

Integration of New Technology in the Education System: Models and Goals

Islands of Innovation: A critical analysis of a model for innovation implementation in school systems

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In recent years, there have been an increasing number of projects implementing technological innovation in education systems, employing the Islands of Innovation model. According to this model, technological innovation is implemented in small islands within an organization, in the hope that they will be imitated, permeate the whole organization with their values and lead to overall, comprehensive innovation and to a new organizational culture.

Islands of innovation are created through two main mechanisms: top-down management decisions or bottom-up, spontaneous local initiatives taken by enthusiasts within the organization. Studies on technological innovation implementation in education systems show that for the most part, islands of innovation fail to generate overall, comprehensive

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*innovation. This article uses three prominent organizational theories - **Institutional Theory, Loosely Coupled System Theory and Disruptive Technology Theory** – to analyze the primary reasons for these failures. It stresses the buffering effect as an isolating mechanism, detaching the islands of innovation from the organization as a whole, and sees it as the main cause of failure in innovation implementation. The article warns against the stagnation that these islands of innovation may cause organization managements, which use them as an excuse to consider themselves innovative, and warns against unsupervised, poorly thought-out use of this model for technological innovation implementation.*

Introduction

Modern digital technologies – particularly multimedia and ICT – are characterized by a transition from systems that are closed, static and monistic to ones that are open, dynamic and pluralistic, ones which enable broad access to information and knowledge and invite social and scholastic interactions that transcend the constraints of time and place. These technologies offer a new interpretation of concepts such as learning, school, authority and the teacher-student relationship (Alexander, 2006; Anderson, 2004; Venezky & Davis, 2002). The widespread penetration of these technologies into all levels of education, training and higher education in recent years has dictated considerable changes in teaching-learning-training processes (Aviram, 2000; Koehler & Mishra, 2009; Kozma, 2002). This is evident in the formulation of technology-oriented pedagogical concepts (Lowenthal & Muth, 2008).

During the past decade, we have witnessed extensive implementation of educational technology as an integral part of teaching, learning and training processes (Cunningham, 2009; De Freitas & Oliver, 2005; Fullan & Smith, 1999; Halverson & Smith, 2010; Selwyn, 2010). This involves the development of unique strategies for adapting multimedia and computer technologies to educational needs and projects of innovative technology implementation such as the ‘interactive board’, the ‘computer for every teacher’ or the ‘computer for every student’.

Analysis of contemporary professional literature reveals that despite the immense inherent potential of educational technologies to enhance and improve teaching, learning and training, these educational systems have

a structural resistance to the organizational and pedagogical changes resulting from their implementation (Charter, 2008; Fullan, 2001; Levin & Fullan, 2008). This resistance presents several obstacles to the implementation process (Salmon, 2005) which lead to disappointment with the limited impact the technologies have on school culture (Cuban, 1986, 1993; Venezky, 2001), a disappointment that is common to most such endeavors (Fullan & Smith, 1999; Mioduser, Nachmias, Tubin and Forkosh, 2006). As early as 1987, Papert aptly described the stagnation of the education system and its resistance to technological innovation, when he formulated his implementation paradox, claiming that “the more suited innovative technologies are to the existing system and the fewer changes needed to implement them, the more marginal the impact they will have” (Papert, 1987)

Studies on technological innovation implementation in education systems show that contrary to the recommendations for leading models of innovation implementation (Levin & Fullan, 2008; Rogers, 1995; Tyack & Cuban, 1995), the decision about how innovations are to be implemented in education systems is usually an imposed top-down policy, that does not involve principals and teachers, and does not take into account the organizational culture, practices, norms and inherent resistance to change. (Levin & Fullan, 2008; Ogoobona & Harris, 2003; Vaillant, 2005; Zimmerman, 2006). The research also indicates that most projects focus on the external characteristics of the organization and ignore the need for a change in the organization’s culture, norms and basic assumptions (Schein, 1990) as a prerequisite for effective, meaningful implementation of innovation (Fullan, 2006; Goldhaber & Eide, 2002; Hargreaves & Goodson, 2006; White, 2007).

The search for suitable methods of implementation has led education system leaders over the past decade to examine effective implementation strategies (Sarason, 1995). In contemporary literature we find two main implementation models: **Islands of Innovation** and **Comprehensive Innovation**. In the Islands of Innovation model, the innovation encompasses only a small part of the organization and is usually focused on a particular content area or a particular task (Mioduser et al, 2006). This model usually leads to first degree changes which mainly involve changes in the characteristics and behaviors of the organization without a significant change in its culture, norms and basic assumptions in the organization (Argyris & Schon, 1978; Raz, 2002, 2006). In contrast, in the model of **Comprehensive Innovation**, the innovation permeates all levels of the organization (Mioduser et al., 2006). It creates a new organizational culture and leads to second degree changes which affect values and basic assumptions in the organization (Argyris & Schon, 1978; Raz, 2002, 2006). At the highest level, this innovation might even become a paradigm shift within the organization (Pelgrum, Brummelhuis, Collis, Plomp, & Janssen, 1997).

Because of the complexity and high cost of educational technology implementation (Venezky & Davis, 2002; Fullan, 2001), many organizations choose to employ the Islands of Innovation model (Avidov-Ungar, 2010) at the first stages of integration, in the belief that this will facilitate gradual, controlled implementation during which these islands will radiate onto their surroundings and lead to comprehensive innovation (Carter, 2008; Day & Lindsey, 2009; Del Val & Fuentes, 2003). Because of the many disappointments with innovative educational technology implementation projects (Cuban, Kirkpatrick & Peak, 2001;

Venezky, 2001), the Islands of Innovation model is attractive to education systems because it only uses up a small part of their resources and any damage from failure is limited. Because the implementation is limited in scope, the big challenge in successful implementation of the Islands of Innovation model lies in their successful expansion to the organization as a whole, including the creation of a change in its culture, and in particular its values and basic assumptions (Dodgson & Bessant, 1996; Morrison, 1998; White, 2007).

In this article we compare the two major models of innovative technology implementation (i.e. islands of innovation versus comprehensive innovation), with a special focus on the implications of the Islands of Innovation model for the implementation of innovative technologies in education systems.

Islands of Innovation and Comprehensive Innovation as models of educational technology implementation

Recent research findings indicate the limited impact of comprehensive innovative technological reforms in the education system (Venezky, 2001) and mention that they usually end in disappointment from their limited success (Cuban et al., 2001; Fullan, 2001; Venezky & Davis, 2002). Unclear trends also emerge from research findings about the effectiveness of the Islands of Innovation model of technological innovation in the education system (Avidov-Ungar, 2010; Wengliniski, 1998). Many studies reported that not only did the hope that these islands of innovation would radiate out into comprehensive innovation prove to be in vain, but also that the islands of innovation themselves were often found to inhibit the wider implementation of technological innovation (Ruggles & Sadtler, 2006; Christensen & Clark, 2003). We will now analyze the two models in an attempt to identify the advantages and disadvantages of each one in terms of effective implementation.

In the **Islands of Innovation** model, the innovation is implemented in a small part of the organization for a homogeneous group with similar traits. In many cases this is done in the form of a pilot project or a specially chosen framework such as a particular age group, subject of study, schools in a certain community or a particular teaching method. Examples of such projects might be the introduction of laptops into a school or examining the effectiveness of learning with video clips in a certain class. The choice of the Islands of Innovation model derives, in many instances, from a conservative approach that aims at a gradual introduction of innovation without causing too many shockwaves or rapid systemic changes to the organizational culture (Gomez, Sherin,

Griesdron & Finn, 2008; Koehler & Mishhra, 2009). The assumption common among many proponents of this kind of innovation is that the success of these islands of innovation will serve as a role model for the whole organization, allowing the innovation to spread and turn into comprehensive innovation (Kozma, Voogt, Pelgrum, Owston, McGhee, Jones & Anderson, 2002). On the other hand, in the **Comprehensive Innovation** model, the implementation of innovative technology is all-encompassing rather than gradual and involves most of the components of the organization and its members. Consequently, the group of participants in the comprehensive innovation model is the more heterogeneous of the two. The comprehensive model derives from the assumption that the implementation of any innovation requires a radical change in the organization's basic assumptions and the formulation of a new worldview (Halverson & Smith, 2010). Hence, while the Islands of Innovation model is often satisfied with a change within the existing organizational structures, in the comprehensive model the technology is perceived as leading an overall change in the organizational culture and in the organizational-educational culture (De Freitas & Oliver, 2005; Fullan, 1998, 2000, 2006). In reference to a school, this would involve systemic changes such as in the structure of the school and the role of the teacher.

Many studies mention the critical importance of matching the implementation model to the organizational culture and the impact of that choice on the effectiveness of the implementation (Carter, 2008; De Freitas & Oliver, 2005; Fullan, 1998, 2000, 2006; Venezky, 2001). On the other hand, other studies reveal that in many instances, the choice of

implementation model is not made out of a deep analysis of the goals and limitations of the implementation or of the organizational culture into which it is to be introduced (Ben Perez, 2009).

Table 1 compares the two models through parameters of organizational change (Sarason, 1995).

parameters of organizational change	Islands of Innovation Model	Comprehensive Innovation model
Goal of change	Improvement of existing structures; changes in behavior, language and symbols	Overall change in organizational culture; a new structure based on new values and worldview
Depth of change	Innovation encompasses only a small part of the members learning and teaching in the organization	Innovation encompasses at least half of the members learning and teaching in the organization
Type of change	A conservative approach; innovation leading to changes defined as first degree	A systemic approach; innovation leading to changes defined as second degree

Focus of change	Innovation is focused on specific content or a specific task	Innovation involves most components of the organization with direct implications for the values and worldview of the organization
Structural features	An operational change of a particular parameter within the organizational system without changing any of its definitions; the innovation has no significant impact on other levels of the organizational culture.	A change in the features and definitions of the organization that becomes of essential value, one that directly affects role variables and creates a 'new culture'
Principal implementers	A particular, unique, homogenous 'audience'	An 'audience' with a broad population that is varied and heterogeneous
Organizational culture components	Innovation involves mainly the level of characteristics and behaviors.	Innovation encompasses all layers of the organization including values and basic assumptions

Table 1: Comparison of the Islands of Innovation and Comprehensive Innovation models through parameters of organizational change

As is evident from Table 1, in both models of implementation there is potential for an educational organization to cope successfully with the complexity and problematic aspects of implementing technology innovation, but this success depends to a great extent on a profound understanding of the advantages and disadvantages and the dilemmas each one poses (Bransford, Brown, & Cocking, 1999). Research literature describes seven key dilemmas pertinent to the implementation of innovation in education systems (Ogawa, Crowson, Goldring, 1999). These dilemmas relate to the processes the school undergoes during implementation and regarding its connection with its environment. These dilemmas are presented in Table 2, with reference to the advantages and disadvantages of each implementation model. The first four dilemmas in the table refer to the relationships between sub-systems within the school and the remaining three refer to the reciprocal relations between the school and its environment.

	Dilemmas pertinent implementation of innovation	Islands of Innovation	Comprehensive Innovation
		Advantages/ Disadvantages	Advantages/Disadvantages
Within the school	Goals of the school vs. needs of the individual	Enables attainment of specific goals; less threatening; roles do not change so quickly; does not necessarily provide a response to the organization's overall values and basic assumptions.	Enables attainment of organizational systems; takes a long time; it is hard to enlist many 'adopters'; threatens the positions of members of the organization
	Formal vs. informal structure	Does not harm the formal structure of the organization; enables creation of parallel structures that do not disrupt the daily routine of the organization.	Requires a redefinition of the formal organizational structure in which the innovation is being implemented; might adversely affect some positions while promoting others; requires a systemic change.
	Professional expertise vs. bureaucratic hierarchy	Requires specific expertise; may initially make do with 'enthusiasts'; does not have to adversely impact the existing hierarchies in the initial phase.	Requires systemic expertise and ongoing learning by all members of the organization; requires a definition of the professional values underlying the innovation implementation; requires extra work on the part of many employees
	Centralization vs. decentralization of decision-making	Based on decentralization in which a subgroup is empowered – by its own initiative or at the initiative of the management; does not require centralization of the leading of the process	Requires a centralized approach in which most of the innovation is implemented top-down, with an overall coordinated and systemic perspective

Between school and environment	Conservatism vs. flexibility	Enables organizational conservatism as the systemic perspective but at the same time acts flexibly vis-à-vis the local innovation; partially caters to the demands of the environment to be flexible and innovative regarding implementing technologies in the school	Harder to remain conservative when implementing an overall systemic change; mental and organizational flexibility is needed to activate the change properly.
	Internal cohesion vs. openness to the environment	Does not adversely affect internal cohesion. Enables each sub-unit to function alone according to its routines; does not require maximum openness to the environment; the environment ‘penetrates’ the organization only through the ‘islands of innovation’	Often adversely affects internal cohesion, creating controversy regarding a systemic implementation that disrupts daily routine; innovation enables the intake of ‘oxygen’ from the environment, usually in the form of innovation
	Obeying technical expectations of environment (achievements) vs. symbolic expectations (values)	‘Islands of innovation’ spare the organization from systemic confrontation of achievements vs. values dilemma; enables small-scale tryout without damaging the organization	‘Comprehensive innovation’ forces the organization to confront the dilemma of achievements vs. values, obligating it to state what the innovation is meant to cater to and how.

Table 2: Comparison of advantages of the Islands of Innovation model vs. the Comprehensive Innovation model with reference to common dilemmas of innovation implementation (Ogawa, Crowson, Goldring, 1999)

Given the rise in the costs of technology and the increasing complexity of technological innovation implementation projects, the model of Islands of Innovation has become the preferred implementation strategy of decision-makers in the education system in recent years (Mioduser et al., 2006). However, it is actually the limited successes of these projects that reveal how important is to understand how islands of innovation are created and what factors encourage or hinder their implementation.

How Islands of Innovation are Created

Contemporary literature reports on the creation of islands of innovation in the education system through two main channels: (a) those created through an organized top-down process of carrying out a policy guided by the system's decision-makers (Morgan, 1992) and (b) those created through spontaneous bottom-up processes, led by local clusters of highly motivated teachers and other enthusiasts in the organization, who lead innovative initiatives (Mioduser, Nachmias, Tubin & Forkosh, 2003). Table 3 compares these two patterns as a basis for the discussion about how these two channels can affect the spread of technological innovation throughout an educational organization.

	Top-down Islands of Innovation	Bottom-up Islands of Innovation
Policy-making	Outcome of overall systemic policy	Outcome of local school initiative
	Predefined outcome	Outcome develops during a localized implementation approach
	Overall centralized approach to the implementation process	Process dependent on the school
	School is obligated by policy-makers to be part of the process	There is choice within the school regarding the depth of involvement in the process
	Expertise from above – from policy-makers to the school	Springs from below – a local, school-based initiative
School	Source of knowledge is external to the school, lying with the policy-makers in charge of the change	Source of knowledge is within the school, lying with those who instigated the change
	Minimal partnership of the school in the planning and initial dissemination	Maximal partnership between school stakeholders who are partners to the innovative change
	Derives from system's needs at the national/local authority level and from policy	Derives from local school needs
	Run by elements external to the school at the "head office" level	Run by elements within the school, position holders and teachers who are particular enthusiasts

Teachers	Teacher are rarely involved in the decision-making	Only the implementers are involved in the decision-makers, not the other teachers
	Teachers implement according to guidelines given “from above”	Implementation is the outcome of the school initiative
	Based mainly on models built outside the school	Based on a local model constructed as part of the innovation
Implications of for school-wide implementation	An element in the framework of the learning (a course, a website, an online project, a virtual space) that expands the students’ learning environment	For a relatively small number of students acting within a very clear framework
	Integrates into the timetable and agenda and contributes to the advancement of the curriculum	The implementation framework is focused on one defined content area or task
	Orientation is the outcome of an overall policy	Orientation is towards the world outside the school i.e. image, research, hi-tech, media, other cultures and the community

Table 3: Comparison of the patterns of creation of Islands of Innovation

Contemporary research studies examining the implementation mechanisms for technological innovation in education systems indicate that in general, islands of innovation do not manage to break through their natural boundaries to become comprehensive innovation within

the organization as a whole (*Christensen & Clark, 2003; Christensen et al., 2006; Scott2003,*). Avidov-Ungar (2010) examined one such implementation process in islands of innovation which created through a top-down approach as part of a management-dictated policy. She found that the failure of the islands of innovation to transfer the innovation to the organization and make it comprehensive so as to lead to a new organizational culture, has two main causes: (a) the size of the gap between the overt level (characteristics) and the covert level (values and basic assumptions) of the organizational culture, and (b) the size of the gap between the management's view of the innovation implementation and that of the teachers. In another study, which examined islands of innovation created through the bottom-up approach, initiated by teachers and other enthusiasts in the organization (Darling Hammond, 2000), it was found that spontaneous islands of innovation originating in local initiatives tended to have a short lifespan. She claimed that the failure of spontaneous islands of innovation indicates a need for systemic support, particularly from the relevant decision makers and managers.

In research on islands of innovation, and particularly where this is an experimental pilot for selected groups acting within an organization, the **buffering effect** is described as the main impediment to the spread of the innovation beyond its original boundaries (Avidov-Ungar, 2010; Cook, Holly & Andrew, 2007). According to these studies, the islands of innovation are perceived by the rest of the staff as a kind of 'elite unit' that cannot be imitated on the one hand, and on the other, management sees it as proof that the organization is being innovative and reformative, and thus it stops looking to generate any further innovation. In this way, the islands of innovation actually create a buffering process that is harmful to the transfer of innovation from one level of the organization to the others: between the islands and the staff and between the management

and the environment in which it functions. Examining the buffering effect in technological innovation implementation in schools, Mioduser et al. (2003) describe how the isolating of the islands of innovation from other activities in the organization rendered these special projects marginal and lacking in influence, even though the initiative for the innovation came from a group of highly motivated teachers with the approval of the management. Support for this claim can also be found in Meyer & Scott (1983), who researched the development of spontaneous islands of innovation. They claimed that because of the buffering effect and because of the lack of awareness on the part of the management regarding the stagnation that these spontaneous islands might create, in many cases the islands actually become the main force impeding expansion of the change to the rest of the organization. A similar phenomenon of “innovation without change” attributed to islands of innovation is reported on in various studies as one of the most prominent features in organizational change and technological innovation in education systems (Avidov-Ungar, 2010; Mioduser et al., 2006; Sarason, 1995; Tyack & Cuban, 1995). It was found that in general, islands of innovation that do not constitute part of the management’s vision or worldview and which do not receive support, particularly those that are spontaneous, do not manage to expand, or radiate to the rest of the organization to become comprehensive innovation (Hanson, 2001; Scott, 2003). On the other hand, the literature testifies to the tremendous vitality of the spontaneous, bottom-up islands of innovation when they do enjoy management support (Kozma, 2000).

Discussion

The phenomenon of technological innovation implementation through islands of innovation has expanded in recent years, whether through

the spontaneous bottom-up approach or through top-down systemic processes motivated by decision-makers who hope that these islands will be the epicenter from which the innovation will spread throughout the organization to become comprehensive. An analysis of the cases and mechanisms discussed in this article reveals that the conditions under which the islands of innovation are created will greatly impact their chances of radiating out to the rest of the organization. It was found that bottom-up processes often widen existing gaps between an organization's overt characteristics and its covert values and basic assumptions (Avidov-Ungar, 2010). This may be expressed, for example, in the gaps in expectations, worldview and values between the school management and the teachers, or between those who set national educational policies (Tyack & Cuban, 1995; Sizer, 1993). There are also significant gaps among the partners to top-down implementation. In many cases, technology innovation implemented in this manner is perceived by the management as a tool and not as a value, and so the motivation for implementation comes from external pressures exerted on the system by policy makers or by the need to resemble competing organizations (Carter, 2008; Cunningham, 2009), without a clear definition of what need the new technology is supposed to cater to (Cook, Holley, & Andrew, 2007; Darling Hammond, 2000). Such processes are typical of many of the decisions to implement technological innovation in education systems and in other organizations that are centralist by nature (Koberg, Detienne & Heppard, 2003), and they contribute to the widening gaps between the levels of the organization that are not part of the decision-making process, thereby which damaging the quality of the implementation (Luo, Hitly, Worlet & Yager, 2006). The most common finding regarding these gaps underlines the fact that islands of innovation created during the implementation are perceived by the environment as inaccessible and they become isolated, which, to a great extent, limits the

degree to which they can spread to the rest of the organization (Zhang, 2010).

From the findings of the abovementioned studies examining the processes of technology implementation through islands of innovation, it emerges that the assumption that their success will automatically permeate the rest of the organization is erroneous (McDermott & O'Connor, 2002; White, 2007) and that the **buffering effect** would seem to be the main impediment to this permeation, both because of the isolation from the rest of the organization and because of the stagnation they create among decision makers who, contrary to reality, use these islands as an excuse to consider their organization innovative (Kozma, 2003).

The buffering effect and the difficulties in the transition from islands of innovation to comprehensive innovation can be explained by three prominent organizational theories: the **Institutional Theory**, the **Loosely Coupled System** and the **Disruptive Technology** theory.

According to Institutional Theory, (DiMaggio & Powell, 1983; Powell & DiMaggio, 1991; Scott, 1987, 2001), organizations aspire to increase their survivability and earn legitimacy by resembling their environment and thus will meet the challenges it presents (Avgerou, 2000). This theory describes how change is perceived by the organization as a purposeless ritual conducted mainly in order to keep it in tune with external fashions of management and thereby earn social legitimacy. The implementation of technological innovation as part of a policy imposed from above is often seen by the school as something that disrupts its ongoing, routine activity (Butler, 2003). This theory also suggests that the organization handles this situation by creating islands of innovation which seemingly show it to be meeting the challenge posed by the system, but because these islands were created in order to please the system, they fail and actually block the creation of the desired systemic change (Bada, Anieboran & Owei, 2004).

The difficulty of turning islands of innovation into comprehensive innovation and the fact that these islands actually hinder the implementation of spread of innovation throughout the organization may also be explained by the Loosely Coupled System theory (Orton & Weick, 1990; Weick, 1976, 1982), which describes the school as an organization composed of units that have loose ties and limited interaction between them, out of a desire to preserve their identity and independence and to protect themselves from changes imposed from above (Heinz-Dieter, 2002). In this theory, the loose ties between the units impede any steady flow of knowledge within the organization and impedes the dissemination of innovation (Lance, 2002). As a result, buffers are created within the organization between the islands of innovation and the other units and so the desired expansion of innovation proves impossible (Tyler, 1987). For example, in a study on introducing a management system in the school, it was found that each unit retained its identity and independence and continued to function with no connection to the other units (Telem & Avidov, 1996). It is important to note that the problematic aspect of disseminating innovation within organizations with loosely coupled system units is not unique to schools but can also be found in other organizations such as the military or the government (Heinz-Dieter, 2002; Lance, 2002; Weick, 1976, 1982)

The Disruptive Technology theory (Christensen, 2003; Christensen, et al. 2006) suggests that the implementation of technological innovation might disrupt the activities and performance of the organization if implemented before they have been optimally developed or when the organization itself is not ripe for such implementation (Christensen, 2003). In terms of this theory, we can say that in many cases, the difficulty in adopting the model of islands of innovation and having them turn into comprehensive innovation lies in the organization's lack of readiness to absorb the technology and in the reluctance of the decision-makers

to adopt a comprehensive implementation approach (*Christensen et al., 2006*), which will eventually lead to a disruption in the innovation dissemination process.

In conclusion, although this article concentrated on islands of innovation in the context of schools, the analysis of the research findings it presents shows that many of the conclusions regarding the implementation mechanism of islands of innovation are also valid for other organizations, particularly ones that are hierarchical and sectioned such as the military and the government, and which confront similar challenges in implementing technological innovation where the islands of innovation might also impede effective dissemination of the innovation (*Heinz-Dieter, 2002; Lance, 2002; Weick, 1976, 1982*).

Conclusions

Today, islands of innovation constitute a common model for leading and implementing organizational and technological changes in education systems (*Carter, 2008; Day & Lindsey, 2009; Del Val & Fuentes, 2003; Mioduser et al., 2006*). This article analyzes the main factors involved in the processes of disseminating technological innovation by way of the islands of innovation model. The article presents reservations regarding this model and offers explanations for the difficulties education systems encounter in turning islands of innovation into comprehensive innovation.

The main conclusions that can be drawn from this analysis are:

- Despite the hope that they will provide leverage for systemic change, islands of innovation might actually hinder the dissemination of the innovation, particularly in organizations characterized by loose internal ties and where there are large gaps in expectations and interests between the partners to the innovation implementation.
- Before the innovation is launched, the organization must clearly

define the nature of the change it is meant to cater to, whether it will be local or systemic to the organization's culture.

- When deciding on the preferred model of implementation, it is important to examine its suitability to the culture of the organization in which it is to be implemented.
- In order to weaken the buffering effect and improve the potential for the spread of innovation throughout the organization, the islands of innovation must conduct an ongoing dialogue with their environment – both within the organization and outside it.

References

(Hebrew)

Mioduser, D., Nachmias, R., Forkosh, A. & Tubin, D (2003) *Educational Innovation on online schools in Israel*, research report, Tel Aviv University

Mioduser, D., Nachmias, R., Tubin, D. & Forkosh, A. (2006). *Pedagogical innovation involving information technologies and communications*. The Center for Science and Technology Education, School of Education, Tel Aviv University. Ramot, Tel Aviv University.

(English)

Alexander, B. (2006). Web 2.0: a new wave of innovation for teaching and learning? *EDUCAUSE Review*, 41(2), 32–44.

Anderson, R. & Ronnkvist, A. (1999). *Computer presence in American schools and classrooms, TLC Report 2*.

Anderson, T. (2004). Towards a theory of online learning. In: Anderson, T. & Elloumi, F. (Eds.), *Theory and practice of online learning*. Athabasca University: Canada, ISBN. 2, 8-22.

Argyris, C. & Schon, D. A. (1978). *Organizational learning: A theory of*

- action perspective*. Reading, Mass: Addison Wesley.
- Avgerou, C. (2000). IT and organizational change: An institutionalist perspective. *Information Technology & People*, 13(4), 234.
- Avidov-Ungar, O. (2010). "Islands of Innovation" or "Comprehensive Innovation." Assimilating Educational Technology in Teaching, Learning, and Management: A Case Study of School Networks in Israel. *Interdisciplinary Journal of E-Learning and Learning Objects* (IJELLO). 6, 259-280. <http://ijello.org/Volume6/IJELLOv6Contents.pdf>
- Aviram, A., (2000). "ICT and Education: From Computers in the Classroom to Mindful Radical Adaptation by Education Systems to the Emerging Cyber Culture", *Journal of Educational Change* 1(4), 331-352
- Bada, A. O., Aniebonam, M. C., & Owei, V. (2004). Institutional pressures as sources of improvisations: A case study from a developing country context. *Journal of Global Information Technology Management*, 7(3), 27.
- Ben-Peretz, M. (2009). *Policy Making in Education: A Holistic Approach in Response to Global Changes*. Rowman & Littlefield Education, U.S.A.
- Bransford, J., Brown, A. & Cocking, R. (1999). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academic Press.
- Butler, T. (2003). An institutional perspective on developing and implementing intranet- and internet-based information systems. *Information Systems Journal*, 13(3), 209-231.
- Carter, E (2008). Successful Change Requires More Than Change Management. *The Journal for Quality & Participation*. 31(1), 20-23.
- Christensen, M, Aaron, S. & Clark, W, (2003). Disruption in education.

- [Education Review](#). Boulder: 38(1), 44.
- Christensen, M, Aaron, S. & Clark, W, (2003). Disruption in education. [Education Review](#). Boulder: 38(1), 44.
- Christensen, M. Baumann, H, Ruggles, R, & Sadtler. T. M. (2006). **Disruptive Innovation for Social Change.** [Harvard Business Review](#). Boston. 84(12), 94.
- Cook, J., Holley, D. & Andrew, D. (2007). A stakeholder approach to implementing e-learning in a university. *British Journal of Educational Technology*, 38(5), 784-794.
- Cuban, (1986). *Teachers and machines: The classroom of technology since 1920*. New York: Teachers College Press.
- Cuban, L. (1993). The lure of curricular reform and its pitiful history. *Phi Delta Kappan*, 75(5), 182-185.
- Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technology in high school classrooms: explaining an apparent paradox. *American Educational Research Journal*, 38(4), 813-834.
- Cunningham, C.A. (2009). Transforming schooling through technology: Twenty-first-century approaches to participatory learning. *Education and Culture*, 25(2), 46-61
- Darling-Hammond, L. (2000). Policy and Change: Getting Beyond Bureaucracy. In: Hargreaves, A., Liberman, A., Fullen, M. & Hopkins, D. (Eds.). *International Handbook of Educational Change*. Kluwer Academic Publishers. pp. 642-667.
- Day, C., & Lindsey. (2009). The effects of reform: Have teachers really lost their sense of professionalism? *Journal of Educational Change*. 10(2-3), 141-157
- De Freitas, S. & Oliver, M. (2005). Does E-learning Policy Drive Change in Higher Education? A case study relating models of organizational change to e-learning implementation. *Journal of Higher Education Policy and Management*. 27(1), 81-95.

- Del Val M. P. & Fuentes, C M. (2003). Resistance to change: a literature review and empirical study. *Management Decision*, 41(12), 148-155.
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147-160.
- Dodgson M. & Bessant J. (1996). *Effective innovation policy: A new approach*. London: International Thompson Business Press.
- Fullan, M. & Smith, G. (1999). *Technology and the problem of change*. Available at: http://www.michaelfullan.ca/Articles_98-99/12_99.pdf
- Fullan, M. (1998). Leadership for the 21st Century: Breaking the Bonds of Dependency. *Educational Leadership*, 55 (7), 1-6.
- Fullan, M. (2000). The Meaning of Educational Change: A Quarter of a Century of Learning. In: Hargreaves, A., Liberman, A., Fullan, M. & Hopkins, D. (Eds.). *International Handbook of Educational Change*. Kluwer Academic Publishers, pp. 214-228.
- Fullan, M. (2001). *The New Meaning of educational change* (3rd edition). New-York: Teachers College, Columbia University.
- Fullan, M. (2006). The future of educational change: system thinkers in action. *Journal of Educational Change*, 7(3), 113-122.
- Fullan, M. (1998). The Complexity of the Change Process. In: Fullan, M. *Change forces*. The Falmer Press. Ch. 3, pp. 19-41
- Gomez, L. M., Sherin M. G., Griesdorn, J., Finn, L. (2008). Creating Social Relationships: The Role of Technology in Pre-service Teacher Preparation, *Journal of Teacher Education* 59(2), 117.
- Halverson, R, & Smith, A. (2010). How new technologies have (and have not) changed teaching and learning in school. *Journal of Computing in Teacher Education*, 26(2).
- Hanson, M. (2001). Institutional theory and educational change.

- Educational Administration Quarterly*, 37(5), 637-661.
- Hargreaves, A., & Goodson, I. (2006). Educational change over time? The sustainability and non-sustainability of three decades of secondary school change and continuity. *Educational Administration Quarterly*, 42(1), 3-41.
- Heinz-Dieter Meyer, (2002). From “loose coupling” to “tight management”? Making sense of the changing landscape in management and organization theory, *Journal of Educational Administration*, 40 (6), 515 – 520.
- Koberg, C. S., Detienne, D. R. & Heppard, K. A. (2003). An empirical test of environmental, organizational, and process factors affecting incremental and radical innovation. [*The Journal of High Technology Management Research*, 14 \(1\)](#), 21-45.
- Koehler, M. j. & Mishra, P., (2009), “What is technological pedagogical content knowledge?” *Contemporary issues in Technology and Teacher Education*, 9 (1), 60-70
- Kozma, R. (2000). *Qualitative Studies of Innovative Pedagogical Practices Using Technology*. SITES M2 design document, IEA.
- Kozma, R., Voogt, J. Pelgrum, W. Owston, R. McGhee, R., Jones, R. & Anderson, R. (2002). Technology, Innovation, and Educational Change: A Global Perspective – A Report of the Second Information Technology in Education Study: Module 2, A Project of the IEA. URL: http://sitesm2.org/SITES_Research_Projects/SITESM2/final_report/index.html
- Lance D. F. (2002). Tightly coupled policy in loosely coupled systems: institutional capacity and organizational change, *Journal of Educational Administration*, 40 (6), 561 – 575.
- Levin, B. & Fullan, M. (2008). Learning about System Renewal. *Educational Management Administration & Leadership*, 36(2), 289-303.

- Luo, J.S., Hitly, D.M., Worlet, L.L. & Yager, J. (2006). Considerations in change management related to technology. *Academic Psychiatry*, 30(6), 465-469.
- McDermott, C. M. & O'Connor, G. C. (2002). Managing radical innovation: An overview of emergent strategy issues, *Journal of Product Innovation Management*, 19(6), 424–438.
- Meyer, J. & W. R Scott (Eds). (1983). *Organizational environments: Rationality and ritual*. Beverly Hills: Sage.
- Morgan, R. M. (1992). [Educational Reform: Top-Down or Bottom-Up?](#) *Educational Technology*, 32(11) 47-51.
- Morrison, K. (1998). *Management Theories for Educational Change*. SAGE Publications Company, London.
- Ogawa, R., Crowson, R. & Goldring, E. (1999). Enduring Dilemmas of School Organization. In J. Murphy, & K. Seashore Louis (Eds.), *Handbook of Research on Educational Administration* (2nd ed.) (pp. 277-295). San Francisco: Jossey- Bass.
- Ogobonna, E. & Harris L. C. (2003). Innovation, organizational structure and performance. *Journal of Organizational Change Management*, 16(5), 512-533.
- Orton, J. D., & Weick, K. E. (1990). Loosely Coupled Systems: A Reconceptualization. *Academy of Management Review*, 15(2), 203-223.
- Papert, S., et al. (1979). "Final Report of the Brookline LOGO Project," *LOGO Memo Nos. 53 and 54*. Massachusetts Institute of Technology.
- Pelgrum, W., Brummelhuis, A., Collis, B., Plomp, Tj., & Janssen, I. (1997). *Technology Assessment of Multimedia Systems for Pre-Primary and Primary Schools*. European Parliament, Scientific and Technological Options Assessment Panel, Luxembourg.
- Powell, W. W. & Dimaggio, P. J. (1991). *The new institutionalism in organizational analysis*. Chicago, University of Chicago Press.

- Raz, A. (2002). *Emotions at work: Normative control, culture and organizations in Japan and America*. Harvard University Press (Asia Center).
- Raz, A. (2006) Managerial culture, workplace culture and situated curricula in organizational learning. *Organization Studies*, 27(2), 165-182.
- Rogers, E. M. (1995). *Diffusion of Innovations*. 4th Edition, The Free Press, New York.
- Sarason, S. B.(1995). The School Culture and Processes of Change. In: Sarason, S. B. School change - The Development of a point of View. Teacher College, Columbia University, New York and London. Ch.6, pp.65-84.
- Schein, E. (1990). Organizational culture. *American Psychologist*. February, 109-119.
- Scott, W.R. (1987). The adolescence of institutional theory. *Administrative Science Quarterly*, 32(4), 493
- Scott, W. R. (2001). *Institutions and Organizations*. Thousand Oaks, CA, Sage
- Scott, W. R. (2003). *Organizations: Rational, natural and open systems*, (5th ed.). Upper Saddle, NJ: Prentice Hall.
- Selwyn, N. (2010). Looking beyond learning: Notes towards the critical study of educational technology. [*Journal of Computer Assisted Learning*](#), 26(1), 65–73.
- Sizer, T.R. (1993). *Horace's school: Redesigning the American high school*. Boston: Houghton-Mifflin.
- Telem, M. & Avidov, O. (1996). The Effect of School Management Information Systems on the Nature of a Loosely Coupled High School Instruction, Administration Subsystem: A Preliminary Study. *The Journal of Research on Technology in Education*, 28(2) 258-270.

- Tyack, D. & Cuban, L. (1995). *Tinkering toward utopia*. Cambridge: Harvard University Press.
- Tyler, M. (1987). [Loosely Coupled' Schools: a structuralist critique](#). *British Journal of Sociology of Education*, 1465-3346, 8(3) Pages 313 – 326.
- Vaillant, D. (2005). Educational reform and the role of teachers. *Prelac Journal*, 1, 38-51.
- Venezky, R. L. (2001). Procedures for Evaluation the Impact of Educational Interventions in *Journal of Science Education and Technology*, 10(1) 17-30.
- Venezky, R.L., & Davis, C. (2002). *Que Vademus? The Transformation of Schooling in a Networked World*. Research report: OECD/CERI, Version 8c, March, 2002.
- Weick, K. (1976). Educational organization as loosely coupled systems. *Administrative science Quarterly*, 21, 1-19.
- Weick, K. (1982). Administering education in loosely coupled schools. *Phi Beta Kappan*, 63(10), 673–676.
- Wenglinsky, H. (1998). *Does it compute? The relationship between educational technology and student achievement in mathematics*. Princeton, NJ: Educational Testing Service. From: <ftp://ftp.ets.org/pub/res/technolog.pdf>.
- White, S. (2007). Critical success factors for e-learning and institutional change – some organizational perspectives on campus-wide e-leaning. *British Journal of Educational Technology*, 38(5), 840-850.
- Zhang, J. (2010). [Technology-Supported Learning Innovation in Cultural Contexts](#) *Educational Technology Research and Development*, 58(2), 229-243.
- Zimmerman, J. (2006). Why some teachers resist change and what principals can do about it. *NASSP Bulletin*, 90(3), 238-249.