Establishing an e-Environment that Empowers ICT within the Education System

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Abstract

Recent developments in ICT have incited an increasing attention in ICT-based blended-learning pedagogy to expand access to learning and adoptive lifelong learning amongst citizens through the use of ICT. The objective is to create an e-environment that permits ICT within the education system and backings, facilitates, and computerizes both educational and administrative activities and services accomplished at all functional levels of the education system. In this paper, the educational strategic goals have been established, followed by specific objectives with action plans to achieve the set goals. Additionally, the ICT scheme has been crafted to build a solid ICT-based, blended-learning pedagogy in schools and to make the usage of emerging technology within the education system easy and effective**.** Results show that the set strategies empower schools to develop the school-based, self-improvement ICT plans. More, the strategies also empower the progressive set of schools to lead others into the following phase of ICT-supported and knowledge economy-based skills.

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INTRODUCTION

Jordan has endeavored towards building a knowledge-based economy, where the generation and the use of knowledge will back expressively to an economic growing and prosperity making. Henceforth, the whole country started a real revolution with a strong-minded political will. Government institutions have permitted new tools for improved productivity and educational systems have refreshed new learning approaches in-line with new installation of advanced network connectivity and state-of-the-art tools. A development is still required to be presented to assure that educational systems are thoroughly reviewed and developed to meet the afflictions of a fast growing and evolving technology parts. This would require creation an effective educational policy that closely links the process of learning development to the formation of highly educated and better-informed labor force devolved with new values, skills, and knowledge that will permit Jordan to become viable in the worldwide ground [1,2,21].

Economic condition for constructing a successful ICT future centers in part on the success of ICT and its role in instructing the excellence of education and training. ICT also grips huge potential as a tool for reducing the costs of continuing and office education and training. However, the cost of courses passed through ICT is usually higher than that carried through conventional teaching [15,22]. Additionally, ICT holds the potential to extend access to high-quality education and training preambles and expresses our students for the knowledge-economy. The new economy places a finest on transformation, customization, new business models, and new methods of organizing work [2,3].

Schools must embed ICT-based, blended-learning pedagogy to spread students' skills and teach them new ways of managing knowledge and information. ICT can definitely help students keep up-to-date of the speedy changes in technology, the sciences, and other disciplines. It has the prospective to reform the basic beliefs of learning by making it different- rather than school-based, removing clock-hour measures in favor of performance and product measures and highlighting customized learning solutions over generic, one-size-fits-all instruction. It offers admission to just-in-time information, advice and performance support [2,5].

Despite that there is some energy by school teachers in the Jordanian schools carrying their own investigations and using trial and error to search for inventions to enhance their courses; these efforts are not coordinated with a large-scale official support and structure to move these initiatives from innovations to principles. We need to extent the culture of using technology to improve the value of education. There is a necessity to shape a system that is driven by instructional technologies that contain design and development of tools. ICT is playing an important role in universal education [16,17]. Additionally, even with the fact that the schools are distinguished in the quality of teaching and activities, their embedding ICT-based, blended-learning pedagogy is still in the early stages and we may face many challenges in this regard. We have excelled in some areas related to ICT and have many challenges to face as well. We will utilize our strengths and build on them, mitigate our weaknesses, avoid our threats and exploit our opportunities [5].

In this paper, five strategic goals have been established, including: Further develop and roll out Infrastructure Technologies across K-12 education system in Jordan with

parity and equality throughout the whole kingdom, Expand and enforce a blended learning pedagogical approach, Implement a robust integrated EMIS for school-based management, Setup and empowering the Lead School concept and Use ICT to build an effective assessment mechanism to evaluate the Knowledge Economy Skills acquired by students. These strategic goals are followed by specific objectives with action plans to achieve the set goals. The paper is intended to set up the blueprint for policy makers to embed and utilize ICT to enhance pedagogy within the educational system, which includes 3800 schools (public and private), 60000 teachers, 60 training centers and more than 1600 teacher trainers from all parts of the kingdom.

BACKGROUND AND REVIEW

Jordan is a leader in the Arab region in education reform and is a model for other countries. Significant initiatives have been and are being launched that are moving education in Jordan in the direction of a knowledge economy, initiatives for which Jordan can be rightly proud. Building on Educational Reform for Knowledge Economy (ERfKE I) and extended with ERfKE II, the Ministry of Education (MoE) is [4,10,18,20]:

- Shifting teacher professional development towards standards that can assure quality teaching and be used to purchase or develop training materials to achieve these standards.
- Growing a curriculum that moves away from "topics covered" to learning outcomes—what students should know and be able to do in each of the subjects, as well as general knowledge economy skills, such as communication, collaboration, problem solving and critical thinking skills.
- Increasing assessment that can be delivered online.
- Instituting a school development initiative that emphasizes a recurring process of evidence-based self-assessment needs analysis, action planning, implementing, and assessment.

Additionally, and in collaboration with MoE initiatives, the Jordan Education Initiative (JEI) has been engaged in innovative, ICT-based educational reform efforts since 2003. JEI is a model for integrating technology in education has proven to be effective, dynamic and adaptable, and therefore JEI has signed a memorandum of understanding with MoE and Madrasati1 to roll out the model in 76 schools. Other initiatives in Jordan include the World Links for Development and Intel Teach which have, so far, trained 7800 in Intel to the future program and 4575 in World Links program of teachers in technology skills and ICT-based pedagogical practices [11,12,13,14].

MoE has already started with several of these presented strategies with supporting organizations, or on a small scale, like the Management Information Stream. However these early efforts are not at scale and need to be associated with overall strategies presented here to give a route to the MoE's efforts to reach a Knowledge Economy educational system [10,11]. A Knowledge Economy educational system demands significant changes across the Ministry - from the way the Ministry implements technology and educational change to the resources at its disposal to carry out this change. We describe below the high-level strategies, the actions and the operational plan for these changes [1,5,19].

[1] Translation: My School. An initiative by Her Majesty Queen Rania Al Abdullah launched in April 2008, the aim is to reach 500 public schools in urgent need of assistance across Jordan, through five years.

MISSION STATEMENT

ICT-based, blended-learning pedagogy is the use of ICT to acquire, create knowledge and move it toward knowledge economy education, and improve educational skills at times and on terms defined by each learner in an interactive, engaging, and personalized environment. It can cover a spectrum of activities from supported learning, to blended learning, to learning that is entirely online. The ICT strategies and actions presented here are based on the Knowledge Ladder presented in [1] and focus on the next five years, changes between 2012 and 2016. But these changes are designed to fit into a longer-term trajectory of change that will transform education in Jordan by 2025 and will both draw on and contribute to the country's economic transformation into a knowledge economy. The Knowledge Ladder three phases beyond Basic Education (i.e. Technology Literacy) are Knowledge Acquisition, Knowledge Deepening and Knowledge Creation. The task mission is to establish an environment that empowers ICT within the education system and supports, facilitates, and automates both educational and administrative activities and services performed at all functional levels of MoE.

STRATEGIC GOALS

A. *Further develop and roll out Infrastructure Technologies across K-12 education system in Jordan with parity and equality throughout the whole kingdom*

It is crucial for the MoE to strengthen its relationship with its key ICT vendors, establish strong partnerships with all vendors, and develop its own capacity to manage ICT projects and maintain resources for it to be able to successfully implement any of the related strategies or action items. Such infrastructure includes, but not limited to, hardware, software, antivirus systems, LMS, EMSS, e-content, and connectivity. It is required to conduct a comprehensive analysis, in cooperation with the Ministry of Information and Communications Technology (MoICT), the National Information Technology Center (NITC) and other relevant organizations, of ICT performance issues from the end-user perspective—computer labs and teacher computers in schools. The outcome of such analysis is to define the gaps in the existing systems and solutions, and fix them.

Objectives and Actions

1. MoE will define the basic technology model to be deployed in all schools and provide an evenhanded access to all schools in the country.
   - 1.1. Assessment of the various models of technology in education deployed in a variety of schools, and adapt and adopt a model that is affordable, sustainable and most of all effective.
   - 1.2. Conducting a baseline ICT in education comprehensive survey of all schools in Jordan to define the availability, actual use and need.
     Outcome: a gap analysis that would define the needs and develop an implementation plan accordingly.
2. Further develop the e-learning resources.
   - 2.1. Assess available resources and define model for upgrading and maintaining them
   - 2.2. Build on existing partnerships with vendors of e-learning resources and enhance their level of participation, to increase the availability of these resources and improve on their quality.
     Outcome: More availability of upgraded sustained state of the art resources

2.3. Build capacity of MoE specialists in the field of maintenance development of e-learning resources and e-learning platform.
Outcome: Better maintained resources while cutting costs of outsourced maintenance contracts.

3. Conduct a comprehensive review of the Learning Management System and EMIS to improve usage performance and access. The review will include performance issues that could be related to every step in the path between the user and the e-Learning platform, such as:
   - computer lab hardware and software,
   - network administration at the school level,
   - bandwidth availably between the school and the data center,
   - the data center networking, hardware, and configuration,
   - the e-Learning platform architecture, and
   - the e-Learning platform software itself.

   3.1. To revise contract negotiated with vendor.
   Outcome: Resolve specific issues with vendor and repair relationship with vendor.
   3.2. To produce a list of desirable characteristics in a LMS and EMIS.
   Outcome: Resolve specific issues with vendor OR identify an alternative vendor and begin negotiating contract.
   3.3. To activate and make use of a LMS available tools, such as collaborative learning, e-exams and e-assignments.
   Outcome: Teachers and students are exposed to more rich and enhanced tools of instruction and learning.

4. MoE will take all measures to ensure timely and comprehensive (preventive and corrective) ICT maintenance of all its ICT resources.
   4.1. Build internal capacity.
   4.2. Deploy preventive solutions and measures.
   Outcome: Computers are protected and safe from viruses.
   4.3. Develop partnerships to outsource certain maintenance functions.
   Outcome: A regular schedule of computer maintenance is secured.
   4.4. To adopt a systematic ICT replenishment policy.
   Outcome: Newer computers and robust technology are deployed.

5. Explore and adopt innovative ICT solutions that would enhance the teaching and learning process and align with the educational outcomes. MoE will keep an open policy towards learning and exploring with new technological solutions that would be educationally and costly effective, such as cloud computing, 3G connectivity, windows multi-seat among several others.
   5.1. To deploy an advanced security solution to protect the MoE ICT components and applications.
   Outcome: MoE users use ICT resources with high security and data integrity.
   5.2. To assess and define the Infrastructure technologies requirements aligned with the Instructional design that assuring quality and equity of access.
   Outcome: Alignment of the instructional design and ICT technologies is attained.
   5.3. To set a comprehensive plan to make use of the JEI pilot projects.

Outcome: Teachers are exposed to more efficient and updated ICT technologies.

5.4. To look for alternative solutions and vendors through capitalizing on pilots conducted and implemented by JEI and other organizations.
Outcome: Other ICT-based solutions and systems are ready available for MoE.

6. To manage and improve contracts and strategic partnerships with all ICT vendors and partners in Education.
   6.1. To review all existing ICT-related contracts and identify key areas for improvement for future contracting.
   Outcome: Current ICT contracts are improved and future contracts are created based on best experience.
   6.2. To assign technical committees to study the contracts to identify the possible implementation problems from both MoE and Vendor sides.
   Outcome: Current and future project implementation problems will be minimized.
   6.3. To define every relationship and its related issues and propose solution with the concerned vendors.
   Outcome: Clear road map with every vendor is established.

B. Establish and enforce a blended learning pedagogical approach

Strategy 2 focuses on teacher professional development and curriculum materials that implement a "blended learning" pedagogical approach. Given that teacher professional development is moving to a standards-based approach, MoE will adopt and adapt, if necessary, the UNESCO Teacher ICT Competency Standards. The framework for these standards parallels the framework used in this strategy and, thus, will reinforce MoE ICT policy. Furthermore, the standards go beyond simple ICT skills to include competencies related pedagogy, curriculum, assessment, and school organization and management—all skills needed to implement the strategies recommended in this plan. Teacher training developed around these and other UNESCO standards would prepare all teachers to integrate ICT into their ongoing, regular instruction.

Objectives and Actions

1. To train all supervisors, principals, and teachers on the use of blended learning pedagogy.
   1.1. To develop a blended pedagogy training materials based on the outcomes of the ICT in education mapping study.
   Outcome: Training material is developed based on the ICT mapping study.
   1.2. To train supervisors, principals, and teachers on blended pedagogy.
   Outcome: Teachers, supervisors, and principals are using blended pedagogy regularly in classes.
   1.3. To employ the ICT-based training programs, create the teachers community and keep links with trainees and community.
   Outcome: Teachers show competence on blended pedagogy skills.
   1.4. To setup advanced training programs dedicated to train trainers towards building the MoE capacity in training.
   Outcome: High quality trainers' community is created.
2. To embed blended learning materials, throughout the curriculum.

2.1. To update and maintain the current curriculum materials, develop or purchase additional curriculum materials incorporating ICT and blended learning, based on the ICT strategy.
Outcome: Teachers using blended pedagogy regularly in the teaching process.

2.2. To update and maintain the teacher guide to include a compulsory blended-learning plans and ICT-based lectures.
Outcome: Teachers using blended pedagogy and ICT-based lectures regularly in the teaching process.

2.3. To improve students communication skills and interactive learning methods.
Outcome: Students using interactive and cooperative learning regularly in the classes.

3. To provide every teacher with an access to a computer and high-speed Internet.

3.1. To allow teachers have easy access to e-services and high-speed Internet via teacher rooms, libraries, and student classes.
Outcome: All teachers using blended pedagogy regularly in classes and exposed to wide resources and references.

3.2. To supply all schools with at least one laboratory dedicated to blended learning process and the required computers for administrative staff usage. The computer-student ratio must be specified.
Outcome: All teachers using blended pedagogy regularly in classes and administrative staff use computers in schools.

3.3. To connect all schools to the National Broadcasting Network (NBN) and connect each classroom to the network.
Outcome: All schools and classrooms are connected to the broadband Internet.

3.4. To supply schools with different types of instructional and access technologies, such as Interactive White Boards (IWB), wireless connectivity, laptops and off-line educational resources, such as CDs/DVDs and Audio/Video streaming servers.
Outcome: Schools and classrooms experience various types of instructional and access technologies.

C. *Implement a robust integrated EMIS for School-Based Management*

The focus of this strategy is to have instructional, assessment, and management information systems that are integrated or at least interconnected by an e-portal that is easily accessible to those with appropriate authorization. This system will be used on a regular basis by MoE staff, directorate staff, principals, and teachers to make decisions about school improvement.

Objectives and Actions

1. To conduct thorough information needs assessment.

1.1. Ministry of Planning (MoP) conduct scheduled information needs assessments to identify specifications for an integrated EMIS and assessment based on a set of performance Indices.
Outcome: Specifications for an EMIS and assessment are identified.

1.2. Queen Rania Center (QRC) conduct scheduled information needs assessments to identify specifications for an instructional system.
Outcome: Specifications for an instructional system are identified.

2. To train all decision-making levels at MoE, principals and teachers in the use of EMIS as a tool for data-based decision making.
   2.1. MoE develop or identify a core and customized sets of training materials on the use of EMIS for decision making, which are useful for all decision-making levels.
   Outcome: Required training materials on the use of EMIS for decision making developed or purchased.
   2.2. To train MoE staff, principals, and teachers in data-driven decision making.
   Outcome: MoE staff, principals, and teachers trained data-based decision making and start using EMIS regularly to generate their own situations and perform queries decisions.
3. To assure that all decision-making levels at MoE; principals and teachers have easy access to EMIS.
   3.1. To ensure that computers are Internet-readily available to MoE staff, principals, and teachers.
   Outcome: different levels of MoE authorities are using EMIS to inform their decision making process.
4. To enforce all MoE departments, field-directorates, and schools to submit department/school-based improvement plans, including ICT plans.
   4.1. To require MoE central departments, field-directorates, and schools to generate and submit their own plans requiring the use of EMIS, which describes their administrative and educational improvement goals and activities.
   Outcome: submit local ICT plans and allocation of ICT resources to all MoE departments, field-directorates and schools will depend on their plans. The approach is integrated into the school development initiative of ERfKE II.

D. To setup and empower the Lead School concept

The goal of this strategy is to lay the foundation for a transition into the next phase of the trajectory that shifts to more advanced, ICT-supported project-based learning pedagogy, curriculum, and assessment, where students acquire key concepts within the subject areas and apply these to solve complex, real-world problems. With this strategy, the MoE will support Lead Schools in pioneering the uses of this approach, perhaps unique to this region.

Objectives and Actions

1. To set up a "Lead Schools" program to support school-based innovation.
   1.1 Develop the concept for the "Lead School" program including scope, mission and vision, application and selection process, and the level of support qualified schools will receive from MoE in order to effectively deploy the program.
   Outcome: A ready program to be announced which will motivate innovative schools to improve their performance from within to qualify, and eventually to adopt neighboring schools and support their development to ring up their level of performance.
   1.2 MoE will develop or use existing communication portal for Lead Schools and other learning schools to enroll in and obtain valuable research materials, post projects, and communicate amongst themselves.

Outcome: Online learning research resources available for schools for self-development, and eventually a community of best practices is built.

2. To begin developing project-based training and materials.
   2.1. MoE develop or identify project-based pedagogical training materials.
   Outcome: Lead Schools will engage in innovation and disseminate this to other partner schools.
   2.2. To train Lead Schools principals and teachers on project-based pedagogy.
   Outcome: Teachers and principals in Lead Schools will be skilled in project-based pedagogy, use project-based pedagogy on a regular basis and spread this to other partner schools.
3. To provide additional resources accompanied by an accountability system by which schools are and hold accountable for using these resources.
   3.1. To provide Lead Schools with additional equipment, funds, and human resources appropriate to their proposed plans.
   3.2. Put in place an accountability system for the usage of these resources. This can be aligned with the accountability system to be developed under component 1 of ERfKE II.
   Outcome: Lead Schools will engage in innovation, spread this to other partner schools and demonstrate adequate progress in implementing their plan.

4. To develop a monitoring and evaluation framework to document the experience of the Lead Schools program.
   4.1. To develop, field test and implement an evaluation mechanism.
   Outcome: Lead Schools program will be regularly evaluated and improved.

E. *Use ICT to develop an effective assessment mechanism to evaluate the Knowledge Economy Skills Acquired by Students*

The current Strategy recommends that the MoE and with the support of its external partners such as the NCHRD continue working together to measure students' knowledge economy skills and to explore ways to develop ICT-based assessments of these knowledge economy skills development of such an ICT-based assessment in the next five years would also position Jordan well for participation in international ICT-based assessments. Since Jordan regularly participates in the studies of both the Programme for International Student Assessment (PISA) and International Association for the Evaluation of Educational Achievement (IEA), development of ICT-based assessments would prepare the country well for these studies. In addition to designing an ICT based large scale national assessments similar to the NCHRD's National Assessment for Knowledge Economy (NAfKE), The MoE should also enforce the usage of ICT in classroom assessment as well.

Objectives and Actions

1. To develop and field test an ICT-based assessment of knowledge economy skills.
   1.1. To develop, field test and implement a national ICT-based assessment of knowledge economy skills. Of course this assumes that schools are equipped with the needed infrastructure to implement this assessment

Outcome: An ICT based large scale national assessment study is designed and ready to be used.

2. To integrate ICT as a tool in the classroom assessment.
   2.1. The different directorates of MoE should work together to find ways to use ICT tools in the authentic assessment strategies currently employed by MoE.
   Outcome: An ICT based national assessment tool is used within MoE.

CONCLUSION

Efforts need to be scaled and aligned with the strategies presented in this article, which are based on the Knowledge Ladder, to empower the efforts of MoE to reach a knowledge economy education system. This is accomplished through the five-year ICT strategy that is planned to build on and contribute to this base by scaling up the educational system in Jordan so that all teachers are employing ICT on a regular basis enhance their instruction, engage and encourage student learning, and evaluate progress. Accordingly, this will have an impact on all students in Jordan.

The presented paper offers school teachers with access to equipment, influential digital assets, and training in blended pedagogy; so that they have the resources and services desired to frequently use ICT in their teaching. Authorizing school teachers to use ICT on a steady basis is the most cost-effective method to influence all students. Additionally, the strategies empower schools to develop their own school-based self-improvement strategies, including ICT plans. While providing the basics to all teachers, principals, and schools, the strategies also empower a cutting-edge set of schools to lead others into the next phase of ICT-supported, project-based learning, in which students use profound thoughtful of school subjects to solve complex, real world complications and develop 21st century, knowledge economy-based skills. ICT-based assessments will be used to measure progress on these developments. Collected, these strategies will move education in Jordan in the direction of knowledge formation in support of a workable knowledge economy. It is recommended that the MoE discover a range of partnerships, including private-public partnerships that can provision the execution of this paper.

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