

# Transforming K–12 Classrooms with Digital Technology

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## Chapter 17

# Interactive Boards in Schools: Middle and High School Teachers' Uses and Difficulties

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### **ABSTRACT**

*This chapter examines middle school and high school teachers' use of interactive boards in the classroom, as well as the goals behind this use and the difficulties encountered throughout it. Ten middle school and high school science and mathematics teachers who use the interactive board for teaching science and mathematics were interviewed to elicit their practices, goals, and difficulties when using interactive boards in the classroom. The first two stages of the constant comparison method were utilized to analyze the collected data. The research findings show that science and mathematics teachers made different uses of the interactive board, which could be related to treating scientific relations, phenomena, and experiments, as well as practicing learned materials and engaging students in building activities in games and in discussions. Utilizing the different options of the interactive board, the participating teachers had various goals: giving students the ability to investigate, motivating them to learn, attracting them to the lesson, making them enjoy their learning, encouraging their collaboration, shortening the teaching time, and loading previously taught lessons. Using the interactive board in the classrooms, the teachers encountered some difficulties, such as: technical difficulties, owning the appropriate skills for using effectively the interactive board's different options, preparing appropriate activities, fulfilling students' expectations, and keeping class order.*

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## **INTRODUCTION**

The interactive whiteboard is a large interactive display that combines a whiteboard, a computer and front projection. As learning tools they engage students with multimodal resources, as images, video and audio. Further, they enable what is done on a computer screen to be projected onto an interactive whiteboard. According to Smart Technologies Company, the first interactive board was introduced by Smart Technologies in 1991 (Smart technologies, 2006). Since then, they are becoming an integral part of the educational scene in schools in the western countries and are not considered just an additional aid to teaching (Kent, 2004a, 2004b). This also has been the case for the last couple of years in the Arab schools in Israel; what necessitates examining different educational aspects associated with the interactive board presence in the classrooms. One aspect of this learning is the teachers' perception of the interactive boards as tools for teaching and learning. This research will attempt, using quantitative methods, to examine such perceptions regarding didactic and pedagogic issues. It will examine whether there are differences between (1) teachers in public schools vs. teachers in private schools; and (2) teachers who use computers in their teaching vs. teachers who do not. Further the research will examine teachers' reasons for not using the interactive boards in their teaching and whether there are differences in these reasons between teachers in public schools vs. teachers in private schools.

## **BACKGROUND**

Researchers point at the interactive boards as tools which contribute to teaching and learning in the classroom. We describe below those researches differentiating between them regarding the subject of the benefit (teacher/ student) and the aspect of the benefit (adding resources, adding motivation, etc.).

Researchers point that interactive boards help change, improve or add to the teaching methods of teachers who use them in the classroom (Cuthell, 2002; Latham, 2002; Levy, 2002; Jones & Vincent, 2010). Cuthell (2002), for example, administered a questionnaire in internet sites about teachers' opinions regarding the use of interactive boards in learning in elementary and middle schools. The findings show that when the interactive boards are installed in the classrooms and when the teachers have the required skills for using those interactive boards, a technological environment will be created which will support teachers and enable the transformation of their teaching methods to diversified ones.

Interactive boards add more resources and strategies to the teaching methods of teachers, enabling them to use more efficiently learning resources (Campbell & Kent, 2010; Cuthell, 2002; Glover & Miller, 2001; Levy, 2002). Specifically, they help teachers provide the students with more challenging learning opportunities (Latham, 2002). Levy (2002), for example, found that teachers looked at the interactive boards as aiding in presenting information and learning resources (as the easiness with which it is possible to draw on a greater number and wider variety of information and learning resources), in facilitating classroom interaction and activity (as freeing up time for interaction and task-related activity), and in their educational impact (as helping teachers to give more effective explanations).

Interactive boards not only contribute to the teacher but to the student too, supporting his learning - enabling understanding, concentrating, presenting information, remembering, thinking processes, and playing, and causing motivation (Kuzminsky, 2008; Levi, 2002; Schmid, 2008; Wall, Higgins, & Smith, 2005); stimulating learning - through increasing motivation, fun, self confidence, attention, and interest (Beeland, 2002; Wall, Higgins, & Smith, 2005); providing preferred learning approaches - through supporting different learning styles: visual, audio, verbal-social, and kinesthetic (Schmid, 2008;

Wall, Higgins, & Smith, 2005); making students involved more interactively in learning and more focused on the learning material (Latham, 2002; Levi, 2002); enabling connectedness in an easy way - with the software, the hardware, and the multimedia (Wall, Higgins, & Smith, 2005); enabling wide range of learning resources and materials (Cuthell, 2002; Schmid, 2008) and increasing the student's achievement (Kuzminsky, 2008; Lewin, Somekh, & Steadman, 2008).

Researchers, as described above, point at the advantages of using interactive boards in the classroom, while other researchers report that interactive boards had no significant impact on the educational scene in schools, for example, Solvie (2001) found no significant difference in student attention and motivation when using an interactive whiteboard as opposed to when one was not used. In addition, Fisher (2006), examined fourth grade student academic performance before and after exposure to IWB use, where no significant gains were identified.

*Barriers to using the interactive board in the classroom:* According to various researchers, the lack of teachers' competence in ICT (information and communication technology) is a major barrier to their integration of ICT in their education (Bingimlas, 2009; Keong, Horani, & Daniel, 2005; Sharma, 2003; Slay, Sieborger, & Hodgkinson-Williams, 2008; Watson, 2001). Sharma (2003) found that one of the main barriers to the use of ICT in education was the low level of teacher ICT knowledge. Watson (2001) extended this finding saying that the application of ICT skills does not follow immediately from the mere knowing of them. Slay, Sieborger and Hodgkinson-Williams (2008) added that in some cases, teachers may be ICT literate, but not competent enough to apply the skills in their teaching. So, it can be concluded that mastering ICT skills and practicing them are conditions for successful use of these skills in teaching.

Keong, Horani, & Daniel (2005) conducted survey to study the barriers to the integration of

ICT in teaching a specific subject: mathematics. They identified six major barriers: lack of time in the school schedule for projects involving ICT, insufficient teacher training opportunities for ICT projects, inadequate technical support for these projects, lack of knowledge about ways to integrate ICT to enhance the curriculum, difficulty in integrating and using different ICT tools in a single lesson and unavailability of resources at home for the students to access the necessary educational materials.

Murcia and McKenzie (2008) also emphasize the importance of teachers' proficiency in ICT and having appropriate time for this use as conditions for the success of their ICT use in the classroom: "inadequate professional development and lack of time to develop skills and plan lessons have been identified as barriers to the successful integration of interactive whiteboards into the classroom".

Bingimlas (2009) conducted a meta-analysis of relevant literature about barriers to technology integration in science education. The author pointed, in addition to the lack of teachers' competence, at teachers' lack of confidence and lack of access to resources as the main barriers for the integration of ICT in education. The author concluded that these barriers indicate that ICT resources including software and hardware, effective professional development, sufficient time, and technical support need to be provided to teachers in order that they integrate successfully ICT in their teaching. Navarrete (2011) confirms these conditions, in addition to leadership involvement.

## **THE RESEARCH RATIONALE AND GOALS**

The interactive boards are becoming an integral part of the educational system in schools, where money and time are spent to utilize these new electronic tools in the classroom. Many researches, as described above, involved the benefits of using the interactive boards in the classroom, where little

research has concentrated on the various uses of these boards in the classrooms. This research attempts to shed more light on this issue, specifically it examines teachers' didactical goals for using the interactive board, as well as their actual uses of this new technological tool in the classroom. In addition, the current research examines the barriers to using the interactive boards in the classroom from the teachers' point of view. These barriers could be those hindering teachers from using ICT in general in the classrooms, as well as those that are related specifically to the interactive boards. This research tries to clarify this issue. The results of this study would benefit teachers coming to use the interactive boards in their classroom, especially those who intend to use it for the first time. These teachers would be exposed to different aspects of the interactive board's use, and thus be better prepared for this use.

### **The Research Questions**

1. What uses do science and mathematics teachers make of the interactive boards in the classrooms?
2. What goals encourage science and mathematics teachers to use the interactive boards for teaching and learning?
3. What barriers hinder science and mathematics teachers' use of the interactive boards in the classrooms?

### **METHODS**

This research is qualitative because we want to explore through interviews the uses that teachers make of the interactive board, why they use it and what hinders them from using it. Quantitative research will not be open enough to cover teachers' various goals and uses of the interactive board, because such quantitative research will be limited to the themes which the researcher confines himself / herself to.

### **Participants**

The research participants were ten middle school and high school science teachers who used the interactive board for teaching science and mathematics. There were four mathematics teachers and six science teachers. The distribution of the teachers regarding the school type was: six teachers in the middle school and four teachers in the high school. The teachers were chosen according to three conditions: (1) they use the interactive board in their teaching; (2) they teach in middle or high school; and (3) they approved to be interviewed. The sample of teachers interviewed was a convenience sample, for we could not locate many teachers who use the interactive board at the time of conducting the research interviews: February 2012.

### **The Research Tool**

*Data Collection:* We conducted interviews with the participants to know what encourages the teachers to use the interactive boards in the classroom, what uses they make of the interactive boards in the classrooms, and what barriers hinder this use. The interviews were semi-constructed starting from questions that probed teachers' use of the interactive board. Getting a teacher's answers, new questions were asked to deepen the understanding regarding teacher's uses of the interactive board and goals of this use. Some of these questions were: How do you use the interactive board in your teaching? What are the barriers to using the interactive board in your teaching?

The list of questions is attached to appendix 1. These questions were developed by the two researchers and were but initiatives for the following more probing questions.

*Data Analysis:* The first two stages of the constant comparison method (Glaser & Strauss, 1967) were used to analyze the data regarding teachers' use of the interactive boards. These stages were:

**Categorizing data:** In this stage we put together data expressions or sentences that implied reasons for the use of interactive boards, the goal from the use or a barrier to this use. For example, regarding teachers' goal from the use of interactive boards, we searched for words like 'because', 'for', 'to', 'due to', etc., where these words, we noticed, were used to indicate a goal behind teachers' use of the interactive board. Other indicators that we looked for were words like 'goal', 'reason', 'make', etc.

**Comparing data:** In this stage we compared expressions or sentences within each previously built category. This gave rise to sub-categories. Let's take for example the category 'using the interactive board to get to the internet', comparing expressions or sentences in this category may give rise to the subcategories: using the interactive board to watch a video from the internet, using the interactive board to work with an applet, using the interactive board to look up a scientific term, etc.

### **Theoretical Saturation**

Theoretical saturation should be kept in qualitative research methods which examine themes and categories in qualitative data (such as data produced in interviews) (Strauss and Corbin, 1998). This theoretical saturation occurs in data collection when: (a) No new relevant data seem to emerge regarding a category; (b) The category is well developed in terms of its properties and dimensions, demonstrating variation; and (c) The relationships among categories are well established and validated (ibid, p. 212). In the current research we kept analyzing the interviews data till the three conditions were met.

### **Inter-Rater Reliability of the Coding**

To ensure inter-rater reliability of the coding, two coders coded 40% of interviews. The coding decisions of the two coders were evaluated for inter-rater reliability using Holsti's (1969) coefficient of reliability and Cohen's (1960) Kappa.

Holsti coefficient of reliability and Cohen's Kappa were computed for the coding done to arrive at the coding categories of teachers' uses of the interactive board, the coding done to arrive at the teachers' goals from using the different options of the interactive board, and the coding done to arrive at the difficulties encountered by the teachers when using the interactive board in the classroom. Holsti coefficients of reliability were found to be 0.81, 0.79 and 0.75, respectively, while Cohen's kappa results were found to be 0.80, 0.71 and 0.69, respectively.

## **FINDINGS**

In this research we were interested to examine three issues regarding teachers' use of the interactive board: their different uses, goals of their uses and difficulties confronted during their uses. Below, the findings regarding each issue are described. This description is done in tables, where the left column of each table includes the categories found, while the right column includes examples from the teachers' saying on the category.

### **Science and Mathematics Teachers' Use of Interactive Boards in the Classroom**

The participating teachers made different uses of the interactive board in their classrooms. These uses could be categorized as:

*Representing Scientific Phenomena:* Seven out of the ten participating teachers mentioned that they use the interactive board to represent scientific phenomena which are difficult to watch or visualize. For example, Farid, a science teacher, said: Sometimes it is difficult for the students to visualize a scientific phenomenon, for example the structure of the cell, so it is easy to use the interactive board to present this phenomenon, usually using the video.

*Showing How to Perform a Scientific Experiment:* Three out of the ten participating teachers stated that they use the interactive board to show the procedures of carrying out scientific experiments which could be dangerous to perform physically in the lab. For example, Salam, a science teacher, declared: I use the interactive board to show the students scientific experiments that could be difficult or dangerous to perform, for example using ammonia or working with concentrated acidic and basic substances.

*Investigating a Scientific Relation:* Five out of the ten participating teachers pointed at the interactive boards as enabling students to investigate mathematical and scientific relations. This use was done through two means: simulations and dynamic tools. Farid stated: I use the interactive boards to show the students scientific simulations, so they discover a specific scientific relation, for example the states of the matter: solids, liquids, and gases. Halim, a mathematics teacher stated: I use the interactive board to let the students work with a dynamic tool, so they discover collaboratively a mathematical relation. We did that to discover the relation between the quadratic function parameters and its graph.

*Practicing Learned Material:* Four out of the ten participating teachers stated that they use interactive boards to make students practice the learning material. Sami, a mathematics teacher, said: I let my students practice what they learned using the interactive board. I noticed that when they did that after they learned about solving mathematical equations it made them enthusiastic.

*Engaging Students in Building Activities:* The interactive boards have working tools that enable students to build scientific and mathematical objects. Five out of the ten participating teachers mentioned using this option in their classrooms. Ahlam, a mathematics teacher, declared: My students use the interactive board to build collaboratively geometrical solids according to some conditions.

*Engaging Students in Games:* The interactive board is also an environment in which students can play games. Two out of the ten participating teachers mentioned that they use the interactive board to engage their students with learning games. Amin, a mathematics teacher stated: My students use the interactive board to play games. This makes the whole class attentive to follow the different actors' steps.

*Engaging Students in Discussions:* Seven out of the ten participating teachers mentioned that the interactive board motivates their students to discuss issues related to the subject matter. Eman, a science teacher, said: I noticed that my students engage more enthusiastically in a classroom discussion during or after their work with the interactive board. This makes me want to engage them in scientific discussions more and more.

### **Teachers' Goals from Using the Different Options of the Interactive Board in the Classroom**

The participating teachers had different goals for using the interactive board options in their classrooms. These goals could be categorized as:

*Making students visualize a scientific or mathematical phenomenon or relation:* The interactive board, as six out of the ten participating teachers mentioned, has different multimedia utilities which help students visualize scientific and mathematical phenomena. Ahlam said: the visual facilities of the interactive boards make it wonderful to show the students the graph of a function and the relation between this graph and the function rule. Thus I use the interactive board for these visual facilities.

*Motivating students to learn:* The different multimedia utilities of the interactive boards, as five out of the ten participating teachers mentioned, also motivate students to engage actively in learning mathematics and science. Eman said: the multimedia in the interactive board enables to show the scientific phenomena as in real life, which motivates students to study these phenom-

ena actively. This motivation is behind my goal of using the interactive board in my teaching.

*Attracting students' attention to the lesson:* The pen's colors in the interactive board, as four out of the ten participating teachers mentioned, help teachers attract students' attention to the lesson. Kholoud, a science teacher said: One reason for my using the interactive board is the pen's colors option which makes it easier for me to attract students' attention to the lesson.

*Making students concentrate on a topic:* The pen's colors, as three out of the ten participating teachers declared, not only help the teacher attract students' attention to the lesson, but they also help the students concentrate on the science or mathematics topic. Nadera, a mathematics teacher, said: the pen colors help students concentrate on the geometric figure and thus arrive faster at the relations in the figure. This is a wonderful option which makes me use the interactive board.

*Making students enjoy their learning:* The multimedia options of the interactive board, as three out of the ten participating teachers declared, also affected positively students' emotions while learning. Asil, a science teacher, declared: I prefer using the interactive board in the classroom to make my students enjoy their learning, probably because of its multimedia options.

*Encouraging students' collaboration:* Students' active learning described above encourages them to collaborate in investigating new phenomena and relations. Omar, a science teacher and one of four teachers who mentioned this goal, said: I use the interactive board for it encourages students' collaboration. The whole class collaborates wonderfully when we use the interactive board to investigate scientific phenomena. This is actually what happened when we investigated the 'work phenomenon'.

*Shortening the teaching time:* The various potentialities, options and tools in the interactive board makes the teaching time of the teacher shorter, as four out of the ten participating teachers mentioned. Salam declared: The interactive

options in the board help the teacher explain the lesson in a shorter time. This encourages me to use the interactive board to utilize all its tools during the lesson.

*Loading previously taught lessons:* An interactive option which was popular in the classroom is to load a previously taught lesson. Amin, one of eight teachers who mentioned this goal as behind his use of the interactive board, said: Sometimes I use the interactive board to load a lesson which was given one or two lessons before to remind my students of a rule or an example.

*Making students more attentive in the lesson:* The possibility to save the lesson taught with the interactive board encourages the student to be more attentive in the lesson, for they do not have to copy every word which the teacher mentions. Kholoud, one of four teachers who mentioned this goal, declared: Some of my students do not copy the material written on the interactive board, for I send them the whole lesson by email. This makes them more attentive during the lesson. This is a great option which makes me use the interactive board in my teaching.

### **Difficulties Confronted by the Participating Teachers in Using the Interactive Board In Their Teaching**

The participating teachers reported different difficulties that they encountered using the interactive board in their teaching. These difficulties can be categorized in the following categories.

*Technical difficulties:* These difficulties could be divided into the difficulty to write clearly using the board's pen and the difficulty to use the board because of its sensitiveness to dirt. Amin, one of four teachers who mentioned this difficulty, complained: Students have difficulty reading my or other students' writing on the interactive board. Further, Kholoud said: Once, one of my students made the board dirty, and thus disabled it.

*Owning the appropriate skills for using effectively the interactive board's different options:*

Feeling in control of the various options of the interactive board worried four out of the ten participating teachers. Salam confessed: Though I have the basic skills for using the interactive board, I do not feel I own the appropriate skills for using its different options effectively in my teaching.

*Preparing appropriate activities:* Preparing appropriate activities for the new technological tool worried seven out of the ten participating teachers. Ahlam admitted: I have to spend long time in preparing lessons that utilize the different options of the interactive board. This makes me use it sometimes as regular board only.

*Fulfilling students' expectations:* Fulfilling students' expectations from the activities learned with the interactive board also burdened six out of the ten participating teachers. Eman complained: Students expect every lesson to include a multimedia application, and it is hard to convince them that this not always necessary.

*Keeping the class order:* Three teachers pointed that the activity and interactivity of the students, which the interactive board encourages, sometimes make it hard for the teacher to maintain the class order. Asil said: Every student wants to participate in the interactive board's activities, so it is hard sometimes to keep the class order. I think we should find creative ways for overcoming this difficulty.

## **DISCUSSION**

*Teachers' uses of the interactive board:* Looking at teachers' uses of the interactive board, it could be seen that the interactive board enabled teachers to perform varied teaching actions recommended by educational institutions and by researchers and expected to benefit students' learning. One of these actions is the ability of science teachers to use simulations to make students investigate scientific ideas. This teaching action is supposed to influence positively students' learning, for it enables them "to observe, explore, recreate, and receive immediate feedback about real objects,

phenomena, and processes that would otherwise be too complex, time-consuming, or dangerous." (Bell & Smetana, 2007, p. 23). Another teaching action enabled by the interactive board is working with scientific phenomena, where the participants in the research were highly aware of this action and performed it in their classrooms. The importance of working with scientific and/or natural phenomena is attended to in various researchers, for example in Bell and Smetana (ibid), as well as in Kolokouri and Plakitsi (2009) who emphasize that understanding scientific concepts related to natural phenomena and developing, as a result, scientific argumentation will contribute to students' increasing responsibility and decision making.

The participating teachers were also highly aware of the contribution of the interactive board to encouraging discussion in their classroom, and thus this use was one of the most uses performed with the interactive board in their classes. This use of the interactive board by the participating teachers will probably influence positively students' learning (National Academy of Science, 1997; National Council of Teachers of Mathematics, 2000). Further, Roth and Garnier (2006) studied the "TIMSS Video Study of Science" in five countries: the Czech Republic, Japan, Australia, and the Netherlands. The authors address the issue of classroom discussion, saying that Japan classroom discussions helped students link learning activities to science ideas, while in the Netherlands, class discussions supplemented the text. In Australia, teachers initiated classroom discussions that challenged students' thinking. The previous findings of Roth and Grnier (ibid) point at the positive contribution of the interactive board if used to promote classroom discussions.

*Teachers' goals for using the interactive boards in the classroom:* Teachers' goals for using the interactive boards in the classroom could be related to various aspects of teaching and learning: the cognitive aspect (for example making students visualize a scientific phenomenon or relation), the emotional aspect (for example

making students enjoy their learning), the social aspect (for example encouraging the collaboration of students), the behavioral aspect (for example making students more attentive in the lesson), and the management of learning aspect (for example shortening teachers' time). Thus the interactive board can support the teacher in her/his attempts to attend to the various aspects of learning, and as a result make students' learning more fruitful. This attendance to the various aspects of learning is described by various researchers as influencing positively students' learning, for example, Russo and Benson (2005) say that the cognitive outcome of learning is an important issue in most learning contexts, while Pekrun (2007), for example, concludes, based on theoretical considerations and evidence, that emotions in academic settings are critical to college students' scholastic development. In addition, Dixon, Crooks and Henry (2006) say that social presence is necessary for building and sustaining communities of learning. Students' behavior in the classroom is another aspect of learning which is connected to the previous aspects and which influences the outcomes of learning.

The most mentioned goals for using the options of the interactive board in the classroom was connecting to previously learned lessons and enabling students' visualizing of scientific phenomena. These two goals realized by the use of the interactive board are related to two main aspects of teaching, where the first goal is related to 'providing a supportive learning environment', while the second is related to the same aspect and to another aspect: 'nurturing processes and strategies which foster learning'. These two aspects are recognized in the literature as significant in terms of students' learning (Jaworski, 1992). This means that the participating teachers were aware that utilizing the options of the interactive board can contribute positively to their students' learning.

*Difficulties of using the interactive boards in the classrooms:* The difficulties described by the participants in this research could be related

to the tool (technical difficulties), to the teacher (Owning appropriate skills and the readiness to prepare appropriate activities) and to the student (students' expectations). Previous researches reported similar difficulties regarding the use of interactive boards in the classroom, but without categorizing them in the current categorization: tool-teacher-student.

The most mentioned difficulties the participating teachers reported were preparing appropriate activities and fulfilling students' expectations. These two difficulties are two sides of the same difficulty which is fitting the educational context to the interactive board potentialities. Regarding this compound difficulty, BECTA (2003) reported that expectations students have regarding the use of the interactive board in the classroom put pressure on teachers, having to continually improve the presentation and content of lessons. BECTA (ibid) points at other factors which influence the use of interactive boards in the classroom. Amongst these are appropriate training and ongoing technical support to teachers and schools. Difficulties encountered for the absence of the factors described above could be overcome by planning actions by the ministry of education (for example planning appropriate workshops) from one side and educational institutions (for example planning appropriate lessons) from the other side. Ensuring appropriate preparation of the teacher and appropriate activities for the interactive board would ensure that the teacher utilizes the interactive board in a way which attends to the different aspects of students' learning, and thus makes this learning fruitful.

## **CONCLUSION AND FUTURE RESEARCH DIRECTIONS**

This research intended to verify the different uses of the interactive board in the classroom by science teachers. The research findings show that science teachers make different uses of the

interactive board: Representing scientific phenomena, showing how to perform a scientific experiment, investigating a scientific relation, practicing learned material, engaging students in building activities, engaging students in games, and engaging students' in discussions.

These uses enabled by the interactive board (learning through phenomena, learning through investigating and through simulation, learning through discussions) are recommended by researchers as practices which help students learn independently and connect their learning to real life (Bouillion & Gomez, 2001). Garofalo, Drier, Harper, Timmerman, & Shockey, 2000).

Utilizing the different options of the interactive board, the participating teachers had the following goals: Enabling students to visualize a scientific phenomenon or relation, motivating students to learn, attracting students' attention to the lesson, making students concentrate on a topic, making students more attentive in the lesson, making students enjoy their learning, encouraging the collaboration of students, shortening the teaching time and loading previously taught lessons. The ability of the interactive board to facilitate teachers' realization of these goals points that by utilizing it properly, teachers can attend to the different aspects of students' learning: the cognitive, the affective, the social and behavioral.

Using the interactive board in the classrooms, the teachers encountered some difficulties:

*Technical difficulties:* (The difficulty to write clearly using the board's pen and the board sensitivity to dirt), owning the appropriate skills for using effectively the interactive board's different options, preparing appropriate activities, fulfilling students' expectations and keeping the class order. Probably, the technical difficulties will be resolved with new versions of the interactive board, while the other difficulties can be resolved by actions from the side of the ministry of education (for example planning appropriate workshops), and from the side of educational institutions (for example planning appropriate lessons).

In this research we interviewed middle and high school teachers regarding their practices, goals and difficulties when using the interactive board in the classroom. It is our conviction that teachers' practices and difficulties should also be examined inside the classroom itself, by observing these practices and difficulties during the actual teaching in the classroom, not only for the middle and high school, but also for the primary school.

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## KEY TERMS AND DEFINITIONS

**Constant Comparison Method:** This method was described by Glaser and Strauss (1967). It consists of actions that seek to find appropriate themes important for the research and then to group these themes in categories that reflect the topic of the research.

**Holsti Coefficients of Reliability:** A method that computes the inter-rater reliability of coding.

**Interactive Board:** an interactive whiteboard is a large interactive display that combines a whiteboard, a computer and a projector.

**Inter-Rater Reliability of Coding:** It is the degree of agreement among raters that interpret the research data. It gives a score of how much homogeneity or consensus there is in the ratings given by judges.

**Scientific Phenomena:** phenomena related to one of the sciences, for example the states of the matter in chemistry and the relation between the parameters of a function and its graph in mathematics.

**Teachers' Goals:** These are the goals behind teachers' decisions regarding their teaching strategies and the different aspects of their students' learning.

**Technical Difficulties:** Difficulties related to operating a technological tool.

## **APPENDIX**

### **The Interview Questions**

1. What makes you use the interactive board in your teaching?
2. How do you use the interactive board in your teaching?
3. For what targets do you use the interactive board?
4. Which tools in the interactive board do you use?
5. For what targets do you use each tool in the interactive board?
6. What are the barriers to using the interactive board in your teaching?