Development of a Conceptual Framework Regarding the Factors Enhancing Teachers' Adoption and Use of ICT in Teaching and Learning

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***Abstract*—This paper presents a conceptual framework regarding the factors enhancing teachers' adoption and use of ICT in teaching and learning, derived from an in-depth survey of the related literature. This aim is achieved by identifying the factors enhancing teachers' adoption and use of ICT in teaching and learning. The main result of this study is a framework derived from the existing literature listing the factors enhancing teachers' adoption and use of ICT in teaching and learning. The findings help to articulate issues related to teachers' adoption and use of ICT and in this way contributes to the development of programs designed to address the relevant issues.**

***Keywords*— ICT, enhance, teacher, school, teaching, learning.**

I. Introduction

In the 21st century the educational systems across the world are under tremendous pressure to use Information and Communication Technology (ICT) to teach students knowledge and skills. In educational systems, increasing the quality of teaching and learning is very important [19] and the integration of ICTs increases the education systems' capacity by helping teachers teach and helping students learn more effectively [31], [21]. ICT has an impact that can enhance teaching and learning in schools in terms of student achievement and teacher learning [3]. [34] State that ICTs enhance science teaching and learning in schools along with ICT tools such as multimedia software for simulation, digital recording equipment, presentation and publishing tools, computer projection technology, and computer-controlled microscopes [30]. [11] States that ICT can be used for science education in primary schools and encourages students to collect science information and interact with the resources (videos and images, communication and collaboration). According to [17], ICT enhances the performance of teaching and administration as a whole and has a positive impact on education. ICT can help to develop skills in disadvantaged communities which can promote liberation and transformation. [16] Concluded that ICT plays a crucial role in students' skills, knowledge and motivation. Furthermore, they claimed that it can be used to present information to students and help them to learn completely. [23] Suggest that in the classroom ICT based teaching improves learning and this ICT based teaching method is better than hands-on students use alone. The ICT based teaching methods of instruction (computer-assisted instruction (CAI) and interactive learning systems (ILS)) pedagogical assumptions include: "learners learn more effectively and efficiently when they are able to control the pace; feedback is a critical part of effective learning; and, active involvement leads to more effective learning than passive involvement" [24].

II. Problem Statement

[2], [4], [20], [22] Have all concluded that when an institution does not provide appropriate technical support for staff, then the adoption and the integration of ICT by the academic staff is severely hindered. Studies by [26] and [38] found that failure by an institution to establish and implement effective plans may inhibit the adoption and integration of ICT. Studies conducted by [28] and [35] in the Dutch teacher education institutes, indicated that the use of ICT for learning by teachers is very limited although computers are widely available. Furthermore their studies indicated that teachers use ICT in their own learning but only half of the teachers use ICT in their course. A study by [37] stated that the integration of ICT in the classroom is very complex procedure because it involves personal, group, organizational, institutional and cultural change.

III. Research Question

What are the factors enhancing teachers' adoption and use of ICT in teaching and learning?

IV. Aims and Objectives

The aim of this study was to develop a conceptual framework regarding the factors that enhance teachers' adoption and use of ICT in teaching and learning. This aim was achieved through accomplishing the following objectives: identifying

the factors enhancing teachers' adoption and use of ICT in teaching and learning.

V. Literature Review

A study conducted by [18] found eight factors that enhance teachers' successful adoption of ICT in the classroom, namely: administrative support, staff development and technical support, availability of technology, technology use plan, technology coordinator, facilities and maintenance, and the assessment and broad participation. [25] Report that the availability of ICT syllabuses/manuals, easily availability computers and computer laboratories directly encourage the usage of ICT in higher institutions. Research results from [14] indicated that the factors that encourage to use the ICT include ease of availability of ICT, upgrading teachers' ICT skills, convenience in terms of time and place, time to upload and download in terms of speed, improving the communication between students and teachers, reliability of ICT, data security, availability of a specialized computer teacher, availability of educational software, improvement of presentation of the subject, encouragement of teachers to use the technology in teaching more often, financial readiness to support the ICT and learner with the training.

[1] Found that the factors that encourage adoption of ICT are: collegiality among computer-using teachers at their school, school support for the consequential computer activities, resources for the development of staff, smaller class sizes and formal computer training. A study conducted in the UK by [13] found that half of the English teachers welcomed the use of ICT in English (the subject) and concluded that English teachers see that ICT is the central form of literacy for students. Research results from the [5] shows that teachers confident enough to use ICT find it very helpful in terms of teaching and for their personal work.

[10] Identified four distinct factors that enhance adoption and use of ICT, namely, learning by doing, real time conversation, delayed the time conversation, and the directed instruction. [17] Suggested ICT has a positive impact on education in terms of improving performance, teaching and administration. A study carried out by [5] showed that regular users of ICT have more confidence in terms of using ICT for their personal work and for their teaching. They found that teachers found that their lessons were more interesting, easier, more fun for them and their students, more diverse, more motivating for students and more enjoyable.

According to [39], ICT can enhance teaching and learning in a number of ways such as storing or sorting information, rapid communication, reducing the quantity information but increasing the quality, integration of teaching and learning, and ICT improves equity and access to higher education. [15] Found that ICT enhances teaching and learning opportunities in terms of practice, analysis, and offering of better access to relevant articles for teaching and learning materials. Furthermore, they have concluded that ICT engages thinking, decision making, problem solving and reasoning behaviour of students. ICT facilitates student-centred learning [9] and social interaction [8]. Studies have found that ICT improves students cognitive development [27], increases creativity [29], and improves problem solving skills [33]. According to [12], having "technology plans" was the strongest enhancer of ICT in schools. Others on their list were in-service training, allocating more budget, allocating specific units, peer support, incentive payment, decreasing the course load of the teacher educators, designing appropriate course content and instructional programs. According to [32], ICT can enhance basic education which includes supporting education in schools, providing non-formal education for out-of-school children and adults, supporting the pre-service distance education of teachers and their in-service professional development, and finally enhancing the management of schools.

VI. Methodology

The strategy for identifying the main factors that enhance teachers' adoption and use of ICT in teaching and learning was a systematic literature review based on the following steps: formulate the review questions, define the selection criteria, and define the quality appraisal criteria [6].

A. The Review Question

The review question provides focus and boundaries, and shapes all aspect of the review process, including: inclusion and exclusion criteria, search strategy, extent of the literature reviewed, quality appraisal, and the synthesis of the evidence [36]. The review question was: What are the factors enhancing teachers' adoption and use of ICT in teaching and learning?

B. The Search Strategy

Google, Google Scholar and Durban University of Technology library electronic databases were searched utilising search terms such as: "enhancing ICT adoption in teaching and learning", enhancing ICT implementation for teachers".

C. Application of Study Selection Criteria

Before studies entered into systematic review, they were subjected to two filters [36]. The first filter comprised a set of inclusion and exclusion criteria such that only literature that was relevant and able to address the review question was taken through the second filter [36].

D. Design of the Studies

Studies included in this review were those with empirical evidence from experimental or observational research, including qualitative research. The study included unpublished and published work [36]. In this literature review, only literature directly associated with factors enhancing school teachers' adoption of ICT and use of ICT in teaching and learning was selected.

E. The Quality Appraisal Criteria

Studies included in the literature review met all the five necessary elements of quality appraisal criteria [36] for valid and trustworthy findings. Articles were selected which were considerable, acceptable, reliable, and empirically valid. Included studies all had a good research question and theory or theoretical framework.

VII. Results

The results of this study are displayed in Figure 1.

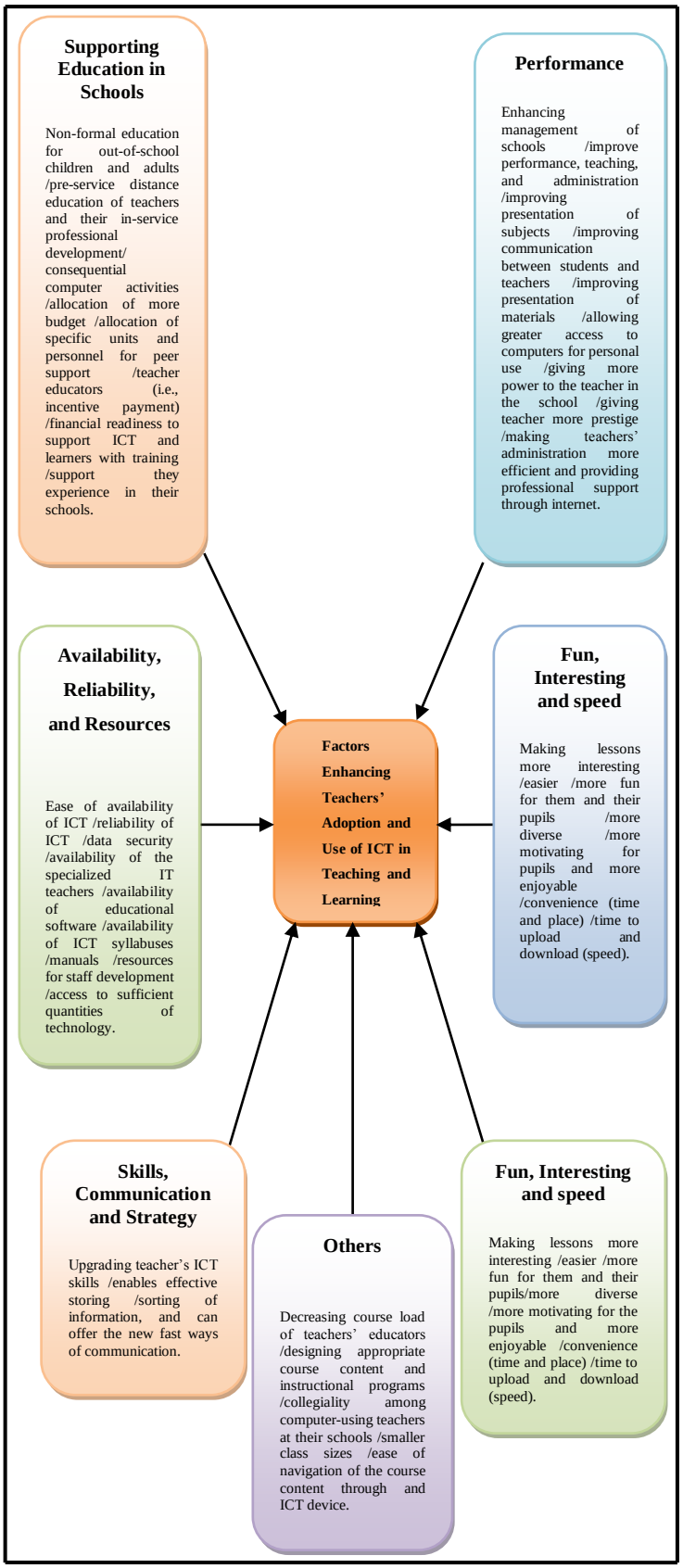

Fig. 1 A proposed conceptual framework on factor enhancing the adoption and the use of ICT for teachers in teaching and learning

VIII. Discussion, Conclusion and Recommendations

The main objective of the study was to examine the factors enhancing school teachers' adoption and use of ICT in teaching and learning. This study has revealed all the majority of factors that enhance school teachers' adoption and use of ICT in teaching and learning. If the Technology Acceptance Model (TAM) is used then the following characteristics are referred to as enhancing teachers' adoption and use of ICT in teaching and learning: perceived usefulness, perceived ease of use, and user acceptance [7]. Regardless of what theory is used, many factors including supporting education in schools, performance, availability, reliability and resources, fun, interesting and speed, skills, communication and strategy also enhance teachers' adoption and use of ICT in teaching and learning.

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