

Diffusion of Computers in Schools

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INTRODUCTION

Every system is shaped by the prevailing paradigm. As society innovates itself, it also adjusts its mechanisms to new situations. The phrase *information society* is one of the mechanisms suggested to adjust to new situations; it is to diffuse the innovation (Askar, 2004). On the other hand, in spite of the easily visible changes and adaptations in companies, it is hard to say this for educational organizations or schools.

The use of computers in schools for the purpose of teaching and learning is a kind of diffusion process in which the computer is an innovation that is defined by Rogers (2003, p. 12) as “an idea, practice or object that is perceived as new by an individual or other unit of adoption.” In fact, computers, as a relatively new building block in the educational system, cause innovations that range from ways of communication, to teaching methods, to educational material and school management. As Rogers points out, getting a new idea adopted, even when it has obvious advantages, is difficult.

In this article, the diffusion of computers in three schools was analyzed in the light of the theory of the diffusion of innovation. Furthermore, the findings were interpreted in the framework of complex systems since school is complex, an organic-like structure with its agents and schemas, and the interactions among them.

FACTORS EFFECTING THE DIFFUSION OF TECHNOLOGY IN EDUCATION

The factors influencing the diffusion of computers in schools have been investigated by numerous research studies.

Beggs (2000) has identified that technology improves instruction and it has more advantages compared to traditional ways; Beggs believes these are the two most important factors in the adoption of educational technology.

Bussey, Dormody, and VanLeeuwen (2000) conducted descriptive research on New Mexico public schools. The results showed that there is an inverse relationship between adoption of technological education and years of experience. It has been identified that teachers have pointed out an insufficient budget as the biggest barrier to adoption of educational technology. This is followed by insufficient resources, lack of educational programs, and other issues. Teachers' concern has been identified as the most common supporting factor in adoption of educational technology.

Braak (2001) has investigated the factors affecting the use of computer-mediated communications (CMC) by the teachers at secondary schools. It has been identified that an insufficient budget, lack of time, lack of external support, lack of understanding of the dimension and importance of results of CMC, as well as insufficient materials have been defined as the strongest factors that prevent the use of CMC by teachers. Technological innovativeness has been identified as the most important factor in the use of CMC. Perceived attributes of CMC have been reported as the next most important factor after technological innovativeness. CMC users have more positive perceptions compared to the nonusers regarding perceived attributes of CMC, like that it is reliable, economical, effective, flexible, and functional.

Butler and Sellbom (2002) in their research examined factors affecting teachers in adopting new teaching technologies and barriers emerging during adoption. Surveys have been mailed to 410 teachers, however, about 30% have responded. As a result of

the research, trust in technology has been identified as the most important factor in teachers' decisions on whether or not to adopt. Know-how, difficulty in learning, and the time required to learn appear as the second most important factors in adoption. Believing that technology enriches and improves education, difficulty in using technology, and management support appear as other factors affecting adoption.

Bennett and Bennett (2003) studied the perceived characteristics of instructional technology that may influence a faculty member's willingness to integrate it in his or her teaching. They have expressed that the most important barrier teachers face in using technology is not the lack of technology or funds, but teachers' lack of willingness and their belief that technology is not useful.

Jebeile and Reeve (2003) reported the findings of a study of teacher adoption of Web technology in a secondary college. The results showed that the innovation-adoption variables of relative advantage, compatibility, visibility, ease of use, results demonstrability, and triability should be considered by school administrators seeking to increase the use of e-learning within their organizations.

Mumcu (2004), in her research on the diffusion of ICT in vocational and technical schools, found that the most critical obstacles were insufficient budgets, hardware, and in-service training. In addition, it was reported that there was a positive relationship between relative advantage, compatibility, and visibility with the use of computers.

The research studies showed that teachers' beliefs, their trust in technology, their concerns, and their willingness to use computers were key factors. In addition, school management in finding funds and organizing physical, technical, and instructional conditions are the other critical issues in the diffusion of computers in schools.

TEACHERS AND THEIR ROLES IN THE DIFFUSION PROCESS

In order to understand the role of teachers in the computer-diffusion process, 27 teachers were interviewed from three different schools two times in the period of a 2-year interval (Askar & Usluel, 2003). The results of the first interview are as follows.

While teachers find using computers moderately complex, they think it could be experimented with on a limited basis. They find it beneficial in both organizational and personal tasks such as preparation of unit plans, entering students' marks, typing examinations, communicating with e-mail, and searching the Internet for their hobbies.

On the other hand, it is understood that multifaceted and continuous strategies are required for the adoption of computers as learning and teaching tools because it has been observed that teachers find computers advantageous in administrative and personal tasks due to concrete benefits like time saving, ease of use, and organization. However, they do not see any benefit in using computers for teaching purposes, and they perceive it as a burden.

The other feature of *new* associated with advantage is observability. Since it is not only the computer being observed as a technological tool but also its benefits, teachers using computers in their administrative and personal tasks can easily be observed by other teachers through personal communication channels in a short time very easily. However, observing the computer's benefits when used as a teaching tool is difficult and takes a long time within the current school system because teaching takes place in the closed environment of a classroom and it takes a long time to gain and see the outcomes.

Regarding the compatibility of the innovation, teachers do not find computers compatible in the teaching and learning process. On the other hand, they find them compatible in administrative and personal tasks. The underlying reason for that may be that it requires further change in such tasks. This encompasses a wide range of changes such as in roles, methods, the ways in which the goal of education is perceived, and so forth. Moreover, teachers might think that when computers take part in the classrooms, it requires different teaching strategies from current practices and thus will cause difficulty rather than make tasks easier. In addition, lack of hardware, software, service, location, and organizational support add to the teachers' worries.

When the stages of the innovation-decision process (knowledge, persuasion, decision, implementation, confirmation) regarding computer usage are examined, it can be said that most teachers are in the implementation stage in personal and administrative

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