ICT Staff Development in Jordanian Secondary Schools

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***Abstract*:**

The objectives of this study are: To produce statistical indicators of the extent to which ICTs are integrated in the educational processes; To show developments over time and to investigate to what extent these are comparable to other countries in the region and beyond; To analyze which factors inhibit and/or promote the nature and speed of educational changes; To study and document examples of educational innovations that are supported by ICTs, so that best practices can be identified and further disseminated to the system at large. The results of this study showed that a very crucial condition for changing pedagogical practices and integrating ICTs is that teachers and support staff need to be adequately trained in order to feel comfortable to apply ICTs in their daily instructional activities. A substantial number of school principals think that many teachers don't have yet the required knowledge and skills, despite the fact that almost all teachers have received some form of training. Also the technical resource persons in the schools, indicated that, although their technical knowledge was quite acceptable, only half of them indicated that they were well prepared regarding the didactical and organizational integration of computers. This is not a phenomenon that only existed in Jordan, it was observed in a substantial number of other countries.

***Key words*: ICT, Staff, Development, Schools**

I. BACKGROUND

The Jordan government has, in recent years, undertaken major initiatives to prepare the country for the information society. It was acknowledged that the economic health of the nation would depend heavily on being successful in preparing the current generations of students to be ready to work in digitized environments where the shelf-live of knowledge becomes increasingly shorter, where autonomy in updating knowledge and competencies is a major basic competency and in which cross-border cooperation and trading in virtual workplaces will become increasingly important. In the past years, roughly 60 millions of USD's were invested in order to equip schools with ICTs and to train teachers, while early 2004 plans for connectivity were launched (that aim at providing broad-band Internet access to all governmental schools).
In recent years, Jordan like many countries has adopted various policies that aim at expanding the role of information technology in schools. The most prominent initiatives have centered on equipping schools with hardware (computers, local networks and internet connections) although policies relating to staff development, technology services and curriculum content have also featured.

Since 2002 the Jordan government is striving for a major reform of the educational system. The following four policy orientations were formulated:

- Structuring the educational system to ensure lifelong learning
- Ensuring responsiveness of the educational system to the economy
- Accessing and utilizing information and communication technologies to support effective learning and system management
- Ensuring quality learning experiences and environments

In Spring 2004 the first round of this monitor took place by conducting a survey among a sample of Jordan MOE-schools. One of the main topics that were addressed was staff

development (school objectives and realization). The design and instrumentation of this first round of the Jordan ICT-monitor was based on the methodology that was developed in the Second Information Technology in Education study (SITES) that was run between 1998 and 2003 by the International Association for the Evaluation of Educational Achievement (IEA). This first round of the monitor provides base-line data for evaluating the changes that may occur in the forthcoming years. Moreover, by comparing the current situation in Jordan schools with those of other countries that took part in SITES, a first appreciation of the current situation is feasible. In addition, the current data can be compared with data that were collected in other international studies in which Jordan participated in 1999 and 2003.

Many studies have been carried out exploring the contribution that ICT can make to the processes of teaching the learning. Some have focused on students' outcomes, whereas others have focused on pedagogy. The second Information technology in Education Study (SITES), organized by the International Association for the Evaluation of Educational Achievement (IEA), was designed to make a further contribution to the growing body of evidence concerning the effective use of ICT within an educational context (Harris, 2002).

A study conducted by Strudler and Gall (1988), which investigated the role of technology coordinators in three US primary schools, found that the ICT coordinators were responsible for training teachers, providing technical support, organizing the school's instructional computing program, and supporting and energizing teachers. A follow-up study by Strudler (1994) showed that school-based technology coordinators, as change agents, could support teachers to overcome various obstacles encountered when using technology in their teaching. Strudler (1994) suggests that without the support that technology coordinators provide it is unlikely that technology would have an impact on teaching and learning. Similar conclusions were noted by Becker (1994), who found that exemplary computer-using teachers in the US were more likely to be found in schools with adequate professional development and computer coordination.

One clear conclusion from the literature is that the ICT coordinators should not end up doing everything related to ICT in the school, simply by default. According to Lucock and Underwood (2001), the ICT coordinator is primarily a teacher, and therefore his/her main responsibility is to guide ICT teaching and learning in the school. Their suggestion is echoed by Reilly (1999), who maintains that the ICT coordinator should be the curriculum leader but not the 'electronic janitor'. The need for curriculum support is found in a study by Moallem, Mory, and Rizzo (1996). This study investigated the roles and responsibilities of the technology resource teachers and the effects of their roles on the integration of technology in the classroom in six middle schools in the US. They found that although the resource teachers spent around 75% of their time on technical support, teachers in these schools expected their role to be instructional, providing them with instructional support through workshops and demonstrating the application of software. They recommended that these teachers should be trained in the field of instructional design so they could follow the analytical, systematic and evaluative approach necessary to help teachers better integrate technology into their teaching.

A study exploring an ICT initiative in British schools (Somekh *et al*, 2001) found that the ICT coordinators in many of the schools were responsible for a number of areas, including professional development, students' skill levels, the development of infrastructure, and the use of ICT to support teaching and learning. They noted that coordinating the use of ICT to support teaching and learning was usually the area that received little attention when they were needed to provide technical support.

The very large expenditures being made by the Government of Jordan and the Ministry of Education in information and communications technology infrastructure require careful planning and coordination if the expenditure is to be translated into a real and measurable investment in education and learning. ICT hardware and software of appropriate specifications and standards for use by teachers and students in schools is the predominant vehicle for the transformation of all learning activities in the schools and will support, through advance in e-learning, the implementation of the new curriculum and assessment framework, the subsequence renewal of core curriculum, the use of on-line resources to support the implementation of the core curriculum, and the development and use of additional learning content, resources, and materials to supplement and expand learning through ICT. The start-up, exportation, and distribution through network capabilities of an e-learning portal "Eduwave" will create conditions where by rapid transformation of teaching practice and learning opportunity is possible across the country. This monitoring and assessment study of the implementation of information and communications technology in schools will provide an essential evaluation of the impact of investment in ICT upon the quality and success of learning for students in both the basic and secondary cycles of public education.

In addition to the larger scale infrastructure initiatives, the Ministry of Education (MOE), at the current time is involved with some specifically targeted activities that are intended to build and support capacity in the utilization of ICT for teaching and learning. These activities include the Discovery Schools project, the Intel and world links teacher training programs, and the schools-on-line Project. This study will provide a timely opportunity for the assessment of the different impacts of these initiatives and will provide the data to guide the MOE decision-making about future policies procedures, and guidelines for the extended implementation of ICT within instructional learning settings and environments.

A great deal of theoretical and empirical work has been done for several decades regarding the impact of ICT on educational processes. The incorporation of ICT into the school has affected its functioning at multiple levels: new configurations of learning spaces and timetable have been created; innovative teaching methods have been devised; autonomous and active learning processes using the technology have been adopted, teachers' traditional roles have been expanded and included personal and group tutoring and guidance functions; and new ICT-based curricular solutions have been generated (Mioduser, Nash Micas, Tobin, and Frankish 2002).

II. POLICY ISSUES, CONCEPTS, INDICATORS, AND RESEARCH QUESTIONS

The conceptual framework of SITESM1 was designed as a collaborative activity by researchers from over 25 countries (Pelgrum & Anderson, 2002). They took into account policy documents, the research literature on ICT and developed a conceptual framework in which four areas were distinguished (curriculum, infrastructure, staff development and management/organization). This framework was used as basis for mapping indicators, generating research questions and the construction of instruments. For any country that wants to repeat Module-1 (M1) it is important to verify whether the concepts, indicators and research questions from M1 are still relevant, given the actual status of educational policies. From Pelgrum & Anderson (2002) the following list of indicators related to the concept 'Staff Development' can be extracted:

- Problems with regard to staff qualifications
- Policies with regard to staff development and its realization
- Methods of transferring ICT-related knowledge

- Availability of ICT-training courses
- Respondents' self-ratings

Research questions
The SITESM1 database, including the Jordan data that were collected in 2004, offers opportunities to address and investigate many different research questions. For the purpose of this study, the following questions will be highlighted:

1. To what extent are teachers adequately trained?
2. Have schools adopted specific policies regarding staff development on ICT?
3. To what extent are staff development facilities available in schools?
4. How is ICT- related knowledge transferred at schools?
5. Which ICT-related courses are available for teachers?
6. To what extent are technical resource persons at schools adequately prepared to support maintenance and pedagogical ICT related activities?

Population definitions and sampling design
The population in Jordan is: all schools in which students from grade 7 or higher are enrolled *and* which have a computer lab (operationalized as at least 15 computers).
This study consisted of a list of all MOE-schools possessing computers and having students from grade 7 or higher enrolled. This resulted in a list of 1240 school, including 351279 students. The total number of schools that enrol students in grade 7 in Jordan is 1862. This means that roughly 67% of the schools in Jordan have access to computers in 2004. This is roughly as estimates that were made on the basis of the TIMSS-2003 data.
Next the sampling frame was stratified according to the school size This sample contains an equal distribution of male (68) and female schools (69) and it contains 15 mixed schools.

Instruments
The instrumentation of SITES Module 1 consisted of a questionnaire for school principals (further referred to as 'principal questionnaire') and a questionnaire for a person in the school who was knowledgeable about the ICT infrastructure and its use. This last questionnaire is further referred to as 'the technical questionnaire'. The SITESM1 questionnaires were translated into Arabic by the researcher. Next, several ICT specialists and students who had a degree in English checked the translation. The translated questionnaires were piloted in a group of university students who also had jobs as school principals and/or as teachers. These checks led to several adaptations in the translations, because it appeared that some words and sentences were interpreted differently by the 'respondents'. On the basis of the inspection of the translation procedures it can be concluded that the translation were done with care and are acceptable.

Data collection
The data collection in Jordan has been done by sending data collectors to each of the selected schools. These data collectors make sure that the questionnaires are completed and that any clarifications that are needed for answering the questions were provided to the respondents. A team of 15 data collectors were involved in this operation. Assuming that the administration of the questionnaires took one day per school and given the sample size of 150 schools this whole exercise took 10 working days. The obvious advantage of this approach; although costly is that it results in an almost 100% response rate and that the quality of the data will be high, because the data collectors can at the spot clarify any problems that occur during the answering of the questions.

III. STAFF DEVELOPMENT

Teachers play a key role in any educational innovation. If teachers are not able to apply new methods, an innovation will fail; therefore, the main goal for the Ministry of Education in Jordan is that of turning teachers into ICT users, through teacher education in the form of in-service training.

The MOE has realized the importance of focusing on the human capital developmental factors on-line with the future knowledge-based world economies. In addition to large scale infrastructure initiatives that the MOE is involved with at the current time, there are some specifically targeted activities that are intended to build and support capacity in the utilization of ICT for teaching and Learning. These activities include the Discovery Schools Project, the Intel and World Links teacher training programs, and the schools-on-line project.

In order to monitor the developments regarding the ICT-staff development, the current situation will be reviewed on the basis of the following questions:

1. To what extent are teachers adequately trained?
2. Have schools adopted specific policies regarding staff development on ICT?
3. To what extent are staff development facilities available in schools?
4. How is ICT related knowledge transferred at schools?
5. Which ICT-related courses are available for teachers?
6. To what extent are technical resource persons at schools adequately prepared to support maintenance and pedagogical ICT related activities?

Are teachers adequately trained?
A considerable number of school principals (61%) indicated that a lack of teachers' knowledge or skills seemed to be a major obstacle in realizing the school's ICT related objectives. However, there is only a small group of school principals (22%) who reported that it is a major obstacle that teachers feel uncomfortable because some students are more competent with ICT than they are.

Policies with regard to staff development and its realization.
Staff development is an expensive activity, and it was therefore reasonable to expect that schools would set priorities with regard to training all staff members. In order to answer Research Question Two 'Have schools adopted specific policies regarding staff development on ICT?', school principals were asked if it was the policy of the school to train all staff members or only some of theme and to what extent their school had realized this policy. Table 3 shows the percentage of students at schools that had adopted goals regarding the training of teachers and percentages of schools that had realized these goals.

Table 3

Percentage of students at schools that had adopted goals regarding the training of teachers and percentages of schools that had realized these goals *almost or fully* in primary, lower secondary and upper secondary education.

	Primary Education				Lower Secondary Education				Upper Secondary Education			
Country	Goal training all teachers to use ICT	Goal train few teach. ICT specialist	Real. Train. all teachers to use ICT	Real. train. few teach. ICT spec.	Goal training all teachers to use ICT	Goal train few teach. ICT specialist	Real. Train. all teachers to use ICT	Real. train. few teach. ICT spec.	Goal training all teachers to use ICT	Goal train few teach. ICT specialist	Real. Train. all teachers to use ICT	Real. train. few teach. ICT spec.
Belgium-French *	~	~	~	~	81	95	10	42	78	95	11	43
Bulgaria	~	~	~	~	71	83	2	16	72	88	1	15
Canada *	85	76	23	34	80	74	17	29	81	73	16	35
China Hong Kong	95	93	4	10	95	88	2	13	95	88	2	13
Chinese Taipei	91	88	23	40	97	90	15	34	97	87	31	41
Cyprus	85	62	3	10	38	49	0	8	92	89	4	12
Czech Republic	~	~	~	~	83	78	12	31	84	89	17	45
Denmark	~	~	~	~	85	88	19	60	~	~	~	~
Finland	97	87	32	35	98	94	31	38	~	~	~	~
France	73	57	3	5	82	87	5	20	85	88	4	30
Hungary	~	~	~	~	97	68	7	15	~	~	~	~
Iceland	80	78	10	21	78	77	8	25	79	69	7	25
Israel *	89	83	30	34	95	84	31	25	95	89	28	32
Italy *	86	72	23	32	90	75	14	22	91	80	17	33
Japan	74	41	16	7	67	47	12	11	45	48	7	10
Latvia *	~	~	~	~	~	~	~	~	91	83	18	20
Jordan	~	~	~	~	87	83	39	39	91	76	14	13
Luxembourg	~	~	~	~	71	100	5	51	71	98	5	49
New Zealand *	95	73	30	39	93	77	22	37	~	~	~	~
Norway	95	86	20	38	97	88	24	47	97	85	24	46
Russian Federation *					51	44	6	13	51	44	6	13
Singapore	99	85	80	36	99	87	74	36	100	93	58	46
Slovak Republic *	~	~	~	~	~	~	~	~	18	21	17	29
Slovenia	98	92	21	46	98	93	17	53	99	94	23	42
South Africa *	~	~	~	~	64	65	6	24	60	67	7	21
Thailand	~	~	~	~	90	91	48	48	~	~	~	~

The overall observation from Table 3 is that, training all teachers to use ICT was a policy goal of the majority of schools in most countries. However, in Cyprus and the Russian Federation this was much less than the case in Jordan, the training of all teachers was a policy goal at a majority of schools (87%), and this goal had been almost or fully realized at 39% of the schools.

In addition to the data given in Table 3, information was solicited from school principals regarding the extent to which training was obligatory for teachers at the targeted grade range and for which types of courses; moreover, the principals were requested to indicate if a substantial number of teachers from the targeted grade range had actually taken particular types of courses. The questionnaire item addressing these issues was worded as follows:

16. The following contains some questions about the ICT-related training for teachers of grades *-*.

    – *Tick 'no' or 'yes' for each question.*

	No	Yes
A)		
Is it obligatory for:		
1. All grades *-* teachers to take at least some basic computer courses?	o	o
2. All grades *-* teachers to regularly take courses to update their ICT-knowledge and skills?	o	o
B)		
*Have a substantial number of teachers from grades *-*.*		
1. Attended at least some basic computer courses?	o	o
2. Regularly attended courses to update their ICT-knowledge and skills?	o	o

Figures 1 and 2 contain respectively the percentages of students whose principals answered questions A1/B1 and A2/B2 affirmatively. The percentages for the items in Part B of the question were not dependent on part A, because it was assumed that Part B could occur in the absence of obligatory prescriptions.

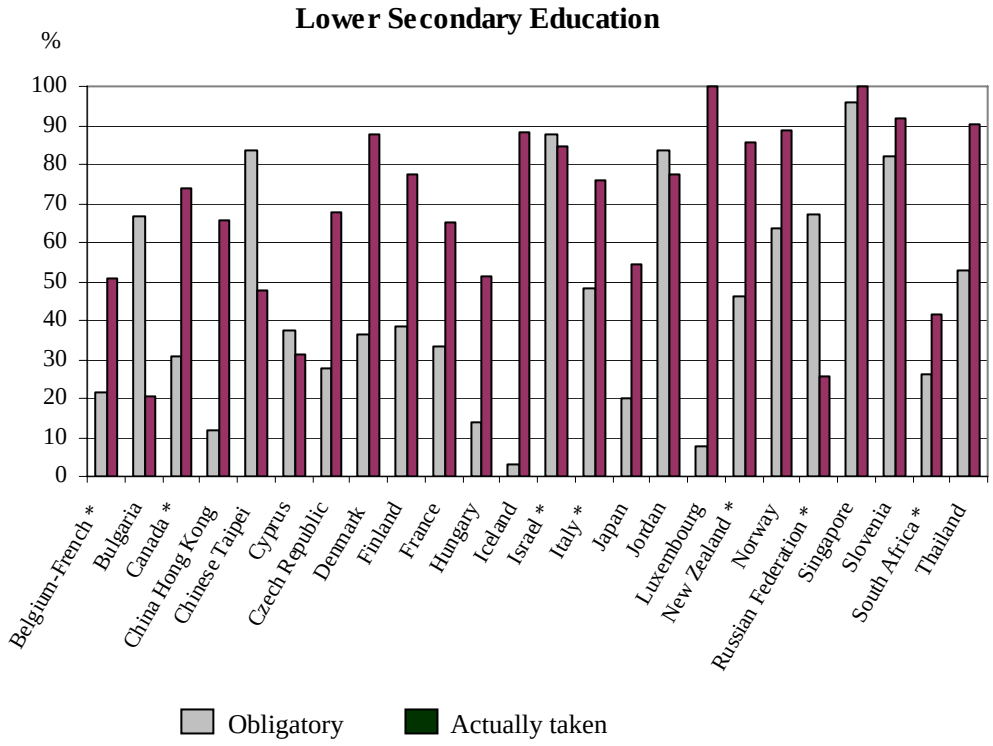

Figure 1 Percentages of students at schools where it was obligatory that all teachers from the targeted grade range had taken some basic ICT course and percentages reflecting if a substantial number of teachers had actually taken such a course in lower secondary education

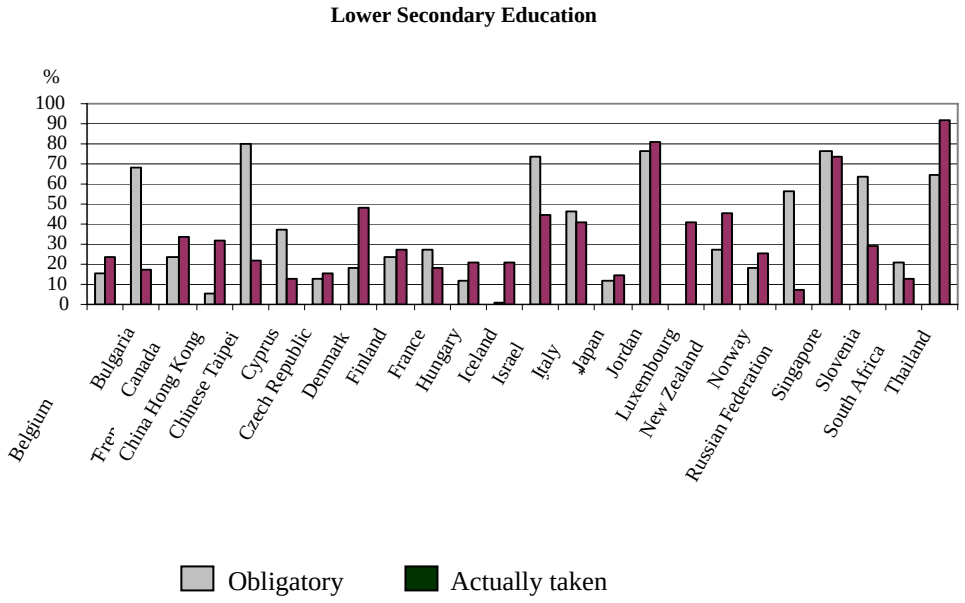

Figure 2 Percentages of students at schools where it was obligatory that all teachers from the targeted grade range take courses to regularly update their ICT-knowledge and percentages reflecting if a substantial number of teachers had actually taken such courses in lower secondary education.

It appears from Figure 1 that especially in Bulgaria, Chinese Taipei, Israel, Singapore, and Slovenia all teachers from the targeted grade range were obliged to attend a basic course in ICT. In these countries it was also claimed that it was obligatory for teachers to regularly update their ICT knowledge, although this was the case to a lesser extent in Slovenia. For Jordan, the results from this figure reveal that all teachers from the targeted grade range were obliged to attend a basic course in ICT in 80% of the schools, which is a high percentage as compared with other countries. It is quite interesting to compare these figures with the percentage of students whose principals indicated that a substantial number of teachers had attended basic courses or were regularly updating their ICT knowledge. The percentage of schools where a substantial number of teachers had attended basic ICT courses was especially high in Denmark, Iceland, Israel, Luxembourg, New Zealand, Norway, Singapore, Slovenia, and Thailand. This attendance happened to a much lesser extent in Bulgaria and the Russian Federation. With regard to the requirement of regular updating of knowledge, relatively high percentages were evident for lower secondary education in Thailand, Jordan and Singapore respectively.

IV. METHODS OF TRANSFERRING ICT-RELATED KNOWLEDGE

It is known from innovation theories that continuous staff development is an important prerequisite for sustained implementation of change. Therefore, it seemed relevant to investigate to what extent schools had set up mechanisms for facilitating the transfer of ICT-related knowledge among teachers in the schools in order to address the question ‘How is ICT related knowledge transferred in the school?’ Transfer may, for example, occur via working groups, the computer coordinator, newsletters, a cascade approach (trained teachers who further disseminate information within the school) and courses within the school. Alternatively, it may be left to individual initiatives within the school’s informal communication network. Table 4 contains the percentages of school principals who indicated that each of these arrangements existed.

Table 4

Percentage of students at schools in lower secondary education where certain arrangements were available regarding the transfer of ICT knowledge among teachers.

Country	1. Via informal contacts/communic.	2. Via school's ICT working group	3. Regular item on staff meetings	4. Via a regular newsletter	5. Teacher repeats external course	6. Courses by an external agency	7. Via in-school courses	8. Via computer coordinator	9. No organized structure	10. Transfer ICT knowledge, other
Belgium-French *	75	15	7	4	60	21	28	56	23	0
Bulgaria	71	5	4	5	10	28	16	19	38	5
Canada *	90	45	16	12	36	32	44	65	22	6
China Hong Kong	88	44	17	12	33	44	57	45	12	3
Chinese Taipei	79	14	5	2	46	38	59	58	6	1
Cyprus	74	14	0	0	0	0	1	1	49	2
Czech Republic	85	6	11	0	17	10	32	35	17	2
Denmark	92	23	5	14	33	50	63	78	50	6
Finland	67	7	3	2	19	33	45	72	14	9
France	86	7	7	1	12	11	18	43	44	2
Hungary	30	21	7	14	25	17	25	29	36	4
Iceland	85	3	6	2	9	33	30	79	45	13
Israel *	49	34	11	5	46	53	57	65	17	6
Italy *	74	32	13	5	29	45	72	44	18	4
Japan	72	18	8	3	14	41	38	41	18	1
Jordan	50	27	26	11	28	28	38	37	28	10
Luxembourg	89	6	0	0	24	52	43	74	52	0
New Zealand *	90	61	13	12	31	38	61	74	20	1
Norway	87	16	4	1	16	38	61	73	22	3
Russian Federation *	68	9	9	2	22	45	8	8	22	6
Singapore	96	79	59	15	57	87	92	87	8	14
Slovenia	91	6	14	45	16	57	37	83	1	6
South Africa *	74	12	7	2	14	14	26	41	38	2
Thailand	59	26	15	5	50	41	72	29	5	3

From this table it appears that, overall, the most prevalent arrangements involved informal contacts, computer coordinators, courses run by external agencies, and in-school courses. Moreover, the respondents in Jordan indicated that transfer took place in the following ways:

1) informal contacts/communication (50%).
2) in-school courses (38%).

3) computer coordinator (37%).

The percentages of students at schools whose technical respondents indicated that all countries except Denmark and Luxembourg had no organized structure for internal ICT information exchange.

Availability of ICT training courses

The availability of training courses is a crucial condition for raising the ICT qualifications of staff. Therefore, a question about this topic was included in the questionnaires in order to address Research Question Four 'Which ICT-related courses are available for teachers?'.

The respondents answering the technical questionnaire were asked if each of the following courses was available in-house or via external agencies for teachers from the targeted grade range:

1. General introductory course (how to use a computer, principles of software and hardware, functions of mouse, printer)
2. General introductory course (history of ICT, relevance, consequences of computer use, etc.) .
3. Introductory course for applications/standard tools (basic word-processing, spreadsheet, databases, etc.) .
4. Introductory course for Internet use (retrieving information, sending/receiving emails, etc.) .
5. Introductory technical course for operating and maintaining computer systems.
6. Advanced course for applications/standard tools (e.g. advanced word-processing, and complex relational databases) .
7. Advanced course for Internet use (e.g. creating websites/developing a home page, advanced use of Internet, video conferencing) .
8. Advanced technical course for operating and maintaining computer systems (e.g. networks, and special equipment) .
9. General course about didactical/pedagogical principles of computer use.
10. Subject-specific training (with subject-specific learning software, e.g. tutorials or drill and practice software).
11. Programming course, where teachers can learn how to create their own software (also with authorware).
12. Special course with digital video- and audio-equipment.

The percentages of respondents who checked the in-house availability of each possible course are shown in Table 5. Table 6 contain the percentages for externally available courses.

Table 5

Percentages of students whose schools (technical respondents) indicated that in-house ICT-courses were available for teachers of the targeted grade range-lower secondary education

Country	1. General technical introduction	2. Introduction, history, relevance,..	3. Introduction in applications	4. Introduction use of the Internet	5. Introduction maintenance	6. Advanced application use	7. Advanced Internet use	8. Advanced maintenance	9. General didactical principles	10. Subject specific training	11. Programming own software	12. Digital video/audio equipment
Belgium-French *	~	~	~	~	~	~	~	~	~	~	~	~
Bulgaria	32	15	22	13	6	5	3	1	4	3	4	2
Canada *	65	20	58	69	9	15	15	3	10	25	2	10
China Hong Kong	53	23	63	48	11	17	6	5	6	4	3	8
Chinese Taipei	~	~	~	~	~	~	~	~	~	~	~	~
Cyprus	28	15	14	0	5	5	0	0	19	14	0	0
Czech Republic	58	16	45	18	4	13	3	1	6	25	1	2
Denmark	67	15	65	63	9	12	11	5	8	18	2	15
Finland	41	5	35	51	6	7	15	3	4	9	5	3
France	~	~	~	~	~	~	~	~	~	~	~	~
Hungary	46	14	41	22	15	10	2	2	2	4	3	0
Iceland	30	2	26	22	2	4	5	0	1	13	1	1
Israel *	51	11	47	26	6	18	8	1	11	21	6	3
Italy *	77	46	67	43	15	12	21	3	11	18	16	6
Japan	48	45	11	22	32	9	6	4	8	19	6	7
Jordan	56	35	49	41	11	28	11	9	35	19	15	12
Luxembourg	~	~	~	~	~	~	~	~	~	~	~	~
New Zealand *	74	20	68	71	17	27	19	6	9	27	7	17
Norway	~	~	~	~	~	~	~	~	~	~	~	~
Russian Federation *	12	0	5	1	4	0	0	0	2	4	1	2
Singapore	57	28	53	41	24	16	24	4	28	50	17	26
Slovenia	81	26	78	54	8	38	12	5	17	37	5	3
South Africa *	69	26	69	39	11	10	10	5	8	5	7	3
Thailand	78	51	73	14	24	21	4	3	27	14	7	7

Notes: *: country did not satisfy all sampling criteria. ~: no data collected. See Appendix D for rules of thumb for estimating the standard errors for percentages.

Table 6

Percentages of students whose schools (technical respondents) indicated that external ICT-courses were available for teachers of the targeted grade range-lower secondary education

Country	1. General technical introduction	2. Introduction, history, relevance...	3. Introduction in applications	4. Introduction use of the Internet	5. Introduction maintenance	6. Advanced application use	7. Advanced Internet use	8. Advanced maintenance	9. General didactical principles	10. Subject specific training	11. Programming own software	12. Digital video-/audio equipment
Belgium-French *	~	~	~	~	~	~	~	~	~	~	~	~
Bulgaria	37	22	34	30	11	15	11	7	15	11	17	7
Canada *	44	27	49	46	30	36	42	26	21	34	20	23
China Hong Kong	37	31	47	46	31	37	39	28	25	32	35	25
Chinese Taipei	~	~	~	~	~	~	~	~	~	~	~	~
Cyprus	61	19	67	40	0	13	8	0	40	31	14	8
Czech Republic	28	10	31	20	8	14	10	8	5	7	7	2
Denmark	36	26	51	44	38	33	34	38	33	38	14	34
Finland	38	12	43	44	23	25	36	23	19	18	15	16
France	~	~	~	~	~	~	~	~	~	~	~	~
Hungary	47	21	53	45	26	37	27	24	22	25	18	13
Iceland	66	41	68	73	46	48	63	40	38	31	21	21
Israel *	29	17	38	39	6	19	11	7	18	16	6	3
Italy *	19	14	16	19	2	8	9	8	8	11	8	4
Japan	72	73	63	69	50	51	55	46	54	42	54	44
Jordan	45	38	52	46	24	27	23	20	27	21	23	15
Luxembourg	~	~	~	~	~	~	~	~	~	~	~	~
New Zealand *	13	12	22	21	13	17	17	18	13	17	11	12
Norway	~	~	~	~	~	~	~	~	~	~	~	~
Russian Federation *	42	24	43	24	27	5	4	5	24	25	34	4
Singapore	52	29	84	78	42	35	48	21	30	48	41	25
Slovenia	31	11	39	40	37	37	37	26	34	38	21	16
South Africa *	23	13	28	20	13	10	15	11	3	3	7	2
Thailand	24	16	28	17	18	16	11	11	18	17	13	8

Notes: *: country did not satisfy all sampling criteria. ~: no data collected. See Appendix D for rules of thumb for estimating the standard errors for percentages.

Not surprisingly, with regard to the in-house training facilities, the largest percentages were observed for courses relating to basic computer-handling skills and the use of basic applications (word-processing, spreadsheets, databases). It should be noted, however, that in some countries only a small group of students were at school, where this introductory training could be handled inside the school, for example, in Bulgaria, Cyprus, and the Russian Federation. In Jordan, the most important courses regarding to in-house training facilities are the following:

1. General introductory course (how to use a computer, principles of software and hardware, functions of mouse, and printer) (56%).
2. Introductory course for applications/standard tools (basic word-processing, spreadsheet, databases, etc.) (49%).
3. Introductory course for Internet use (retrieving information, sending/receiving e-mails, etc.) (41%).

In relation to the external courses, it seems reasonable to expect that training facilities would be available for most of the above-mentioned topics. However, as the data in Table 23 reveal, this was, according to the perceptions of the technical respondents, clearly not the case. Another finding of relevance was that relatively small groups of the questionnaire respondents indicated that external courses were available and dealt with the didactical/pedagogical principles of computer use and with subject-specific training. The availability of such courses may be hypothesized as an important factor affecting the use of ICT in daily classroom practices. In Jordan, the questionnaire respondents indicated that external courses were available and dealt with the following:

4. Introductory course for applications/standard tools (basic word-processing, spreadsheet, databases, etc.) (52%).
5. Introductory course for Internet use (retrieving information, sending/receiving e-mails, etc.) (46%).
6. General introductory course (how to use a computer, principles of software and hardware, functions of mouse, and printer) (45%).

A more condensed impression of the extent of availability of in-house and external courses can be gained from Figure 3. In-house availability in this figure reflects the average percentage of courses that were checked. External availability was calculated in the same way. In general, and not surprisingly, more external than in-house courses were available to teachers.

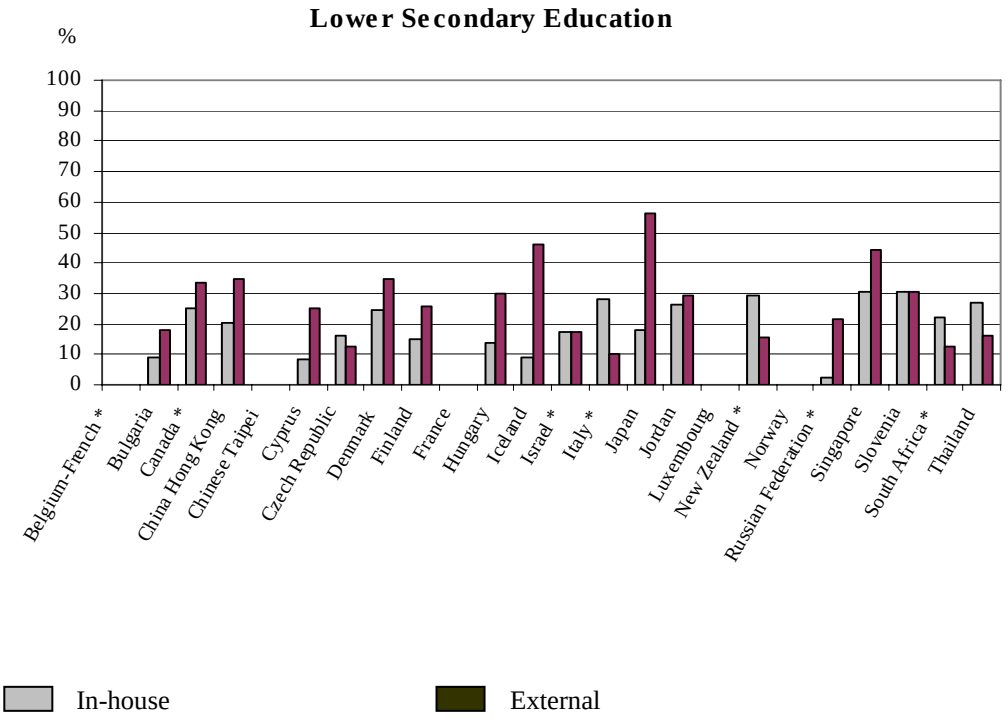

Figure 3. Average percentages across schools of available in-house and external courses.

Relatively high availability of external courses existed, for instance, in China Hong Kong, Cyprus, Hungary, Iceland, Japan, Russian Federation, and Singapore, while it was relatively low in, for example, Italy, New Zealand, South Africa, and Thailand. For Jordan, it appears that the availability of external courses was little bit higher than the availability of in-house courses.

On the whole, however, the availability of courses tends (at least in the perception of school principals) to be low. This is consistent with the finding that a substantial number of school principals reported that a lack of training facilities was a major obstacle in realizing the schools' ICT-related objectives, while also a meaningful number of respondents found the quality of available teacher training courses was insufficient (53%). Although this was often seen as a major obstacle for most of the other countries, in Jordan it was mentioned most frequently.

V. KNOWLEDGE AND SKILLS OF TECHNOLOGY COORDINATORS IN THE SCHOOLS

If one assumes that the person who answered the technical questionnaire also plays an important role in transferring knowledge within the school, then it is interesting to know to what extent these persons were adequately prepared for their work in supporting ICT activities within the school. In order to acquire and estimate such an indicator, the questionnaire respondents were asked to rate how well prepared they thought they were in each of the following areas:

General
1. MS-Windows
2. MacOs
3. MS-DOS
4. Word processing
5. Databases
6. Spreadsheets

Instructional processes
7. Subject specific applications
8. Application of student progress tracking software
9. Didactical and organizational integration of computers in subjects
10. The use of specific programs for subjects
11. Evaluation and selection of instructional software
12. Use of computers for individualized learning programs
13. The use of multimedia application
14. Adaptation of software to fit school purposes

E-mail, Internet, WWW
15. The use of e-mail for educational purposes
16. The use of the Internet/WWW for educational purposes

Presentation
17. The use of software for making presentations

If the area was not relevant, respondents would be allowed to check a box titled not applicable. Table 7 contains the percentages of respondents who answered each item affirmatively. Some general observations can be made on the basis of the data in this table. Overall, it seems that the highest self-assessment of adequacy of preparation

occurred for word-processing. It is not surprising to find that these self-assessments were low for the Mac operating system because the majority of schools did not use these operating systems, In some countries (for example, Canada, Singapore, and Slovenia) 85% or more of the respondents indicated that they felt adequately prepared for use of the Internet for instructional purposes. However, this was barely the case in other countries (for example, Bulgaria, Cyprus, Czech Republic, Japan, Russian Federation, and Thailand).

Table 7

Percentages of students whose schools (technical respondents) indicated that they were adequately prepared for supporting ICT-activities in particular areas in the school-lower secondary education

Country	1. MS-Windows	2. Mac Operating System	3. MS-DOS	4. Word processing	5. Data bases	6. Spreadsheets	7. Subject specific applications	8. Application student progress soft.	9. Didactical integration of ICT	10. Use specific progr. for subjects	11. Eval./select. instruc. softw.	12. Use for individualized learning	13. Use of multimedia applications	14. Adaptation of software	15. Use of e-mail for instruction	16. Use Internet for instruction	17. Use of softw. for presentations
Belgium-French *	88	6	75	94	62	74	23	18	20	24	26	22	43	28	59	57	39
Bulgaria	75	17	85	89	70	82	37	21	23	34	56	27	41	38	38	33	26
Canada *	82	29	64	94	78	84	61	44	41	55	59	34	70	54	79	88	75
China Hong Kong	95	9	89	97	85	89	54	10	32	41	50	57	64	25	71	72	83
Chinese Taipei	95	2	93	97	58	74	47	25	44	46	58	43	68	26	82	84	72
Cyprus	70	6	47	70	30	24	78	19	23	20	9	11	29	13	28	33	11
Czech Republic	89	8	79	93	50	78	58	29	33	43	57	49	53	33	36	35	28
Denmark	93	5	64	97	65	89	54	15	41	58	55	45	65	44	72	76	53
Finland	89	3	88	95	76	92	46	13	25	50	33	22	46	23	70	74	49
France	78	4	63	90	53	80	40	26	12	23	20	30	51	26	37	41	43
Hungary	96	4	95	98	74	92	64	69	53	40	59	67	66	41	53	57	51
Iceland	85	29	51	98	55	79	44	46	43	53	51	61	73	46	80	79	68
Israel *	77	8	55	91	79	60	48	37	56	53	53	50	62	64	50	52	77
Italy *	92	6	77	89	59	83	57	16	50	59	53	27	72	48	67	73	60
Japan	58	12	60	77	41	70	48	55	16	38	22	27	28	29	27	30	26
Jordan	96	20	84	100	97	97	83	56	53	75	65	68	82	70	66	72	86
Luxembourg	88	0	89	87	69	87	27	12	18	21	27	5	24	34	78	81	69
New Zealand *	82	35	60	97	81	88	48	39	67	44	53	30	60	42	80	77	67
Norway	72	2	51	88	32	65	26	13	13	21	27	22	36	11	54	58	38
Russian Federation *	70	7	76	88	73	87	54	35	36	50	67	66	29	48	26	20	28
Singapore	98	6	62	100	59	85	76	34	44	61	88	74	75	64	85	85	97
Slovenia	96	6	76	98	52	86	71	28	68	75	55	54	62	58	83	86	69
South Africa *	81	5	77	92	78	88	48	22	24	44	43	24	47	32	56	55	49
Thailand	63	4	53	68	37	50	18	4	4	4	9	19	10	10	10	11	23

Notes: *: country did not satisfy all sampling criteria. See Appendix D for rules of thumb for estimating the standard errors for percentages.

On the basis of the answers from Jordanian respondents, the rank order of items addressing adequacy of preparation appeared to be as follows:

1. Word processing (100%)
2. Databases (97%)
3. Spreadsheets (97%)
4. MS-Windows (96%)
5. The use of software for making presentations (86%)

6. MS-DOS (84%)
7. Subject specific applications (83%)
8. The use of multimedia application (82%)
9. The use of specific programs for subjects (75%)
10. The use of the Internet/WWW for educational purposes (72%)
11. Adaptation of software to fit school purposes (70%)
12. Use of computers for individualized learning programs (68%)
13. The use of e-mail for edu16.7cational purposes (66%)
14. Evaluation and selection of instructional software (65%)
15. Application of student progress tracking software (56%)
16. Didactical and organizational integration of computers in subjects (53%)
17. MacOs (20%)

From these items two scales were created, one reflecting the extent to which general ICT skills were mastered and one which reflected the instructionally related topics. Figure 7 contains the average percentages for each of these scales in each country.

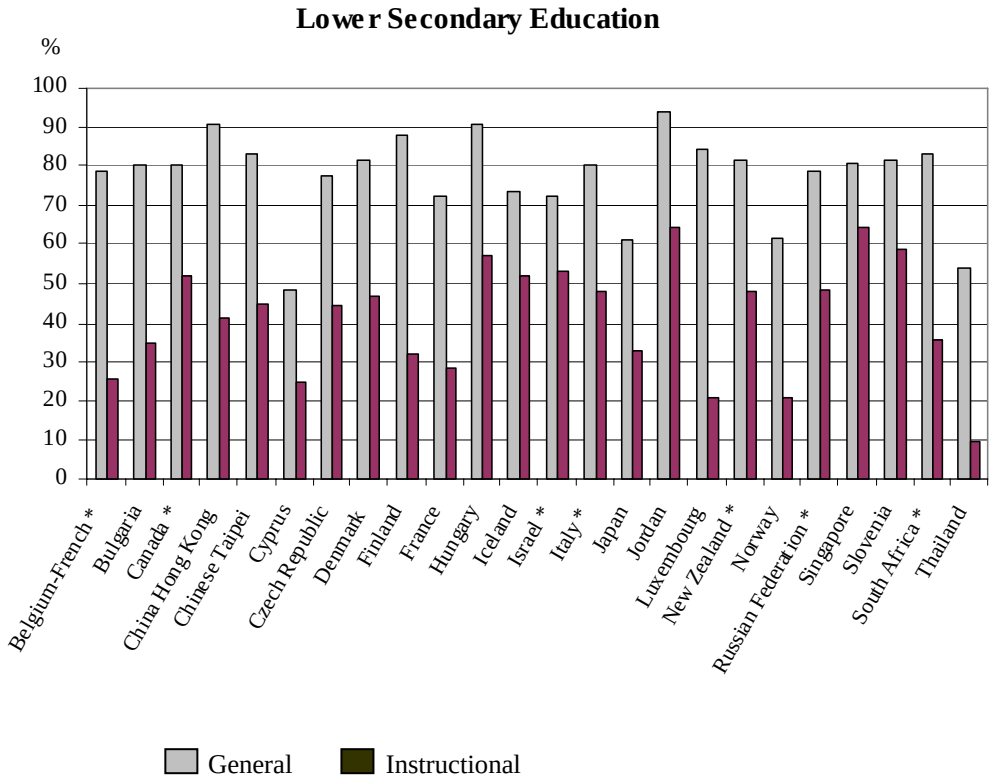

Figure 4 Average values of self-ratings from technical respondents regarding the adequacy of preparation for supporting general ICT-related activities and pedagogical ICT-related activities-lower secondary education.

A first observation from this figure is that the self-ratings for the general (or alternatively more technical) ICT-related activities were much higher than for the instructionally related activities. With regard to the latter activities, the ratings were relatively high in Jordan, Hungary and Singapore. However, the instructionally related ratings were comparatively low in Belgium-French, Cyprus, France, Luxembourg, Norway, and Thailand.

VI. SUMMARY OF MAIN FINDINGS

A very crucial condition for changing pedagogical practices and integrating ICTs is that teachers and support staff need to be adequately trained in order to feel comfortable to apply ICTs in their daily instructional activities. A substantial number of school principals think that many teachers don't have yet the required knowledge and skills, despite the fact that almost all teachers have received some form of training. Also the technical resource persons in the schools indicated that, although their technical knowledge was quite acceptable, only half of them indicated that they were well prepared regarding the didactical and organizational integration of computers. This is not a phenomenon that only existed in Jordan, it was observed in a substantial number of other countries.

Almost all schools intend to train *all* teachers to use ICTs and a *few* teachers to become ICT-specialists. These goals are, according to the perceptions of school principals, realized in 40% of the schools. This is a fairly high percentage when compared with other countries. On the other hand the lack of skills of teachers to use ICT is mentioned by 60% of the schools as a major obstacle in realizing the school's ICT-related objectives. From these observations in combination with the *perceived* lack of availability of courses, it seems fair to state that attention should be given to improving the facilities for staff development. As the training of teachers usually is a very costly activity, it may be worthwhile to explore the possibilities for distance learning (for instance, via an educational portal) in combination with a cascade approach, whereby one or a few well trained teachers in the school guide their colleagues in acquiring the necessary skills and in making adaptations in their didactical approaches. In particular attention should be paid to training the technical support persons of whom roughly 50% indicated that they were not prepared enough to support the didactical integration of ICTs in the school.

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