Aspects of Successful Integration of ICT in Schools

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AABSTRACT:
The term ICT (Information and Communication Technology) is used to refer to the convergence of audio-visual and communication networks with computer networks through a single cabling or link system. Many studies have proven that implementing ICT in schools requires the availability of number of aspects; this paper aims at presenting these: management and leadership, financial support, digital content (the curricular), technology and network infrastructure, technical support and teachers training. These aspects represent areas requiring early consideration in the process of e-learning development which should be treated as a cycle that should be revisited throughout the project lifecycle as part of a continuous improvement strategy.
Keywords: Information and Communication Technologies (ICT), technical infrastructure, integration, implementation.

المستخلص:
يستخدم مصطلح تكنولوجيا الإتصالات والمعلومات للإشارة إلى إقتران الشبكات المرئي- مسموعة وشبكات الإتصالات مع شبكات الحاسب الآلي من خلال كابل وحيد أو من خلال نظام ربط. لقد برهنت العديد من الدراسات أن تنفيذ إستخدام تكنولوجيا الإتصالات والمعلومات في المدارس يتتطلب توفر عدد من الجوانب؛ هذه الدراسة تهدف لعرض هذه الجوانب والتي تشتمل على: الإدارة والقيادة، والدعم المالي، والمحتوى الرقمي، والتكنولوجيا وشبكة الإنترنت بالإضافة إلى الدعم الفني وتدريب الأساتذة. هذه الجوانب تمثّل المجالات التي ينبغي النظر فيها في وقت مبكر في عملية تطوير التعليم الإلكتروني ويجب أن تعامل كدائرة يتم الرجوع إليها بطريقة مستمرة خلال دورة حياة المشروع كجزء من إستراتيجية التحسين والتطوير المستمر.

INTRODUCTION

ICT in Schools provides opportunities to students to mainly build their capacity on ICT skills and make them learn through computer aided learning process. Using ICT in schools requires the availability of a number of aspects. These aspects include: committed leadership that should be in charge of the financial support of the whole learning process because any innovation without available and affective resources, such as money, tools and materials to support its implementation, will not be successful. Thus, for successful digital learning process there must be available funds to meet today's needs and available resources to expand the technical capabilities for tomorrow (Powell, 2000). Furthermore, it needs good curricula because not all contents are suitable for the digital learning. Also, technical support to assist the teachers and the learners with technical problems. Providing technical support would enhance learners' studies as it will help in making them concentrate on the learning content rather than being distracted by technical issues (Suhonen & Sutinen, 2006). Besides, teachers' training in the use of ICT that is relevant to their own environment, their own stage of development, and training in

the pedagogical use of technology. These aspects should be treated as interrelated links in an interconnected cycle that the loss of one of them could lead to the collapse or failure of the learning process.

Definition of ICT:

Information and communications technology (ICT) is often used as an extended synonym for information technology (IT), but is a more specific term that stresses the role of unified communications (Hammond & Michael, 2004) and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information (Geer & Sweeney, 2012).

ICT in education refers to teaching and learning the subject matter that enables understanding the functions and effective use of information and communication technologies (ICTs) in the learning and teaching process (Hammond & Michael, 2004).

ICT can be used for realizing the following functions:

Generally, ICT can be used for realizing the following functions (Moonen and Kommers, 1995).

1- ICT as a subject. It refers to learning about ICT. Mostly organized in a specific course. What is being learned depends on the type of education and the level of the students. Education prepares students for the use of ICT in education, future occupation and social life.

2- ICT as an 'assisting tool'. ICT is used as a tool, for example while making assignments, collecting data and documentation, communicating and conducting research. Typically, ICT is used independently from the subject matter.

3- ICT as a medium for teaching and learning. This refers to the use of ICT as a tool for teaching and learning itself, the medium through which teachers can teach and learners can learn. It appears in many different forms, such as drill and practice exercises, in simulations and educational networks.

4- ICT as a tool for organization and management in schools.

Aspects of successful integration of ICT in Schools:

This section illustrates a range of aspects that are essential to the development of good ICT learning opportunities in schools, these aspects are:

    a. Management and Leadership.
    b. Financial support.
    c. Digital content (the curricular).
    d. Technology and network infrastructure.
    e. Technical support.
    f. Teachers training.

Each of these aspects is necessary, but each is not sufficient by itself to provide good ICT learning opportunities. The presence of all aspects increases the possibility of good ICT learning opportunities (Becta, 2003).

A. Management and Leadership:

The implementation of ICT in education requires enlightened management and leadership which will be responsible for the financial support, technical infrastructure, technical support, teachers' training, curricula and evaluation of the implementation process.

As the field of ICT in education is new in Sudan, these leaders can benefit from the experiences of some of the educational institutions (especially African ones) which have already made significant progress in this process. They can learn from these examples by analyzing what works in the funding and management frameworks (ScholNet Africa, 2004).

1. **Financial support**

Education leaders should tackle funding issues that restrict innovation by making the best use of all the resources they have available through effective procurement, cost modelling and management for sustainability so that they can lead sustainable ICT implementation (Department for Education and Skills, 2003).

The financial planning requires a collaborative engagement of government leaders, Ministry of Education and the education institutions. The education institutions should help leaders make informed decisions about the costs and benefits of innovative technologies, and ensure that funding mechanisms are a help, and not a hindrance, in taking forward e-learning. Moreover, there should be inclusion of business and private Sectors (GeoSINC International, 2002).

There are three aspects related to resources that administrators have to consider when financing the integration of technology (Surry, Ensminger, & Melissa, 2003). These aspects are:

    A. Continuing resources (hard money): The Ministry of Higher Education should allocate annual revenue that can be counted on for financing the instructional technology.

    B. Temporary resources (soft money): Higher education institutions should find a mechanism that is mainly specialized in raising funds and sponsorship e.g. from international organization UNESCO and UNICEF and from national and international donors.

    C. Resource allocation: The administrations of higher education institutions should manage these revenues wisely and utilize it probably for technology purchasing and upgrading, technological support, maintenance, teacher's training and personnel expenditures.

A. **Digital content (The curricular):**

There are some elements that should be considered in the curricula design to make it appropriate for digital learning (Becta, 2006):

    a. The course objectives should be clearly stated.
    b. The outcomes of the course should be clearly specified.
    c. The course needs should be clearly determined.
    d. Content should be selected.
    e. The course time should be stated.
    f. Criteria for promotion and examination should be determined.
    g. The relevance of the course to the learners' specification field should be clearly stated.
    h. The needed technology applications should be stated in the course framework guidelines.
    i. It should specify the way in which mastery will be evaluated.

- **Technology and network infrastructure:**

Implementing ICT in schools requires a well-planned technological infrastructure supported by adequate resources. It includes i.e. hardware, connectivity, internet connection speeds and access to wireless networks and supporting technologies such as interactive whiteboards (presentational technology) (Becta, 2005).

The technical infrastructure should be based on the institution's technical capabilities to deliver and manage the teaching/learning process. The administration should aim at having an affordable and a reliable infrastructure that help in enhancing the quality and effectiveness of learning and teaching. Moreover, it should aim at developing digital infrastructure through which the institution can obtain the needed support and services to develop and maintain robust, reliable and sustainable E-Systems that will fulfill the needs for reliability and performance, both now and in the future (Becta, 2007).

According to Boettcher and Kumar (2000), the technical infrastructure should be:

1. Scalable: able to handle growth in term of increased number of users, more demanding applications, and greater variety of applications.
2. Sustainable: resilient and reliable enough to survive and to accommodate technology changes as well as the test of the time.
3. Reliable and consistently available: 24 hours a day, seven days a week.

Therefore, technical infrastructure planning should focus on the following issues (Khan, 2005, p. 155):

1. What technological and technical capabilities are required to support teaching/learning process?
2. What essential skills (i.e. digital literacy) are needed by learners, instructors, and support staff to be successful in ever changing digital learning environment?
3. What standard and guide lines should be followed to create and share learning content?
4. What policies should be employed for technology infrastructure?

1. Technical support:

The problem of the technical support in the Sudanese universities is that there is a lack of qualified and technical staff (The Federal Ministry of Education Ministry, 2004). What's more, skilled, trained staffs that are well acquainted with the ICT tools are very limited. They also tend to prefer the private sector to government positions (Amr, 2007). Thus, increasing the wages of the qualified technicians will motivate them to stay and will provide opportunity to employ them to train the unqualified ones.

1. **Teachers' training:**

It is educating educators about technology. Teaching with technology is different from teaching in a typical classroom. That is why teachers must be trained in how to plan, create, and deliver instruction within a technological setting. In order to use technology effectively, educators need to be trained in using technology and they need to develop a good understanding of it. Technology is used to enhance learning; therefore it is important for educators to be comfortable using it to ensure that students get the full advantages of educational technology (Geer & Sweeney, 2012).

There are many factors causing variations in the students   achievements, but the biggest factor is the individual teacher i.e. students   learning and achievement differ greatly depending on whether they get effective or ineffective teacher. Therefore, training and preparing teachers with the needed knowledge and skills to use ICT in the

teaching/learning process is a vital factor to the success of the whole project. They need to have a good understanding of how technology applications can realize efficiencies and that it has the potential to address workload and productivity issues (Becta, 2005).

However, the effective use of ICT in teaching and learning is dependent on the teachers being able to understand the pedagogy of using ICT as a teaching and learning tool. There is a tremendous potential for innovative and creative learning to take place in the learning process, but teachers must be fully competent and confident in the pedagogy of using ICT (McCarney, 2004).

Thus, staff development in ICT should not concentrate only on the skills and the technical use of ICT rather than on the pedagogical use. Teachers may attend a training course and learn how to word process or 'surf the net' or develop web pages, but these skills must be placed in a pedagogic context and teachers must be shown how to refocus their work and lessons to take account of ICT. This pedagogic context should enable teachers to understand how to use ICT in teaching, consider how ICT can support and enhance learning as a natural part of the teaching/learning process, consider how ICT can provide more learning opportunities and be another vital learning tool for students. When a teacher is using ICT, he or she will be teaching about ICT in an implicit manner and will be developing students' practical skills, but it will also be about creating enhanced learning contexts and challenges for students in many curricular areas. This is the crucial challenge that faces the teacher and for which they need support and staff development (McCarney, 2004).

Therefore, teachers need good quality training in using the ICT that is relevant to their own environment, their own stage of development; but they also need to know how to apply that knowledge within the curriculum. For that reason, teachers need to know the advantage of using technology so that they may be encouraged to adopt ICT where appropriate during their professional lives as classroom practitioners, planners, managers and learners. Thus, training needs to present ICT as a vehicle through which the curriculum can be developed and delivered rather than a separate entity (Williams, Wilson, Richardson, Tuson & Coles, 1999).

CONCLUSION:

Integrating ICT in schools is a process that requires careful deliberation, planning and designing and it should occur only after careful consideration of a number of factors. Therefore, schools intending to use ICT teaching/learning process should consider preparing a number of aspects before initiating this process; these aspects include: management and leadership, financial support, digital content (the curricular), technology and network infrastructure, technical support and teachers training. Preparing these aspects will help in identifying the limitations with regard to the implementation of ICT. In addition, it will offer suggestions on the design of a strategy which may help in preparing the schools to be ready for using ICT.

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