QUEST FOR TEACHER NEEDED COMPETENCIES FOR INSTRUCTIONAL USE OF ICT

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ABSTRACT

The aim of this paper was to identify the competencies needed by teachers for the development and implementation of ICT-based education. The study which covered 19 member countries of European Union was guided by three research questions. Data were collected through the use of emailed questionnaire and analysed using frequencies and percentages. Some personal, pedagogical and subject oriented/didactical competencies were identified. Among the recommendations was that the Federal Government should make the development of ICT competencies of teachers a priority and set targets when all teachers should become ICT-literate to mandatory standards.

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BACKGROUND

The advent of information and communications technology (ICT) in education which is exacting an unprecedented impact in the learning process is a culmination of advancement in information technology (IT). The recognition of communicative abilities and facilities offered by the computer, notably the e-mail, led to the replacement of the term "Information Technology" with that of Information and Communications Technology (ICT) over a decade ago. While sharing this view, Pelgrum and Law (2003) affirm that the term ICT started replacing that of IT from the 1990s. Abbott (2001) observes that at the initial stage of ICT while more people were adopting the term ICT, people in higher education were using communication and information technology (C&IT) to refer to the same concept. It is interesting to note that most developed countries have embraced ICT in education as a means for ensuring the development of ICT capability of the people. This is with a view to achieving technological emancipation and to competing favourably in the international arena. The major way of developing the ICT capability of citizens is through the implementation of the three facets of ICT-based curriculum which comprise: learning about ICT, leaning with ICT and learning through ICT. It is in this regard that Tanner (2003) presents ICT as discipline, resource and key skill. ICT as discipline refers to ICT as a subject in the curriculum. As an instructional resource, ICT encompasses a wide range of technologies including telephones, fax machines, televisions, video, audio recorders, CD players, CD-ROMs, personal organisers, programmable and remote-operated toys, radios, computers (O'Hara, 2004) as well as any other technologies that can enhance the processes of finding,

exploring, analyzing, documenting, exchanging and presenting instruction based information. ICT is also considered as skill in line with literacy and numeracy.

The enormous benefits of ICT have been well documented by various authorities and researchers such as Department for Education and Employment (DfEE, 1997); the Independent ICT (IICT) in Schools Commission (1997); the National Grid for Learning (NGfL, 1997); DfEE and QCA (1999); Akudolu (2002); Sharp, Potter, Allen and Loveless (2002); Olibie (2003); the Scottish Executive (2005) and the UNDP/APDIP (2006). Among the various points mentioned by these authorities are that ICT promotes learning, motivates and empowers the learner as well as facilitates the job of the teacher. The NGfL and DfEE (2001) add that ICT "has the potential to transform the way education is delivered and to provide new opportunities, enhancing scholarship and investigation….." In fact a compilation of research findings on the benefits of ICT as presented by the British Educational Communications and Technology Agency (BECTA, 2004) is grouped under benefits for learners, teachers, parents and the society. These numerous benefits of ICT which cannot be itemised in this paper due to constraints of time and space can only be realized when teachers who still remain the key to learning have developed the necessary pedagogical competencies for instructional use of ICT. Presently, there is a global awareness of the centrality of the teacher's role in the learning process, even in ICT-rich contexts. Teachers cannot be replaced by the best technology. Jones (2003:3) reiterates this fact and opines that "no matter what educational systems mandate and expect, in the end effective learning is very dependent on the will and competence of the teacher." In recognition of this fact,

country members of the European Union entered “the twenty-first century in the throes of a major programme of equipping schools and training teachers” (Abbott, 2001:33). Also the IICT in Schools Commission (1997:22) warns that “if we wish to ensure that our children and country reap the benefits of ICT we must cherish our teachers and do everything we can to help them to take it on board”.

It is consoling to note the declaration by the Federal Republic of Nigeria (FRN, 1999:9) at the on-set of the UBE programme that “current efforts to raise the level of general education of teachers (as well as efforts to raise the level of their initial professional preparation) will be pursued, broadened, and intensified.” The same document presents the “career-long professional development of serving teachers” as a “crucial issue”. An indispensable element of teacher preparation for the present information age is the development of teacher competencies for instructional use of ICT. Bearing in mind the existing ICT-poor school environments in the country and the vastness of ICT capabilities, what competencies are teachers expected to possess for them to implement an ICT based curriculum? What ICT pedagogical competencies should teacher preparation institutions aim to develop in teachers to ensure that these teachers can help the country cross to the positive side of the digital divide and keep pace on the information superhighway? These are some of the questions that present the problems of this study.

The study is limited to the development of ICT competencies of teachers. This is based on the fact that ICT competencies involve knowledge of skills, knowledge of how and when to apply the skills as well as knowledge of reasons for using the particular ICT or the contributions of that ICT to the solution of problems. Authors

such as Loveless (2003), UNESCO (2004) and Potter and Darbyshire (2005) are of the view that ICT competencies are concerned with the ability to:

- know when to apply or develop a particular skill in using an ICT resource;
- be aware of the reasons for using ICT and its effect on both users and context; and
- Have a critical and confident attitude to learning with the technology.

In this regard ICT competencies are used as synonymous to capability. Consequently, Tanner (2003:7) observes that though knowledge and skills are necessary for the development of ICT capability, they "should be considered as vehicles for developing ICT capability rather than its focus". The present study therefore focuses on the development of teachers ICT competencies.

RESEARCH QUESTIONS

The study was guided by the following research questions:

- What personal ICT competencies do teachers need to possess?
- What are the ICT pedagogical competencies that teachers need to possess?
- What are the ICT didactical and subject oriented competencies that teachers should possess?

METHOD

Design and Area of Study: The study was a survey and it covered 19 member countries of the European Union (EU).

Population and Sample: The population comprised all the 51 members of the European Commission (EC) Work Programme on "Implementation of Education and Training 2010-Working Group C: "ICT in Education and Training" and the 115 academic members of staff in the Faculty of Education at the University of Glasgow. This population was chosen for the fact that the members of EC had been involved in planning ICT in Education for EU countries while the academic members of staff in the Faculty of Education at the University of Glasgow have over the years been preparing teachers for ICT in Education.

Instrument: Data were collected through the use of questionnaire which comprised two sections. The first section presents a description of the Nigerian educational system with regards to the state of development and implementation of ICT in education as well as the availability of ICT facilities in the schools and in the society. The second section comprised 30 items structured on a four point scale ranging from strongly agree to strongly disagree. Copies of the questionnaire were emailed to the 166 respondents twice with an interval of four weeks. The need for sending the questionnaire twice to the same respondents was necessitated by the low response recorded at the first instance. Some of the respondents at the University of Glasgow were contacted again physically (in person) or through phone and urged to complete the questionnaire. A total of 56 copies of the instrument were completed and returned.

Validation and Reliability: After testing the instrument on two doctoral students in the Faculty of Education, University of Glasgow, copies of the modified instrument were sent to two lecturers at the University of Edinburgh for content validation. This exercise resulted in the modification of one of the items. Reliability was

ascertained by administering the instrument to 10 post graduate students in Education at the University of Glasgow. The application of Kuder-Richardson Formula 20 yielded a score of 0.82 for internal consistency.

Data Analyses: The obtained data were analysed using frequency and percentage.

RESULTS

Table 1

Personal ICT Competencies

Total = 56

	Items	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Skills in:	F	%	F	%	F	%	F	%
1	Use of the keyboard	12	21	36	64	6	11	2	4
2	Identifying and using available hardware	24	43	20	36	10	17	2	4
3	Use of different instructional software packages	4	29	22	39	14	25	4	7
4	Use of different operating systems	2	4	18	32	22	39	14	25
5	Accessing the internet	12	21	28	50	10	18	6	11
6	Use of e-mail	14	25	30	54	8	14	4	7
7	Using key ICT skills in developing and presenting information	22	39	34	61	-	-	-	-
8	Participating in online discussion	16	29	24	43	10	18	6	11
9	Hardware repairs	-	-	1	2	40	71	15	27
10	Writing general programmes	2	4	12	21	34	61	8	14

When scores for strongly agree and agree are added, only items 4, 9 and 10 scored less than 50%. This indicates that the respondents did not consider ability to use operating systems, repair hardware and write general programs as teacher-required personal ICT competencies. On the other hand, item 7 on the use of key ICT skills had the highest score of 100% (for Agree and Strongly Agree).

Table 2

Pedagogical Competencies

N=56

S/N	Items	Strongly Agree		Agree		Disagree		Strongly Disagree	
		F	%	F	%	F	%	F	%
1	Select and evaluate subject-specific educational software	14	25	34	61	4	7	4	7
2	Develop and maintain educational web site	12	21	36	64	8	14	-	-
3	Prepare ICT-based learning materials	16	29	40	71	-	-	-	-
4	Prepare schemes of work and lesson notes using ICT	24	43	26	46	4	7	2	4
5	Solve common ICT problems relating to instruction	26	46	26	46	2	4	2	4
6	Write educational programmes	6	11	8	14	32	57	10	18
7	Monitor and evaluate ICT teaching and learning	38	68	18	32	-	-	-	-
8	Integrate ICT in other subjects across the curriculum	40	71	16	29	-	-	-	-
9	Use ICT for teaching and learning	30	54	26	46	-	-	-	-
10	Develop hardware components	-	-	4	7	32	57	20	36

Only items 6 and 10 scored below 50% when Strongly Agree is combined with Agree. This implies that the respondents do not think that writing educational programmes and developing hardware components are teacher-required pedagogical competencies.

Table 3

Subject Oriented and Didactical Competencies

N=56

S/N	Items	Strongly Agree		Agree		Disagree		Strongly Disagree	
		F	%	F	%	F	%	F	%
1	Use ICT as a didactic tool in the class	32	57	24	43	-	-	-	-
2	Employ digital devices during instruction	36	64	18	32	2	4	-	-
3	Implement cooperative learning strategies using ICT	34	61	20	36	1	2	1	2
4	Establish virtual learning environment	18	32	35	63	1	2	2	4
5	Encourage ICT-based collaborative learning	15	27	32	57	5	9	4	7
6	Use educational subject-specific software to give assignments to only the intelligent students	1	2	8	14	33	59	14	25
7	Work effectively with ICT in developing learners ICT capability	20	71	8	29	-	-	-	-
8	Use ICT to involve parents in their children's learning	8	14	38	68	3	5	7	13
9	Promote learner-autonomy by discouraging teacher-learner interaction	5	9	4	7	28	50	19	34
10	Encourage on line learning more than face-to face learning	-	-	-	-	41	73	15	27

All except items 6, 9 and 10 scored above 50% indicating that the respondents consider competencies in using digital devices during instruction, using ICT to encourage cooperative, collaborative and virtual learning strategies and environments as well as to develop learners' ICT capability and involve parents in their children's learning as the necessary ICT didactical competencies that teachers need to possess.

DISCUSSION

It has been revealed in this study that among the personal ICT competencies that teachers need to develop, the highest scoring item is the development of the ability

to use key ICT skills in developing and presenting information. Freedman (1999) presents personal key ICT skills in four main areas of knowledge namely: hardware, software, curriculum and general knowledge. These key ICT skills are not limited to knowledge of technical skills such as key boarding and technical use of some software packages. They include the ability to recognize when and how to apply ICT to the solution of problems. In fact the QCA in Clarke and Englebright (2003:56) state that key skill ICT "is based on user being able to find, explore, develop, and present information in the form of text, images and numbers." This is in line with the idea of many educational technologists that emphasis should not be on mere knowledge of technical skills. Loveless (2003) among others maintain that since ICT skills are limiting and easily redundant it is better to emphasize ICT capability which is quite broad in the sense that it involves the application of knowledge and competence to the process of information. However, knowledge of key ICT skills is the foundation for the development of ICT competencies. Consequently, from knowledge of skills, teachers are expected to progress to that of how, when and why each skill should be used.

Another finding of this study is that teachers need to develop competencies not only in selecting, developing, monitoring and evaluating ICT instruction but also in developing and maintaining educational web site. This is to make it possible for learners to interact with the learning content any time and any where. The need for teachers to develop competencies in the instructional integration of ICT in subjects across the curriculum is to ensure that ICT based education promotes the integration of disparate subject areas. This type of ICT based education offers

opportunities for spiritual, moral, social and cultural development of pupils (DfEE and QCA 1999).

It is interesting that all the respondents agree that teachers need to develop competencies in using ICT as a didactic tool in the class as well as in developing learner's ICT capability. Using ICT as a didactic tool implies using it to establish dynamic and powerful instructional strategies and environment. Developing learner's ICT capability is an important aspect of didactical competencies and it requires that learners be helped to understand the potentials of ICT and to have confidence and desire to use ICT. Teachers with didactical competencies demonstrate confidence in making meaningful use of ICT across the curriculum. Williams, Wilson, Richardson, Tuson, and Cole (1998:2) affirm that such teachers " have the capacity not only to enhance the richness of the learning experience but also encourage the development of information literacy in their own students."

CONCLUSION AND RECOMMENDATIONS

It is obvious that in this era of ICT, Nigeria as a nation will find it very difficult to cross the digital divide if concerted effort is not made to promote ICT education. One of the strategies to be adopted in this regard is the production of teachers who have developed competencies for the instructional use of ICT. Teachers who do not possess these competencies cannot develop same in the learners. To ensure the development of teachers' ICT competencies the following recommendations are made:

- ICT should be a compulsory course in all teacher preparation institutions.
- Teachers should be helped through in service educational activities to become competent in and receptive to ICT.
- ICT facilities notably computers should be made available in schools so as to provide access to ICT to both teachers and learners.
- The Federal Government should make the development of teachers' ICT competencies a priority and set targets when all long serving and newly qualified teachers are expected to become ICT-literate to mandatory standards.
- To ensure the integration of ICT education across the curriculum, every teacher training course must include elements for developing ICT competencies of both teachers and learners.

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