

Teaching, Learning and Evaluation in a Transparent and Monitored Environment: The Case of the Virtual High School in Israel

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Abstract

Recently, an Israeli Virtual High School (VHS) was launched as a joint initiative of the Ministry of Education, the Center for Educational Technology (CET) and the Trump Foundation. Its mission is to increase the number of high school students from the Israeli periphery that score well in high level of mathematics and physics matriculation exams. The Israeli VHS has joined other virtual schools across the world, to serve as "transparent laboratories" that provide a fresh look into the processes of Teaching, Learning and Evaluation (TLE).

This VHS operates all TLE processes fully online, through synchronous classroom lessons, synchronous small group practice sessions, monitored homework and online tests.

The unique characteristics of the school, based on a virtual Learning Management System (LMS), are: classroom transparency, online monitoring system and feedback mechanisms. These serve as the means to design, improve and personalize the TLE processes. The analyzed data include time spent by the students in the virtual environment, scope and quality of homework performance, evaluation given by the teachers, etc. All the synchronous lessons are recorded and used as a powerful resource to help teachers and students acquire a deep understanding of the teaching and learning processes. Most of the students' online tests are automatically scored and provide feedback to the student as well as to the teacher .

The transparent environment, along with the comprehensive and immediately – available analyzed data, promotes a broad understanding of the students' performance in the virtual environment. These characteristics facilitate personalization and adaptation of teaching and learning according to each student's unique needs.

The VHS students are expected to be independent learners who can fully utilize the feedback mechanisms due to their high self-efficacy (SE). Findings from a formative evaluation research show that the VHS students are equipped with this characteristic. Moreover, the research shows a significant correlation between the degree of students' SE and their achievements .

Key words: virtual learning, synchronous lessons, classroom transparency, online monitoring, personalization-based learning

Background

The trend toward online learning is growing throughout the world, and the ability to learn in any location, at any time, and using any user device, is perceived as one of the important skills for the 21st century. The abundance of information available today across the internet, along with the accelerated growth of its cumulative knowledge, requires education systems throughout the world to provide students with the ability for Life Long Learning (LLL) in the digital world, and it is more and more evident that this ability is based, to a large extent, on self-directed learner skills. Making the brick-and-mortar school structure more flexible by means of various elements of online learning, offers education systems across the world new kinds of opportunities, including from the perspective of the new methods that can be offered to student diversity (personalization and competency-based learning) and from the perspective of improving TLE methods in line with the challenges of the digital age.

In the United States there are nearly 2 million students taking single online courses, and 275,000 students in full-time online schools. 28 states offer online courses through a statewide Virtual School providing students with supplemental online courses; 31 states have full-time online schools for students in K-12 education (Patrick et al.; 2012).

Online learning has become popular because of its perceived potential to provide more flexible access to content and instruction by

- 1) Increasing the availability of learning experiences for those who cannot or choose not to attend traditional schools,
- 2) Assembling and disseminating instructional content more efficiently, and
- 3) Increasing student – instructor ratios while achieving learning outcomes equal to those of traditional classroom instruction (Bakia et al., 2012).

E learning allows more individuals and social groups to access and acquire education, a fact that makes it a more convenient method (Arbaugh, 2004). Virtual Schools are personalizing student learning and extending it beyond the traditional school day. They've created new models for the practice of teaching with opportunities to easily observe, evaluate, and assist instructors. Students don't have to proceed at the same pace as an entire classroom, they can take extra time to review and receive additional guidance on lessons, or move through a course at an accelerated pace. Virtual Schools can organize entire courses according to an individual student's learning needs (Tucker. B., 2007).

Virtual schools serve as a kind of “transparent laboratory” through which one can observe the activity of TLE, and derive significant professional insights for the educational community.

The Virtual High School (VHS)

To the growing trend of virtual high schools throughout the world, a new initiative was added this year, one that is the focus of this paper, and that is the Virtual High School set up as a joint project of the Ministry of Education, the Center for Educational Technology (CET) and the Trump Foundation. Its mission is to increase the number of high school students from the Israeli periphery who score well in high level mathematics and physics matriculation exams (STEM education).

According to this initiative, Internet based teaching of Mathematics and Physics provides a solid basis for further expansion to other, less complex, subject areas.

The courses offered by the VHS are FOL (Fully Online). The target audience for the program is those schools that cannot offer their students high level matriculation studies in these subjects, due to the lack of a suitable teacher or the low number of students.

The VHS's learning model includes four key components: synchronous lessons for a class of 20 students, synchronous practice sessions for groups of 3 students, monitored homework for self-study, and online tests and examinations. The timetable for a student in the virtual high school comprises about 4 synchronous lessons, 3 practice sessions, and self-study. The teaching staff includes leading teachers in their subject fields, and tutors who are outstanding college students in the relevant subjects. Teaching and learning are supported by interactive digital content, developed in line with the syllabus. This content includes slide presentations for lessons and practice sessions, online homework assignments, simulations, videos, laboratory guides, and specialist lectures. All of the teaching and learning processes take place on a dedicated technological platform that includes powerful tools for monitoring and follow-up.

The high school began to operate in 2012, with about 100 students in Grade 10, from about 32 high schools. Over the next few years it is supposed to gradually expand to approximately 1,000 students. This year the high school included 6 teachers and 38 tutors. Operations of the high school included ongoing communication with the schools, to monitor the students' progress, synchronous meetings with parents at the end of each semester, and synchronous staff meetings to learn lessons and improve working processes.

The Virtual High School's Monitoring and Evaluation Mechanisms

One of the High School's unique characteristics, as an LMS-based virtual learning space, is the transparency of the classroom, and the ability to obtain data and information on the performance and behaviors of the students, teachers and tutors, as a basis for constantly improving teaching, learning, and their administration. Online monitoring mechanisms include: monitoring of students' attendance at lessons and practice sessions, time logged into the system, the extent to which homework was completed, and the quality of the homework, and whether the teachers had checked the assignments and provided feedback to the students. All of the lessons and practice sessions are recorded automatically, and these recordings are an innovative, powerful tool for in – depth understanding of each student's learning processes. The quizzes completed by the students, as part of their independent learning, are scored automatically , thus providing feedback to the students, and giving the teacher an immediate picture of the class's overall level of understanding and the level of each individual student. In light of the pioneering nature of the VHS, it was decided to accompany its activities, from its launch in 2012, with an evaluation research. The research data, alongside with the monitoring mechanisms, facilitate a learning process assisting the VHS to meet its goals, and providing a basis for future expansion.

The data sources for the research include data retrieved from the technological system, online surveys, focus groups, and interviews with students, teachers, tutors, and school principals, at various times during the school year.

Monitoring – Transparency and Administration

The monitoring capacity that characterizes the Virtual School is a critical aspect for ensuring the quality of teaching, according to Tucker (2007):

"In online courses, the curriculum, the teacher's daily lesson plans, the interaction in the classroom are all on display, available for capture and replication because they are online for all to see. The system also provides administrators with a comprehensive view of the school's courses, student performance, and progress toward credits. Instructional leaders, teachers, students and parents can access the portion of the data appropriate for their roles. All of the data, including class scheduling and waitlists, is available for instructional leaders to ensure a level of quality control that is too often lacking in traditional public high schools."

According to Patrick et al. (2012):

"The bigger issue is the need for better transparency of student data: demographic, proficiency, and assessment data developed based on standards – based trajectories used to analyze individual student growth outcomes."

Patrick et al. (2012) adds that : "To address the quality assurance questions requires collecting and reporting more transparent data, implementing multiple measures of student performance, rethinking school evaluation, and clarifying which performance metrics are most important to create a more robust benchmarking picture of performance. These can and should apply to all schools, but the need is especially pressing for online schools."

Our research shows that the transparency of the VHS is an important component of the supervisory ability of the principals of the schools from which the students have come. 88% of them stated in a survey that the information that they receive from the VHS allows them to take responsibility for their students' learning. According to one of them: *"I get ongoing updates and follow-up regarding our students, both in terms of attendance and in terms of their achievements"*.

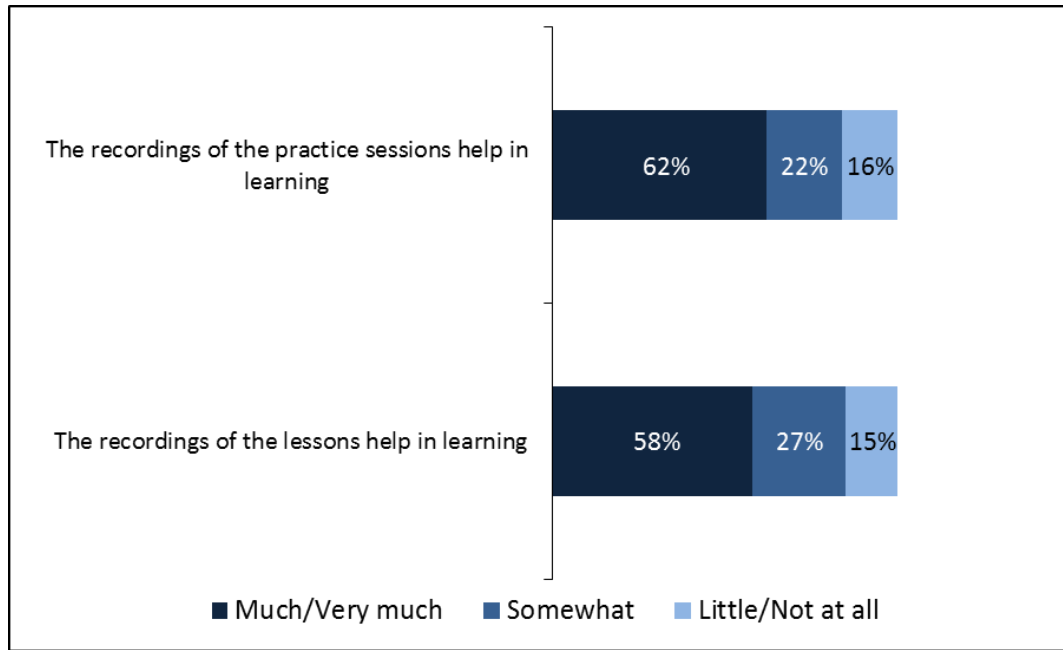
Monitoring – Transparency and Personalization

The monitoring mechanisms allow transparency of the TLE processes. Furthermore, the ability to obtain the information immediately, with analysis, allows a better understanding of the performance of the student within the virtual space, and personalization and adaptive learning for each student.

Patrick et al. (2012) indicate that one of the reasons that online learning is expanding so rapidly is that teachers can personalize learning, using more engaging content and technology tools to better address the needs of each student in way that is very difficult for a traditional environment. They add that technology – based models allow for rapid capture of student performance data and personalized instruction tailored to the specific needs of individual students. Teachers, who adapt instruction by accessing data on student mastery and work with students to target their needs, can individualize learning to reflect the skills and knowledge students have mastered. These online models have the potential to keep students engaged and supported as they learn, to allow students to access the best teachers from any location, and to help students to progress at their own pace, leading to dramatically higher levels of learning and attainment .

Also others argue **that online learning can provide individualized and differentiated instruction** (Archambault et al., 2010; Christensen and Horn, 2008; Waldeck, 2008; Watson and Gemin, 2008) through multiple mechanisms that provide immediate formative feedback about a student’s performance (Dennen, 2005; Rice et al. 2008). Personalized learning can tap students’ innate curiosity and help them deepen their learning (Bakia et Al., 2012).

The usefulness of the online monitoring mechanisms can be evident in students' responses, as shown in Graph 1.

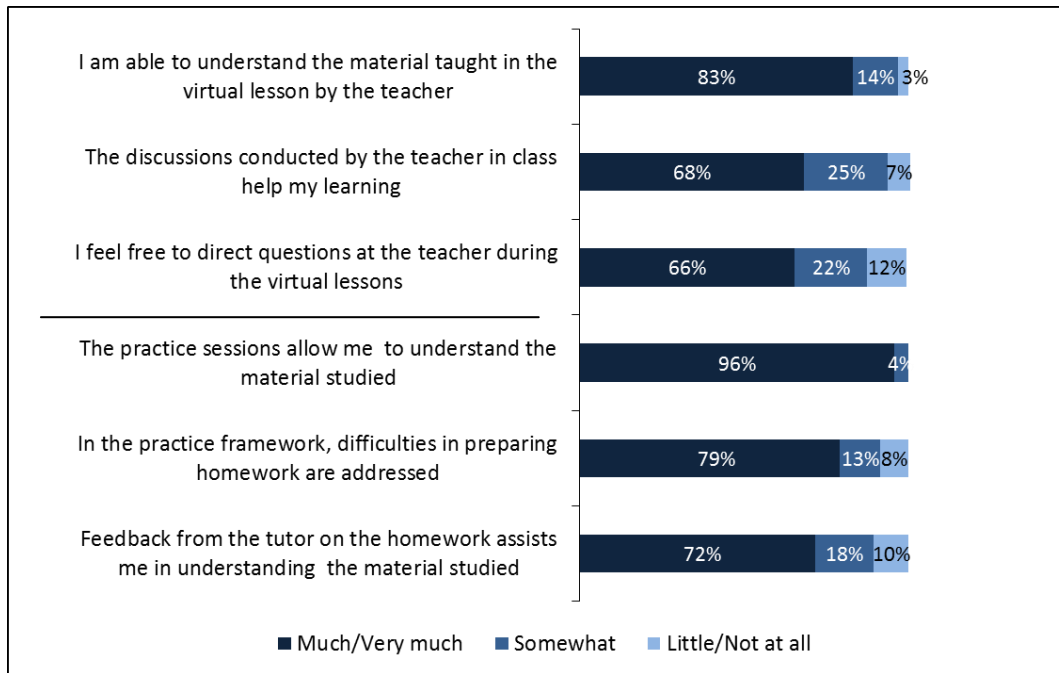


Graph 1: The perceived usefulness of recorded practice sessions and lessons (students self-report)

According to one of the students:

"I can learn from home, there is more flexibility in the pace of learning, I can review things on my own that I did not understand, without holding everyone else up"

Further evidence of the personalization of teaching in the VHS, and the students’ satisfaction as a result, can be found in their perceptions of the learning processes taking place during the lessons and practice sessions, as shown in Graph 2.



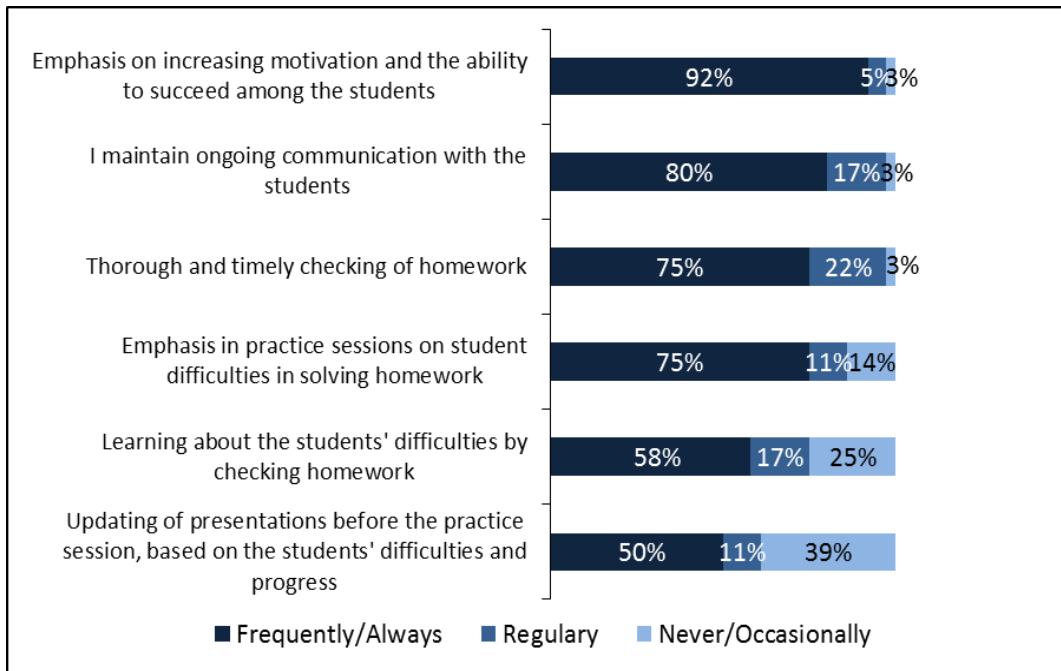
Graph 2: Student perceptions of learning and teaching processes

The students attested to their satisfaction, with emphasis on personalization of teaching and learning:

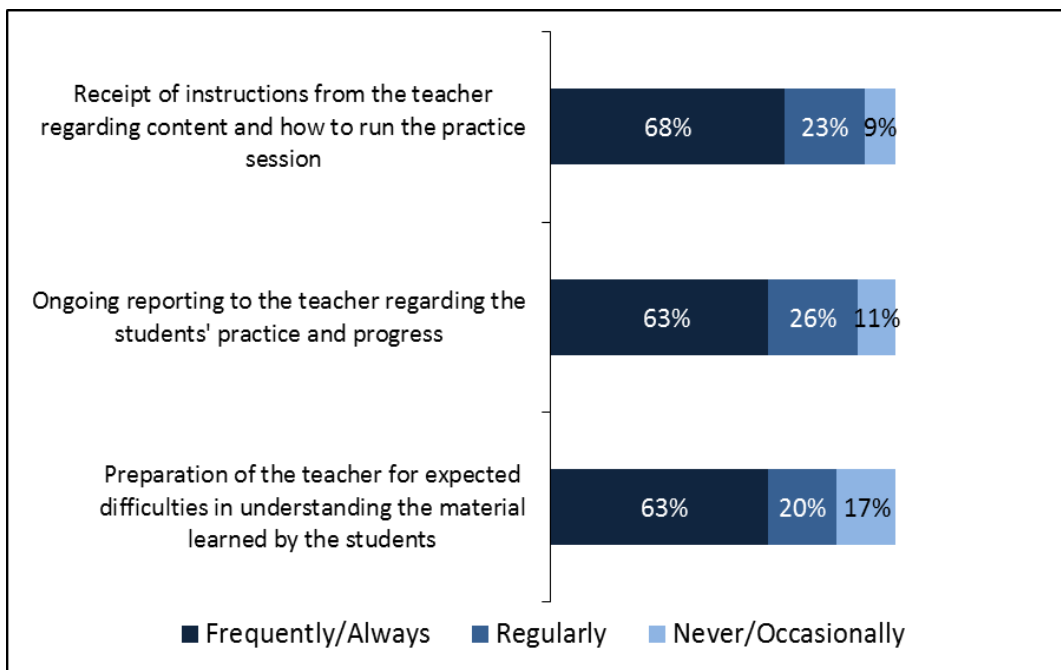
“ The practice sessions are excellent, because you get the personal attention that each student needs”.

“The teacher always helps me with any problem that I encounter; she supports me and encourages me to succeed”.

Personalization of teaching in the high school is reflected in the practices adopted by the tutors in relation to the students (Graph 3) and the teachers (Graph 4). These practices include: maintaining regular contact with students, encouraging them to succeed, a personal attitude and adaptation of teaching methods to the students, checking homework on time and providing individual data to teachers to allow lesson adaptation to developing needs.



Graph 3: Tutors' practices in relation to the Students (self-report)



Graph 4: Tutors' practices in relation to the Teachers (self – report)

As one of tutors wrote: *“The personal connection between tutor and student still exists online and allows us to push and encourage students through individual and group motivational talks”*.

In the focus group, teachers and tutors emphasized the desire to personalize the learning processes by providing a personal relationship and close support, encourage students to take responsibility for their own learning, pushing for flexibility and adjustment of teaching, diagnosis of weak points, and empowering students.

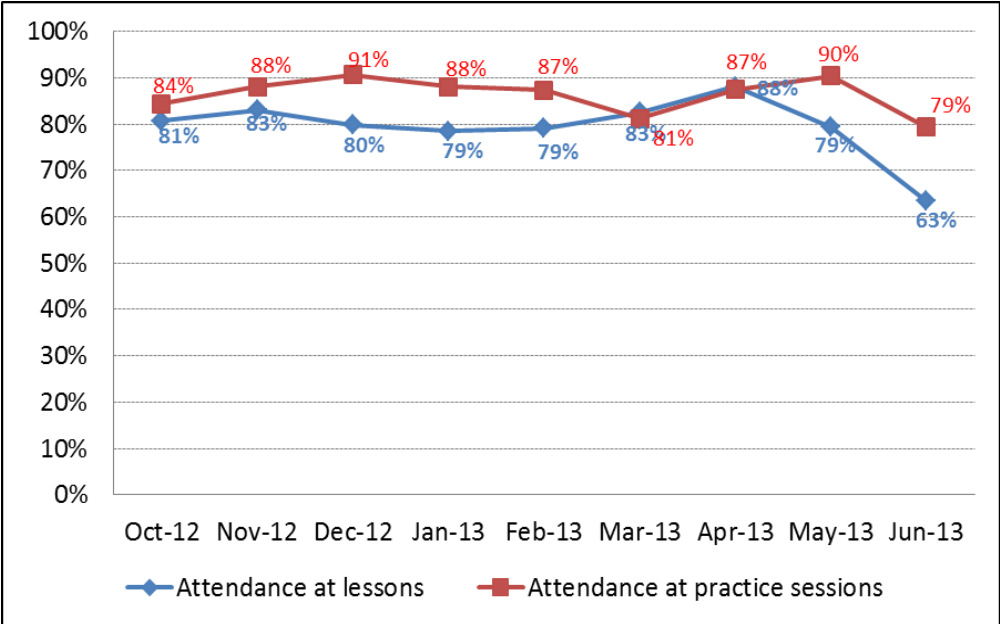
Monitoring – Transparency and Evidence Based Assessment

The monitored, transparent system allows the design of systematic, evidence based assessment which includes, apart from tests and quizzes, the level of attendance during lessons and practice sessions, and the percentage of homework submitted, as detailed in Table 1.

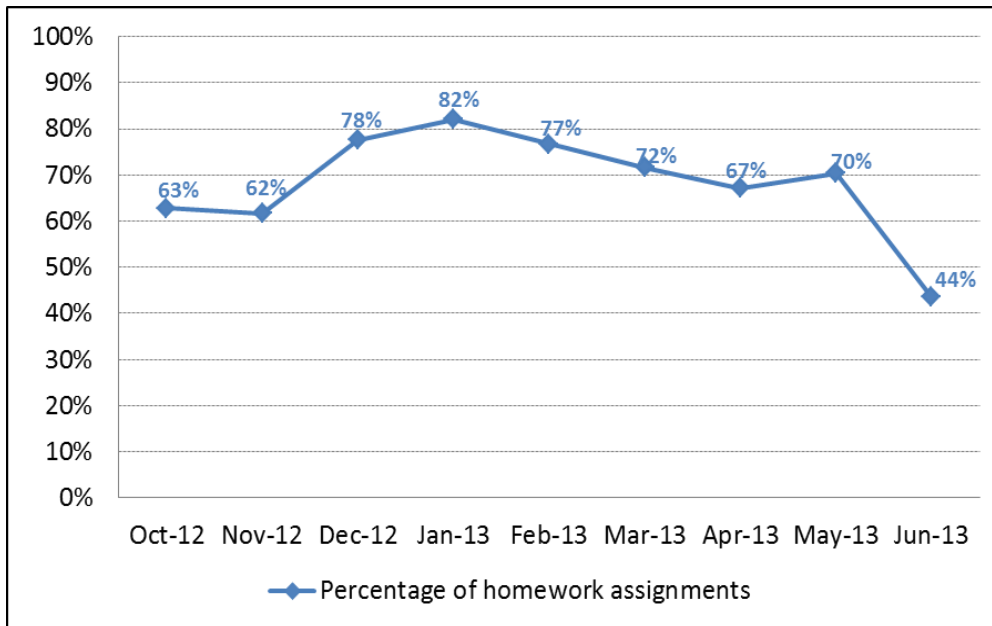
Component	Weight
Grade in final examination (pen and paper)	30%
Grade in tests (online)	20%
Percentage of homework submitted (from the online monitoring system)	15%
Understanding and persistence in homework (tutor’s evaluation)	15%
Commitment to lessons (teacher’s evaluation)	10%
Commitment to practice sessions (tutor’s evaluation)	10%

Table 1: Components of student assessment in the report card, and their weights

Monitoring the attendance by students (shown in Graph 5) and the rate of submission of homework (shown in Graph 6) gives a picture of the “learning behaviors” of the students over the course of the school year, and are some of the components of the students’ final grades. These can be obtained at the touch of a button, and are available to the teaching staff and school principal online.



Graph 5: Percentage of attendance by students at lessons and practice sessions, in the 2012/13 school year by, month



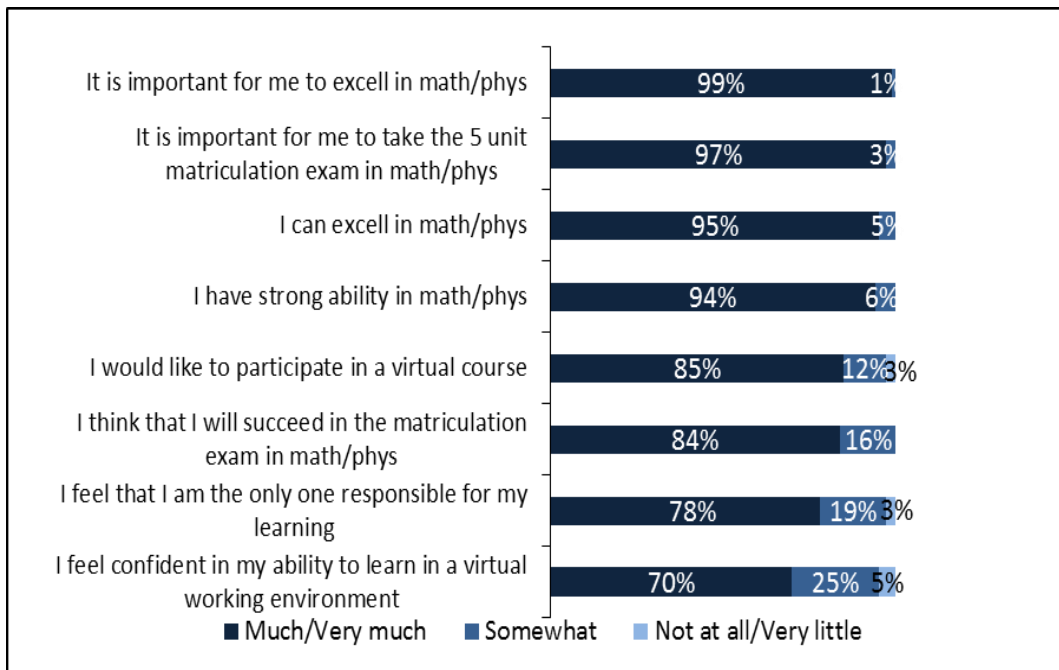
Graph 6: Percentage of completion of homework in the 2012/13 school year, by month

Monitoring – Transparency and Student Characteristics

In order to maximize the potential of the VHS's transparency and monitored system, the students need to be characterized by a high level of motivation and discipline. This requirement is also supported by studies that examined the relationship between student characteristics and persistence and success in virtual learning (Piccoli et al., 2001; Hong, 2002; Kanuka and Nocente, 2003). Other studies indicate the importance of self – efficacy in adjustment to and success in virtual learning (Marakas, Yi, & Johnson, 1998; Joo, Bong, and Choi, 2000; Thompson, Meriac, and Cope, 2002; Wang and Newlin, 2002).

Moreover, researches' findings show that E learning fosters and enables students' independence, and increases their responsibility (Brandon & Hollingshead, 1999; Arbaugh, 2004).

In the recruitment of students to the VHS, the high school administration set criteria based on these studies. The evaluation research accompanying the VHS indicates that this policy was indeed implemented, with the students enrolled being characterized by high motivation, self-efficacy and self-direction, based on their self-reported scores (Graph 7).



Graph 7: Characteristics of VHS's students at the beginning of the school year

The evaluation research confirmed this policy, as it was found that the students' attitudes in terms of ambition, disciplined homework habits, and motivation to study in the high school at the beginning of the year, had a significant positive correlation with key aspects of learning behaviors in the VHS, including a percentage of homework completion ($r = 0.30, p < 0.05$) and with their level of understanding and persistence in homework, ($r = 0.50, p < 0.01$), according to their teachers. It appears that these data confirm the role of self-efficacy in coping with the VHS, both through its correlation with homework behavior and through its correlations with the level of satisfaction expressed by the students with various aspects of the VHS.

In addition, at the end of the year a significant positive correlation was found between the level of students' self-efficacy and their scores in the final examination ($r = 0.39, p < 0.01$).

Discussion

The transparency that characterizes the VHS allowed us to examine the TLE processes in the field, while comparing them with the knowledge that exists in the literature.

This examination emphasizes the uniqueness of the virtual learning environment.

This uniqueness is reflected in the response to administrative needs and to the need to supervise the quality of teaching; the personalization of teaching and learning; the systematic, evidence – based assessment; and the characteristics of the students.

All these make use of the monitoring and feedback mechanisms inherent in the online technological platform and virtual learning.

These mechanisms may be seen a compensating for the lack of unmediated interaction between teacher and student. The lack of knowledge on the part of the teacher as to what the student is doing during the synchronous lesson was indeed mentioned as a limitation by teachers in the focus group. The online platform undoubtedly requires the teacher to acquire

new habits of attending to the students' behavior. At the same time, it appears that the technological solution for this function has not yet been fully defined. Ideas that were proposed in this context included the inclusion of Skype technology which would allow the teacher to see the individual student.

The potential of the VHS for personalization of teaching has not yet been fully achieved. In this context, it was proposed to significantly expand the work in small groups, with the tutor, at the expense of reducing the frontal teaching component, consider turning it to an asynchronous component. As we have mentioned, not all the students adjusted to the VHS to the same extent. Their prior characteristics had a predictive nature. This finding raises questions both as to the possibility of applying a more selective recruitment policy and as to the effort required to advance those students whose opening characteristics were less suited to virtual learning.

The VHS reflects a model that has enormous potential for reshaping the structure of the traditional school, by means of distance learning technologies. The students experience, within a relatively short time, significant, innovative learning processes, relevant to the demands of the 21st century. The school's transparency allows the educational community to understand in greater depth the TLE processes, and the involvement of the Ministry of Education in the program reflects its readiness to move from a limited initiative to a broad-based systemic process.

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