TEACHERS PLANNING AND IMPLEMENTING
ICT-BASED PRACTICES

Introduction

Planning is a human behavior aimed at reducing uncertainty. Planning involves future thinking, decision making, integration, and formalized procedure (Mintzberg, 1994). Introducing Information Communication Technology (ICT) into schools heightens uncertainty due to the complexity and ambiguity of the process. Complexity stems from the powerful, flexible and intricate usage of ICT, while the ambiguity results from the high expectations embodied in ICT integration versus the schools' limited ability to change (Cuban, 2001; Tyack & Cuban, 1995).

Planning is one of the tools helping teachers to cope with ICT in school. By decomposition, articulation, and rationalization of ICT-based practices, teachers can better integrate it into the classroom. More and more literature deals with teachers' management of ICT integration (Kozma, 2003; Tubin & Chen, 2002; Venezky & Davis, 2002) but almost nothing has been written about teachers' planning of ICT usage.

The aim of this paper is to address this gap by studying the process of teachers' planning and its effects on ICT implementation at one elementary school. The rest of this introduction presents a theoretical background of planning, planning in education, and the relationship between planning and ICT integration into school.

Planning

Planning literature presents two basic types of planning. The first is *strategic planning*, a guide for future action that evolves from past patterns, including realized and intended strategies (Mintzberg, 1994). Strategic planning is characterized by being long-term and holistic, and it includes clear goals, a stable environment, linear progress, and convenient audit and control tools (Bell, 2002; Bennett, Crawford, Earley, Glover, & Levacic, 2000; Fidler, 1998).

The second type is *emergent planning*, where a realized pattern is not expressly intended. This kind of planning is characterized by a general concept, navigation according to unfolding events, checking alternatives, and evaluation in light of the changed situations (Bennett et al., 2000; Fidler, 1998; Mintzberg, 1994). Few, if any, strategies can be purely one kind or another. Real-world strategies combine both ways, attempting to control uncertainty without stopping the learning process (Mintzberg, 1994).

The organizational planning process is formed by external factors such as the level of environment stability, market expectations, and political, economic, and demographic trends. Internal factors affecting planning are the organizational structure, culture, coherency, reputation, and financial state (Bennett et al., 2000; Fidler, 1998). While this is true in general, educational organizations have some special characteristics.

Planning in Education

Over recent decades many countries (e.g., England, Australia, New Zealand, Denmark, Israel) have engaged in educational reform aimed at providing the school with greater autonomy while demanding greater accountability (Datnow, Hubbard, & Mehan, 2002). This has obliged schools to engage in more strategic planning and development planning (Davies & Ellison, 2003).

The findings regarding school planning processes are mixed. Some found them helpful in gaining legitimacy and increasing managerial control (Leggate & Thompson, 1997), and in improving student achievements (MacGilchrist, Mortimore, Savage, & Beresford, 1995). However, criticism of school planning holds that it has become an empty ritual (Giles, 1995). This raises serious questions about the connection between school development planning and claims of enhanced efficiency (Hatton, 2001). Despite the criticism, researchers agree that educational planning could be efficient if it were systematic, participative, flexible, and dynamic (Bell, 2002; Hopkins & MacGilchrist, 1998).

Some organizational planning ideas are also applicable to teacher planning. Previous research on teacher planning has focused on planning models (Yinger, 1980), the key factors affecting plans (Brophy, 1982), and the differences between novice and experienced teachers' planning processes (Sardo-Brown, 1996). Findings show that among the factors affecting teacher planning were the students, curriculum, class size, the school's goals, and teacher experience (Brophy, 1982; Sardo-Brown, 1996; Sardo-Brown, 1988). The majority of the studies deal with curriculum and class management planning, but teachers' planning in the ICT context is still a virgin land.

Teachers' Planning and ICT

The infusion of ICT into schools around the world creates strong pressure on teachers to integrate it into the class and use it for improving learning and increasing achievements (Kozma, 2003; Venezky & Davis, 2002). So far these expectations have only been partly realized, with teachers' reactions ranging from resistance, to integrating ICT into traditional practices, to innovative practices such as school websites for solving arithmetic problems, a portal for a dynamic learning center, and a digital projects portal (Kozma, 2003; Tubin, Miodusar, Nachmias, & Forkosh-Baruch, 2003; Venezky & Davis, 2002).

Teachers' reactions to ICT integration reflect different planning strategies. For providing students with ICT skill, linear strategic planning seems to be good enough. For creative and project-based learning, emergent planning is favored. When integration of ICT into the school curriculum is the mission, it was found that long-term participative planning—whereby every year the entire school staff engages in learning the past year's lessons and planning the coming year accordingly—is called for (Hopkins & MacGilchrist, 1998; Tubin & Chen, 2002).

This study explores the planning processes among teachers integrating ICT, its impact on implementation, and the relation between teachers' planning patterns and school planning patterns. It is assumed that in the turbulent environment created by ICT in school, different patterns of planning will be found, depending on individual and school factors. However, it is assumed that the more detailed and strategic the planning, the more it will reduce uncertainty, increase efficiency, and support implementation (Hopkins & MacGilchrist, 1998; Bell, 2002).

Methodology

This study is an instrumental case study aimed at analyzing underlying issues, relationships, and causes that can be used to generalize beyond the case (Stake, 1995). The case was chosen for its potency to answer our questions on the planning process among teachers integrating ICT.

Population. The study took place in an elementary school (6–12 years old) during September 2003–February 2004. The school comprises 350 children from the local neighborhood, which can be described as mainly middle class. The 22 school staff members include the principal, twelve home-room teachers, who are in charge of each of the twelve classes and in this school are also in charge of introducing ICT into their class, and nine teachers who did not introduce ICT (such as music, physical education, art teachers). The principal and the twelve home-room teachers were interviewed. These teachers' experience ranged from 12 to 30 years, with an average of 20 years. Fifty-four percent of the teachers have a B.Ed. degree, 31% a B.A., and 15% an M.A.

Data collection and analysis. Semi-structured interviews were conducted with the teachers, validated by relevant documents such as lesson plans and minutes of planning group meetings. Each interview lasted about 90 minutes, and was recorded, transcribed, and analyzed by content analysis methods aimed at answering the general research questions (Guba & Lincoln, 1981).

Results

School Planning Policy

The school studied integrated ICT in 1990 and now has 50 computers, all connected to the Internet and located in classrooms (2–3 in each), laboratories, and hallways. Students learn ICT skills (including Microsoft Office applications, e-mail, Internet) from first grade, usually as part of project-based learning. According to their grade and abilities students are required, for example, to compare their town with others in Israel (using the Internet as a source of information), conduct a presentation on their pets, or transform board games to digital games. Additionally, each of the home-room teachers is obliged to introduce ICT into the subject matter she teaches (using Excel in math, PowerPoint presentation in Bible, Microsoft Word

in Hebrew, etc.). The school planning policy was found to be strategic, systematic, and participative, as related by the principal:

> Planning is participative. I begin when the school year ends for the following year… for example, we met at a teacher's home and discussed what we had managed to accomplish. What had we missed? Why it happened? And then we raised suggestions concerning the coming year and the implications on the curriculum.

This planning policy was validated by the teachers. For example:

> The planning was, of course, a cooperative decision. At the beginning of the year we made the general plans: what subjects we were going to teach, what trips we were going to take the students on, what plays we would see. We decided what should be learned, for what reasons, and what the final digital product would be. The policy is to open things up with the teachers and ask, "What would you like? What are your priorities?" (Second grade teacher).

This policy is true in general, and for ICT introduction in particular. As the computer coordinator says:

> I bring my ideas, like a digital newspaper, digital games, a digital presentation, to the teachers and they asked "but how can it be integrated into the subject?" I bring the 'computer head' and they bring the 'pedagogical head' and together we inlay the ideas.

In this way the teachers cooperate in developing the ICT semi-structured curriculum. As described by a fourth grade teacher: "We get the curriculum framework and work on addressing it. For example, we look for suitable software to teach human body in first grade, family in the second grade, and so on."

In general, the teachers are pleased with the school planning policy, and find it provides helpful guidance. In addition to the long-term planning, a weekly hour is allocated in the timetable for the computer coordinators (the school's computer coordinator and a computer coordinator for each level: first and second grades, third and fourth grades, fifth and sixth grades) regarding ICT weekly usage in all classrooms. Based on the school-wide planning policy, each teacher has her own planning pattern.

Teachers' Planning Patterns

Three patterns of planning were found among the teachers: the "flow" pattern, the "flexible" pattern, and the "fulfiller" pattern. Table 1 and its ensuing discussion present the main characteristics of these patterns as they emerged from the content analysis.

Table 1

Main Characteristics of the Teachers' Planning Patterns

Pattern	Flow *n=4*	Flexible *n=3*	Fulfiller *n=5*
Model	Broad outline with emergent details and implementation	Detailed program with adjusted implementation	Fixed outline and details with exact implementation
Procedure phase	Process	Output	Inputs
Disadvantage	Overflow, waste of time, missing school expectations	Time consuming, frustration from partial implementation	Time consuming
Advantage	Freedom, surprise, appreciation of extra activity	Order, meeting expectations, ability to adjust to the unexpected	Easier work, respect for others
Implementation	Above or below plans	Full implementation	Above or below plans
Causal attribution	Lack/extra information, lack of time, lack of computers, students' laziness and limitations	Students' difficulties, technical problems	Students' limited abilities, lack of manpower, class size and make-up
Self-perception	Very spontaneous, open to changes	Very organized, very tidy, conservative	Very planned, have to know exactly what to do every minute

The "flow" pattern. In this pattern the teacher plans general sketch lines, leaving the details to the implementation process as they emerge.

> I don't like that (long-term planning) because it is so routine....There are general things I think about...and during the year additional things emerge and I bring these new things to the teachers....Also when I instruct in school I don't like to come to a teacher and tell her: This is the computer's job—sit and do it. I like to ask what are the needs, what are you doing at the moment, and then I offer to plan together how to integrate the computer. (Computer coordinator and first grade teacher)

Teachers in this pattern focused on processes: They 'flow' with the students' ideas as they emerge, and merely respond to ongoing events. For example, in an assignment in which the students had to collect stories about buildings in the neighborhood and prepare a neighborhood profile, the assignment broadened to individual people's stories since, "We got such remarkable stories that it was a pity not to document them" (Fourth grade teacher).

The "flow" pattern's disadvantages are students who take advantage of the overflow to shirk their duty; the time needed; and the difficulties in meeting school requirements for long-term plans. The advantages are freedom and appreciation, as described by a fourth grade teacher: "I always take a subject and enlarge it, and this could be a problem since the time needed is more than we can afford.…It is always a great surprise to see the products and there is an appreciation for the extra activity."

Implementation is "nine times the plan," or "either 70% or 95% of what was planned." The explanations for the inaccurate implementation are lack of or extra information, or lack of time, computers, or student motivation. For example, a sixth grade teacher commented, "Some students can't do things because of laziness…others take greater initiative." On a personal level, "flow" teachers described themselves as flexible, spontaneous, and open to change.

The "flexible" pattern. This is a detailed program based on the assumption that change could take place during the implementation phase: "I know what I want. I plan a lot. I am a very organized and tidy woman. Without writing things down it is as if I have done nothing…but still, all plans are a basis for change" (Second grade teacher). "Each week I make a plan, but it is not a firm one. I can also implement the plan by other means. I am open to change" (First grade teacher).

The "flexible" teachers treat plans as a contract, as a "commitment to the students, school and parents," and focus on the planning output. They see an advantage in fulfilling the contract with the required flexibility. "If half way I have a new idea, or realize that the planned idea is unfeasible, it is O.K to change. When you bang your head against the wall, it just spoils the whole process." But such processes take time and the implementation obstacles are frustrating. "The computer shut down? You can do nothing for three days...The ink cartridge is empty? You're stuck until a new one arrives. A student is sick? You can't advance him. That's how it is—there is a plan and there are changes."

However, the "flexible" teachers report full implementation: "What we planned is what we got," but they added that the products varied according to the students' abilities and technical problems. As for their self perception, a fourth grade teacher said: "My planning changes as the years go by, hopefully for the better." A second grade teacher added:

> I write everything down. My diary is a madhouse, all notes and notes. I know who I am, where I would like to go, and what I would like to achieve, so I plan the stages that will take me there. Things must be known in advance, and of course they need to be open to change.

The "fulfiller" pattern. This is organized and structured planning that has to be implemented precisely: "I am very meticulous, a perfectionist. If I plan something, I expect to fulfill it" (Third grade teacher). A sixth grade teacher said:

> I make incredibly ordered plans...I have a 'teacher folder' in which everything is filed by schedule: what I have to do with each group, what the rest of class will do while I sit with the group, who went out of the lesson, who came in, everything has to be written down in my schedule table...I am very planned person….

The " fulfiller" teachers focused mainly on the inputs, on things that should be done: "I need to know exactly what to do at any time" (Sixth grade teacher). The advantage of this pattern is that it makes teaching easier: "Organizing (planning) is one of the most important tools in the teaching profession. An unorganized person will find it very difficult to work in the class and in such a demanding system" (Sixth grade teacher). Detailed planning also "conveys respect for and heed to all the players" (Second grade teacher). The main weakness is that it is time consuming.

The teachers report below or above plan implementation: either "80% or 95% of what was planned," or "I wanted X and got X squared." The explanations indicate the students' limited abilities, lack of manpower, or class size and make-up: "If there was a possibility of getting extra help in class, I would have managed better." "I wanted to teach computer skills, but it is impossible to accomplish [that] in a large group.…I wanted to reach more students but did not measure up to expectations."

The teachers are usually pleased with their planning pattern: "I am satisfied with my work style. Due to my planning, the work is easier for me." "This way is energy consuming, but I don't know how to do it differently. It's the way I am."

Planning in Other Contexts

In addition to comparing different planning patterns, we asked the teachers about planning in other contexts.

Planning in everyday life. In general, a match was found between the way teachers plan in school and everyday life, when they plan a vacation or a family dinner. Only two teachers reported on a new pattern of planning—the 'absence of planning' pattern—in which teachers have not

planned ahead. If they go on vacation, for example, they just take whatever clothes they feel like, without planning their dress for every occasion.

Planning in other subject matter. It was found across all patterns that ICT-usage planning is more flexible than planning in other subjects. One teacher explained: "In other subjects I do what I plan. In history, for example, I know I will need six lessons for a subject because I have been there before. In computers it is new. Each time I have a new idea, I haven't been there yet" (Fourth grade teacher, 'flow' pattern). "In Bible studies, for example, there is a basic curriculum I have to teach…I can't decide to skip the first chapter because I feel like it...it is a bit more rigid than computers" (Fifth grade teacher, 'flow' pattern).

The 'flexible' teachers explain that it is easier to address students' needs that emerged during ICT-based lessons than in other subjects, and a 'fulfiller' teacher said: "In ICT-based lessons I also see the macro and give the students freer rein" (Second grade teacher). All in all, it seems that the flexibility of ICT technology, its newness and dynamism, and the ICT semi-structured curriculum make the teachers' planning patterns more flexible than the planning of traditional subject matter.

Discussion

This study analyzed planning patterns among teachers integrating ICT. As expected, different planning patterns were found, but unexpectedly, the most efficient pattern is the flexible pattern and not the most detailed and strategic one.

There are several explanations for this. First, and compatible with the literature, is that adjusted planning is more efficient than detailed planning because it takes the changing environment into account (Fidler, 1998; Mintzberg, 1994). Second, the flexible pattern is effective because it fits ICT characteristics, which combine necessary skills with additional expertise depending on the tasks and missions. A third explanation assumes that those perceiving themselves as flexible are more satisfied with the implementation outcome. In other words, despite the difficulties of implementation, the 'flexible' teachers who adjusted themselves to the class, students and ongoing events, changed the mission as it unfolded, and then summarized it as if fully completed.

However, two factors were found to be common to the three patterns: the time needed and the place of the students in the implementation process. These two factors indicate the difficulties of the school as a planning environment: The rigid timetable, on the one hand, and the students' variability, on the other, create a turbulent situation. Thus, it is an effective fallacy to invest more time in detailed planning assuming it will cause greater improvement (Bell, 2002).

School Planning and Teachers' Planning

The data presents systematic (every year), participative (involved all the home-room teachers) school planning, also known as 'corporate

planning,' that was found to be very effective in supporting the attainment of school goals (Hopkins & MacGilchrist, 1998).

However, despite the crystallized planning approach of the school, three different patterns were found among the teachers. This reinforces the findings of other studies, that planning patterns are also affected by personal data (Cohen, Bronson, & Casey, 1995), which raises the question of harmony in personal and school planning patterns. Based on our study we found that even teachers who defined themselves as spontaneous and unplanned in their everyday life managed to adjust to the school planning pattern.

ICT and Teachers' Planning

According to the teachers' testimony, ICT does create a new and turbulent environment in school. According to the Davies and Ellison typology, the flexible pattern is like a strategic intent combining a high level of turbulence with a high level of understanding of the core direction in this environment (Davies & Ellison, 2003, p. 37). This means that insofar as the teachers know where they are going with ICT, they can get there safely with the required flexibility. It therefore seems that ICT not only increases uncertainty but also nurtures planning abilities and flexibility.

Implications and Recommendations

The lessons to be learned from our case study apply to policy, practice, and research.

Policy. Despite the time required and range of outcomes, the participative planning process is recommended for recruiting teachers' good will and efforts demanded for ICT introduction. At the district level it is also suggested that each school be enabled to find its most suitable pattern of ICT integration and then combine this into a general district ICT plan.

Practice. At the school level it is worthwhile to match the mission to the personal planning pattern, and to avoid assigning a 'fulfiller' teacher to a complex, ambiguous mission, or a 'flow' teacher to a simple task requiring accuracy. In addition, it is suggested that the principal be aware of his/her personal planning pattern (which has a significant impact on the school's planning pattern) and the potential conflict with each individual teacher's pattern.

Research. Further research is needed for better understanding how a school ICT planning pattern is created, to what degree it is part and parcel of school culture or special for ICT, and how this pattern supports or suppresses teachers' and students' achievements.

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