literacy skills, critical thinking skills, interpersonal communication skills, information and communications technology skills and self-regulated learning skills, than undergraduate students who graduated from public high schools.

4.2. The moderating variables in the model

Zheng, Saunder, Shelley and Whalen (2002) [5] investigated the link between grades in the first year of college and previous background characteristics: high school grades and ACT grades (equivalent to the Psychometric Test in Israel), gender, ethnicity, parents’ education and parental status (married or separated/divorced).

Whereas the high school and ACT grades were found to be significant predictors of academic success, explaining about 25% of the variance in the average grades in college, the remaining variables together - gender, ethnicity, parents’ education and marital status - were found to explain only 6.2% of the variance in the grades.

In light of these findings, in the present model, we refer to the following factors - average grade on the matriculation exams, Psychometric Test score (scoring scale ranges from 200-800 points), gender, parents’ education and marital status - as the moderating variables when comparing the type of high school in which the student studied and their command of 21st skills.

We hypothesize that we will find an interaction effect between the type of high school from which the student graduated and each one of the intervening variables noted above: average grade on the matriculation exams (H2), Psychometric Test score (H3), gender (H4), parents’ education (H5) and marital status (H6), at the level of control of each of the five 21st century skills.

5. Method

5.1. Participants

The study participants were undergraduate university and college students. They were selected under the assumption that as students now, and high school graduates in the not too distant past, they would utilize the skills acquired in their high school studies and as such, be able to assess their command of these skills.

All 317 participants graduated from Jewish state schools in Israel. Of these, 239 graduated from public schools (75%) and 78 graduated from private schools (25%). This representation was found to be fairly close to the general population proportions (80% vs. 20%, respectively).

Of the participants, 200 were women and 111 men (6 participants did not answer the question about gender) and the range of ages was 19-34 ($M = 25.82$, $SD = 2.31$).

209 of the participants are studying in universities and 108 are studying in colleges. 40 of the participants are in their first year of study (freshmen); 87 were in their second year (sophomores); 137 were in their third year (juniors) and 53 were in their fourth year (seniors) or more.

5.2. Instruments

The study data were collected using a questionnaire, constructed and based on items taken from validated questionnaires published in the scientific literature. The questionnaire comprised five parts. The first part included questions about their backgrounds. In the second part, participants were asked to rate their level of ability to carry out each one of the actions listed in the questionnaire on a 1–5 Likert scale. In this part, items that measured control of information literacy skills appeared [6]. In the third part, participants were asked to mark their degree of agreement on a Likert scale with each item listed. In this section, items that measured command of critical thinking skills [7], interpersonal communication [8] and self-regulated learning [7] appeared). In the fourth part, participants were asked to rate on a Likert scale their frequency of carrying out each of the actions listed. In this section, items that measured command of the use of ITC skills appeared [9]. The fifth part of the questionnaire asked for additional demographic details.

5.2.1. Checking the validity of the measurement instrument. After the questionnaires were completed, all the items belonging to each skill were tested for the fitness between statements. We used Cronbach's α to represent the degrees of fitness found: information literacy: $\alpha = 0.771$; critical thinking: $\alpha = 0.824$; interpersonal

communication: $\alpha = 0.827$; self-regulated learning: $\alpha = 0.538$; information and communications technology: $\alpha = 0.582$. The fact that the items used to measure each skill were taken together from validated questionnaires (see Section 5.2 Instruments), allowed the examination of the results to continue.

In addition, we conducted a confirmatory factor analysis (CFA) using AMOS software. The CFA shows the goodness-of-fit indices. When the fit of the model's factors, ranging between 0-1, is closer to 1, there is a good fit. All these goodness-of-fit indices attest to the good fit of the model when their values are close to 1.

When the value is .85-.90, the fit is good [10]. The root mean square error of approximation (RMSEA) measure is an additional measure used in reporting, and reflects a misfit so its value should be less than 1. A value smaller than .06 returned by the measure shows a close fit and values between .06-.08 represent reasonable errors in the population [11]. It is acceptable to report about a minimum of three central fit measures in order to prove the theoretical model's fit to the data [12].

The five-factor model for the 21st century skills was the model with the best fit: $\chi^2 = 778.968$, $n = 498$, CFI = .897, NNFI = .884, IFI = .900, and RMSEA = .042.

5.3. Sampling process

Students for the study were recruited via electronic publication of the questionnaire on the Internet and distribution of the questionnaire in class in various institutions of higher education.

After data were collected, the type of school attended by the study participants was classified by name of school and participant's place of residence during high school, as reported by the participant.

Classification was made according to the list of schools found on the Ministry of Education's website and in line with the details of Section 2, above: Every school whose legal status is "official", or whose legal status is "recognized but unofficial," yet is owned by a municipality or a local council, is regarded as a public school. Likewise, every school whose legal status is "recognized but unofficial" and is owned by a body that is not a municipality or a local council is regarded as a private school.

Of the 401 students that completed the questionnaires: 5 noted that they are no longer students; 28 graduated from school in the state-religious sector, 20 graduated from high schools in the Arab sector, 7 graduated from high schools in the Druze sector, 5 graduated from schools abroad; 4 did not provide the name of the school from which they graduated (and hence, we could not classify the school as public or private); for 5 respondents we were unable to locate the name of the school from

which they graduated in the Ministry of Education's database; 10 respondents were born before 1980. The data regarding these 84 respondents were deleted from our database and were not included in the analysis.

6. Findings

To test Hypothesis H1, we conducted t-tests for two independent samples.

We did not find that the students, graduates of private high schools, had better command of the five 21st century skills than the graduates of the public schools [information literacy- $t_{(315)}=-1.565$, n.s.; critical thinking- $t_{(314)}=0.753$, n.s.; interpersonal communication- $t_{(310)}=-1.279$, n.s.; self-regulated learning- $t_{(311)}=0.404$, n.s.; information and communications technology skills- $t_{(315)}=0.405$, n.s.].

Nevertheless, among third-year university or college students, the information literacy skills of graduates of private high schools ($M=4.28$, $Sd=0.46$) were found to be stronger than those of graduates of public high schools ($M=4.08$, $Sd=0.61$), $t_{(65.019)}=-2.06$, $p<.05$.

It was hypothesized that the type of school, average matriculation grade and the interaction between them influences each of the five 21st century skills (H2). The hypothesis was checked using linear regression analysis. For each of the five skills, we checked two factors: type of school and average matriculation grade using a regression model with interaction. Not one of the models was found significant. The hypothesis was not supported [information literacy- $F(3,307)=1.76$, n.s.; critical thinking- $F(3,306)=0.24$, n.s.; interpersonal communication- $F(3,302)=-1.43$, n.s.; self-regulated learning- $F(3,303)=0.68$, n.s.; information and communications technology skills- $F(3,307)=1.37$, n.s.].

The hypothesis that the type of school, Psychometric Test score and the interaction between them affects each of the 21st century skills (H3) was examined using linear regression.

Interaction between type of school and Psychometric Test score was found in the command of students of the information literacy skill [$F_{(3,305)}=3.33$, $p<0.05$]. Among students whose score on the Psychometric Test was 600 and below, students who graduated from private schools, had an advantage in their command of the information literacy skill. For students who had a score of 600 or higher on the Psychometric Test, no similar significant advantage was identified.

Interaction between type of school and Psychometric Test score was found in the command of students of the use of information and technology tools [$F_{(3,305)}=4.29$, $p<0.01$].

Figure 1 presents the interaction of type of school and psychometric test score over the use of

information and communications technology skills. Among students whose score on the Psychometric Test was 650 and below, students who graduated from private schools, had an advantage in their command of the use of information and technology tools.

Nonetheless, in the case of students whose Psychometric Test result was 700 and above, the finding was reversed and students who graduated from public schools had an advantage in their command of the use of information and technology tools.

The rising trend of the contribution of private school command of information and communications technology skills reverses and starts to descend among students who scored 600 and above on their Psychometric Test.

Three other models that were checked for predicting command of interpersonal communication skills, critical thinking skills and self-regulated learning, using the type of school, Psychometric Test score and the interaction between them were not found to be significant [critical thinking- $F(3,305)=2.38$, n.s.; interpersonal communication- $F(3,300)=-1.75$, n.s.; self-regulated learning- $F(3,301)=0.26$, n.s.].

The hypothesis that type of school, gender and the interaction between them influence each of the five 21st century skills (H4) was examined using linear regression.

For the model in which the type of school, participant's gender and the interaction between them were introduced into the regression as independent variables and information literacy skills were introduced into the model as a dependent variable, a significant regression equation was found [$F_{(3,310)}=2.95$, $p<0.05$].

Figure 2 presents the interaction of type of school and gender over command of information literacy skills. It was found that among females, graduates of private schools vs. graduates of public schools have an advantage in their command of the information literacy skill, whereas among males, no similar significant advantage appears.

For the model in which the type of school, participant's gender and the interaction between them was introduced into the regression as independent variables and critical thinking skills were introduced as a dependent variable, a significant regression was found [$F_{(3,309)}=3.38$, $p<0.05$].

Among men, it was found that graduates of private schools vs. graduates of public schools had stronger critical thinking skills. This was not the case among women.

For the model in which the type of school, participant's gender and the interaction between them was introduced into the regression as independent variables and information and

communications technology skills were introduced as a dependent variable, a significant regression was found [$F_{(3,310)}=5.18, p<0.01$].

Among women, an advantage was found for graduates of private high schools compared to public high school graduates in command of information and communications technology skills. Among men, a very slight advantage was found for public school graduates compared to private school graduates.

It was found that among men, there is a greater advantage for graduates of private schools in comparison to graduates of public schools regarding command of the critical thinking skill than among women.

It was hypothesized that type of school, father's education, mother's education and the interaction among them influence each of the five 21st century skills: information literacy, critical thinking, interpersonal communication, self-regulated learning and use of information and communications technology (H5).

A significant model in which the type of school, participant's father's education and the interaction among them was found when introduced into the regression as independent variables and command of the information literacy skill was introduced as a dependent variable [$F_{(3,314)}=7.05, p<0.0001$].

Figure 3 presents the interaction of type of school and parents' education over the command of information literacy skills. Among students whose fathers had a high school or lower education, it was found that graduates of private schools had an advantage in information literacy skills compared to

students whose fathers had a graduate degree or higher. Among the latter, the graduates of public schools had an advantage in command of the same skill.

The additional models were checked for prediction of command of critical thinking, interpersonal communication, self-regulated learning and information and communications technology skills, using type of school, parents' education and the interaction among them. No significance was found [critical thinking- $F(6,311)=0.87, n.s.$; interpersonal communication- $F(6,307)=-1.01, n.s.$; self-regulated learning- $F(6,308)=0.88, n.s.$; information and communications technology- $F(6,312)=0.92, n.s.$].

It was hypothesized that type of school, parents' marital status and the interaction among them influence each of the five 21st century skills(H6).

The hypothesis was examined using linear regression. For each of the five skills, we checked two factors: type of school and parental marital status, in a regression model with interaction. Not one model was found to be significant. The hypothesis was not supported [information literacy- $F(3,297)=1.80, n.s.$, critical thinking- $F(3,296)=0.61, n.s.$; interpersonal communication- $F(3,293)=-1.09, n.s.$; self-regulated learning- $F(3,293)=0.40, n.s.$; information and communications technology- $F(3,297)=2.48, n.s.$].

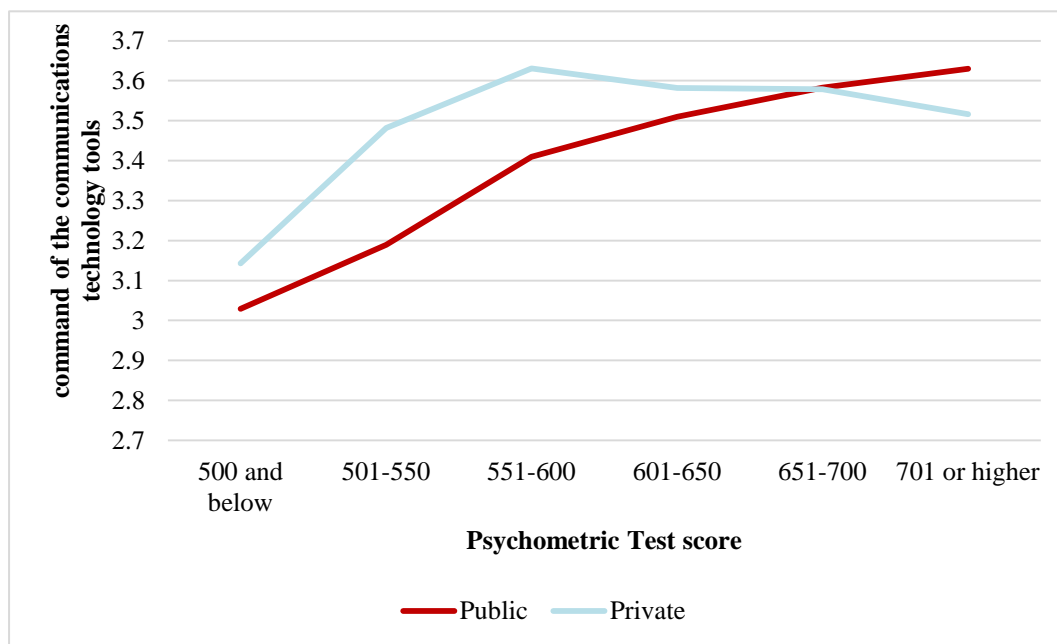


Figure 1. Examining the interaction between type of school and psychometric test score and the use of information and communications technology skills

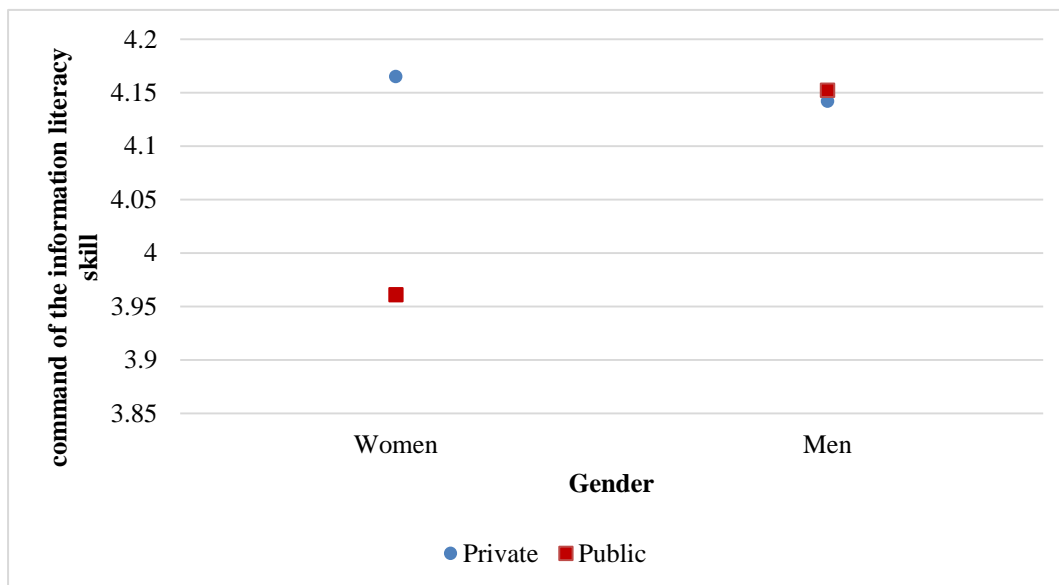


Figure 2. Examining the interaction between type of school and gender and command of information literacy skills

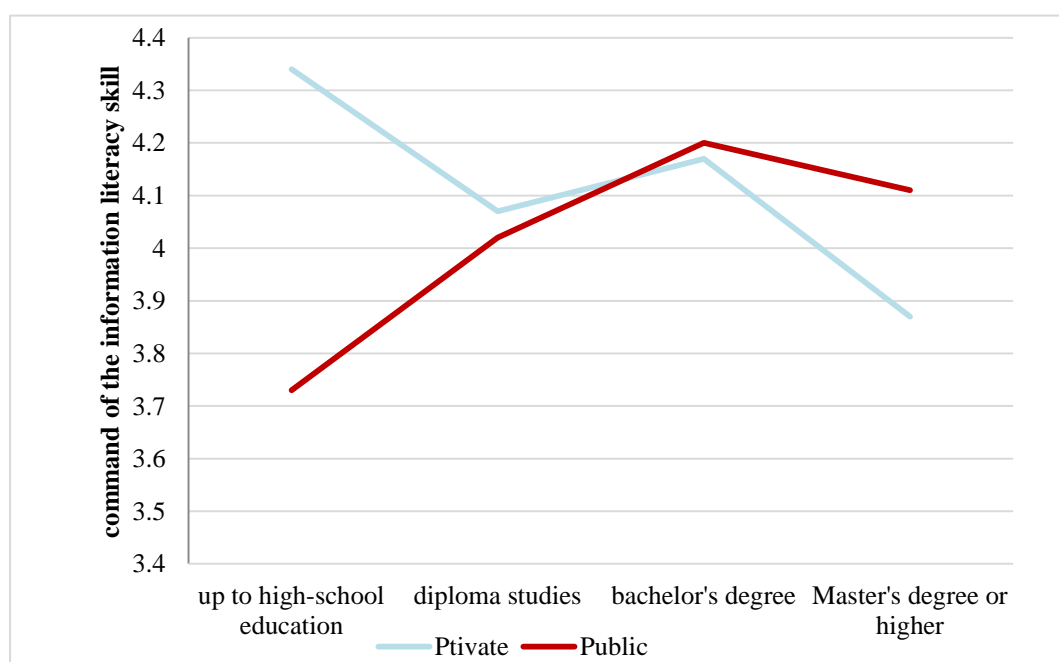


Figure 3. Examining the interaction between type of school and parents' education and the command of information literacy skill

7. Conclusion

7.1. Summary and possible explanations for the research's main findings

The research findings did not support the main hypotheses that we would find a difference between graduates of private schools and graduates of public schools regarding their command of each of the five 21st century skills (H1).

Nevertheless, a significant difference was found between graduates of public high schools and graduates of private high schools in command of information literacy skills among third year undergraduate students. We found that graduates of private high schools have better command of information literacy skills than graduates of public high schools.

Based on the examination of curricula for undergraduate studies in a number of institutions of higher education in Israel, it may be that this difference is significant only in students' third year of studies, since in this year they are generally required to write a seminar paper. This type of assignment forces them to use information literacy skills to search for data, read papers, and process and draw conclusions from such academic articles. The use of information literacy skills makes students more aware of their command of the skills and their reporting of their level of command more exact.

It was found that among students whose Psychometric Test score was 600 or below, students that attended a private high school had an advantage in command of information literacy. For students whose Psychometric Test score was 600 or above, no similar significant advantage was seen. In practice, the higher the student's score, the smaller the difference between private high school and public high school attendance (H3).

Reviewing the information booklets of different psychometric test preparation companies, it appears that, in general, the improvement rates of students, after having taken the test once, range between 100-130 points if they take a preparatory course. Consequently, a student starting from a low point of origin will remain, most likely, in the lowest score categories. These students, usually, were also weak students in high school.

From interviews that we conducted among teachers in public and private high schools, we saw that private schools invest many resources in encouraging learning among weaker students, in comparison to public schools. This situation is due to private schools have the privilege of discontinuing a student's studies, and therefore, not infrequently, weak students drop out of private schools – which is detrimental to the financial interests of the school. It may be that this is the reason why the higher the

student's score on the Psychometric Test, the smaller the difference between the public and private school graduates' command of the skills.

The findings of the present study partly supported the fourth hypothesis, which proposed that we will find an interaction between participants' gender and command of the five 21st century skills [H4]. It appears that among men, graduates of private schools have an advantage over graduates of public schools in their command of critical thinking skills. These findings partly support the study's main hypothesis [H1], according to which private school graduates will have better command of 21st century skills, among which are critical thinking skills, than public school graduates.

In addition, among women it was found that graduates of private schools have better command of information literacy skills than graduates of public schools – a finding that did not appear among men.

A possible explanation for the fact that the type of school has a stronger influence on women than on men lies in the psychological concept of "locus of control". Locus of control is a personality characteristic that is expressed through a general belief held by an individual regarding the degree to which events in his or her life are controlled by him or her.

People who have an external locus of control believe that their behavior or events that they experience are determined more by external forces, e.g., fate, luck, the government or other significant people [13]. In contrast, people who believe that their personal efforts, behavior and talents influence the outcome of events in their lives have an internal locus of control. Researchers maintained that in general, women are more external locus of control oriented than men [14]. Consequently, it may be that the type of school has a greater effect on command of information literacy among women, who believe that their success is dependent on external factors, compared to men. In general, the skill command levels among men were higher than among women. Nonetheless, it should be noted that there are researchers that claim that the difference in locus of control among the genders varies depending on which behavioral field is being discussed.

The results of the present study supported the fifth hypothesis only partially. This hypothesis claimed that undergraduate students whose parents had higher education would have better command of the five 21st century skills than undergraduate students whose parents have lower education [H5].

Among students whose fathers had a high school or lower education, we found that graduates of private high schools had an advantage in their command of information literacy, compared to students whose fathers had a graduate or higher degree. For the latter, the graduates of public schools had the advantage. A possible explanation for this

may lie in a factor related to success in studies - parental expectations of their children. A study that was conducted in the University of Illinois in Chicago [14] found that parents' expectations influence the scholastic achievements of their children: 1. The more parents believed that their children will continue to higher education, the greater the children's achievements were; 2. Parents' beliefs that their children will continue to higher education led to their children perceiving their parents' expectations more clearly, which led to their own expectations of higher achievements in their studies, and these led to higher achievements; 3. Parents' beliefs that their children will continue to higher education led to their children perceiving their parents' expectations more clearly, which led to the children investing more time in their homework, and this led to higher achievements.

Accordingly, it would appear that students whose fathers had a high school or lower education and who were sent by their parents to a private school felt a stronger expectation on the part of their parents and a stronger obligation to succeed. This is in contrast to students whose fathers had a graduate or higher degree, who probably felt that they had a "bar" to meet, even if they were sent to a public school. In opposition, students attending a private school see higher education as the norm, do not feel that their parents made any special investment and do not display any special effort or achievements.

7.2. Research recommendations and implications for future research

Based on the findings reported above, we recommend expanding the present research on a number of levels. First, we recommend using a larger population of students, which will better represent students from different subgroups (educational institutions, study fields and years of study), to enable analysis of the differences in command of 21st century skills among specific subgroups of graduates of private and public high schools. Doing this may reveal clearer and more focused findings regarding differences in command of the skills.

Further, studies in the field of educational performance of students indicate the importance of two elements of learning: motivation and cognition. When looking at the differences between study participants in motivation and cognition, it is important to examine how these differences are liable to change, for example, in accordance with the participant's gender [16]. Accordingly, we recommend adding consideration of additional cognitive and motivational aspects – among which is locus of control – which may vary in line with the participant's gender.

7.3. Research and social implications

The findings of the present study raise a number of issues that should be considered. It would appear that public high schools as well as private high schools do not make any special investment in strong students, which are in any event perceived as the ones that will succeed regardless of their environment. Another issue relates to the gaps found between men and women in command of the skills we examined.

The results presented herein are significant primarily for high school principals and educators.

The findings can be implemented in the planning of effective policies, which should pay attention to the gaps between different student populations are differentiated from each other by factors such as gender, previous educational achievements, socio-economic status and the like.

High school principals must recognize the skills of the 21st century, as well as factors such as gender and parental education that impact upon them, and the variables that may be affected by them. In order to create a more equitable educational system, which relates to unique characteristics of varying populations that influence the success of students later on in their academic lives, the issues discussed here must be considered.

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