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## Factors inhibiting teachers' embracing elearning in secondary education: a literature review

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**Abstract:** Twenty-first century has witnessed the rise of eLearning and in this second decade it is more frequently used as a replacement term for all forms of learning. Numerous studies have been done and continue to be undertaken to study the factors influencing eLearning in education. This study adopted a mixed-method approach and employed a critical meta-analysis design to explore the factors inhibiting teachers embracing of eLearning in education. A total of 17 studies from across the globe with focus on inhibiting factors were analysed. The key inhibiting factors reviewed were categorised into teacher-level, school-level and system-level inhibitors. Furthermore, the impact of the inhibiting factors on eLearning implementation is explored and some relevant strategies for promotion of eLearning are discussed. The review recommends that teacher-level inhibiting factors feature prominently and there is a need for further research on these factors to find out the greater impact on student achievement and engagement.

**Keywords:** Inhibiting Factors, Teachers Embracing, Elearning, Influencing, Integration, ICT, Online, Technology, Barriers, Secondary Education

124

### Introduction

Technology has changed the way that we live our lives. Even though technology enhancements are enabling us to be more eLearning successful, there is still an enormous amount of uncertainty around how to implement eLearning successfully, particularly in education for secondary schools (Fitzpatrick, 2012). The Information Communication and Technology (ICT) has established a central place in the global market and actively influencing change. With the increased importance of ICT in our daily lives (Buabeng-Andoh, 2012), and in our education system, there is a growing demand for educational institutions to use ICT to teach the skills and knowledge students need for the 21st century. Educational institutions are often re-aligning their practice and restructuring their educational curricula both in terms of content and pedagogy in order to bridge the existing technology gap in teaching and learning. A plethora of research can be found online focusing on eLearning factors which enhance the embracing of ICT in schools. However, there is lesser focus on factors inhibiting teachers embracing eLearning in secondary education. A recent study conducted in Kenya by Tarus, Gichoya and Muumbo (2015) looked at challenges of implementing eLearning. However, this study had key focus on Kenyan Public Universities. Islam, Beer and Slack (2015) carried out a literature review on eLearning challenges faced by academics in higher education. Once again the focus of the study was primarily on higher education with key focus on Middlesex University. Similarly, other researchers

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exploring the factors to eLearning adoption have either focussed on success factors or where the emphasis was on inhibiting factors, they contextualised it primarily on higher or tertiary education. Thus, the focus on inhibiting factors remains narrow. Nanayakkara (2007), revealed three groups of factors: individual, system and organisational, affecting the adoption of eLearning systems in the tertiary institutions. Furthermore, factors (barriers) that discourage the use of ICT by teachers are classed by Buabeng-Andoh (2012), as teacher-level, school-level system-level barriers. This study aims to find answers to three questions as outlined below:

1. What are the factors inhibiting teachers' embracing eLearning according to the current literature?
2. What impact do the factors have on the implementation of eLearning in secondary schools as outlined in the literature?
3. What strategies are available in the literature to minimise the risks associated with the inhibiting factors and promote eLearning?

## Literature

### Theoretical Background

#### *Efficacy of eLearning*

The efficacy of eLearning is contested in some literature. A meta-analysis and review of online learning studies conducted for the US Department of Education by Means, et al., (2010), found that students online performed modestly better, on average, than those learning the same materials through traditional face-to-face instruction. Arguably, the same report outlines that most of the variations in the way in which different studies implemented online did not affect student learning outcomes significantly. These disparities will be further explored through this literature review. This study intends to eliminate the gap in the literature by carrying out a meta-analysis of the literature to offer a fresh perspective on factors inhibiting teachers embracing eLearning in secondary education.

New technologies including Information Communication Technology (ICT) and eLearning have become the driving forces in most institutions (Tarus, Gichoya&Muumbo, 2015). Elearning seems to be the way to the future and great responsibility is placed upon the shoulders of the educators in all contexts to drive eLearning. Secondary schools in New Zealand are increasingly adopting the Learning Management Systems (LMS) in order to establish a platform through which they can deliver teaching and learning using different ICT tools. The use of ICT as a medium focusses on the use of ICT for enhancement of the teaching and learning process (Drent&Meelissen, 2007). It is a fact that teachers are at the centre of curriculum change and they control the teaching and learning process (Afshari, et al., 2009). Therefore, it is very important to examine the factors which inhibit teachers embracing eLearning. Teachers' belief about ICT use for teaching and learning is an important factor for eLearning success. According to Comi, et al (2017), "Existing evidence demonstrates that teachers' beliefs about ICT use for teaching and learning affect the frequency of ICT use in schools more than the availability of infrastructures". Arguably, students taught by teachers who are positive about ICT use in education but face low access and high obstacles to utilizing it at school report more frequent use of ICT during lessons compared to students taught by teachers having high access to ICT but being less positive about its usefulness for teaching. This demonstrates that teachers are not fully exploiting the potential of eLearning which signifies the need for examining the factors inhibiting uptake of eLearning. Through study and meta-analysis of several strategically selected literatures this study will endeavour to answer the questions that follow.

### *Defining eLearning*

eLearning has been interchangeably used with terms such as online learning, ICT, online education and online training. According to Rock, Coventry, Morgan and Loi (2016), eLearning is the pedagogically driven use of mobile and non-mobile web-based technologies ranging from hypertext pages to avatar-populated virtual worlds (VW's) and virtual realities for the purpose of acquiring knowledge and skills. ELearning is the use of new multimedia technologies and the internet to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration,(Alonso, et al., 2005). ELearning is also defined as interactive learning in which the learning content is available online and provides automatic feedback to the students' learning activities where online communication with real people may or may not be included (Paulsen, 2002). ELearning is the use of telecommunication technology to deliver information for education and training (Sun, et al. 2008). ELearning is a broad combination of processes, content, and infrastructure to use computers and networks to scale and/or improve one or more significant parts of a learning value chain, including management and delivery (Aldrich, 2005). A global survey in an effort to build an inclusive definition of eLearning by Sangra, Vlachopoulous and Cabrera (2012) defined eLearning as an approach to teaching and learning representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction that facilitates the adoption of new ways of understanding and developing learning.

For the purpose of this research, eLearning is defined as “the use of internet, intranet/extranet, audio and video, satellite broadcasts, interactive TV, and CD-ROM, not only for content delivery, but also for the interaction among participants (Industry Canada, 2001) inclusive of mobile and wireless learning applications (Wagner, Hassanein& Head, 2008)”.

### *Different types of eLearning*

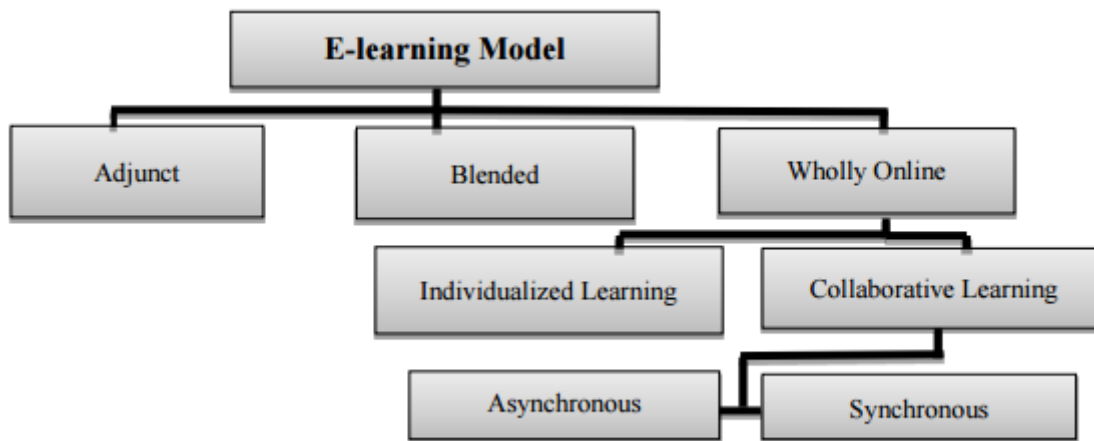
Literature search makes an awareness of various ways of classifying types of eLearning. Classification based on educational context are closely linked to Algahtani (2011), Almosa (2001), Zeitoun (2008) and Almosa and Almubarak (2005).

ELearning is divided into two basic types, consisting of computer-based and internet-based eLearning, (Algahtani, 2011). According to Algahtani (2011), the **computer-based** learning comprises the use of a full range of hardware and software generally that are available for the use of ICT and also each component can be used in either of two ways: computer-managed instruction and computer-assisted learning.

The **internet-based** learning is a further improvement of the computer-based learning as it makes the content available on the internet, with links to related knowledge sources, for examples, email services and references which could be used by learners any time and place as well as the availability or absence of teachers or instructions (Almosa, 2001).

The completely online mode of eLearning is described as 'synchronous' or 'asynchronous' by the application of applying optional timing of instruction (Algahtani, 2011) as cited in Arkorful and Abaidoo, 2015 and illustrated below.

### A model for using e-learning in education



**Figure 1.** eLearning Model (Adapted from Algahtani, 2011)

For the purpose of this research synchronous and asynchronous eLearning will be referred to in order to explain the factors inhibiting embracing eLearning by teachers' in secondary education. **Synchronous**, meaning "at the same time", involves interaction of participants with benefit of an instructor via the web in real time (GC Solutions). **Asynchronous**, which means, "not at the same time", allows the participants to complete the web-based training (WBT) at their own pace, without live interactions with the instructor. The use of combination of both the synchronous and asynchronous types in the most recent times is called **blended learning**.

Factors Inhibiting embracing of eLearning.

Several factors inhibiting teachers' embracing of eLearning has been identified by researchers. **Inhibiting** is defined as hinder, restrain or prevent (an action or process) and make (someone) self-conscious and unable to act in a relaxed and natural way (Online Dictionary). **Embracing** is defined as accept (a belief, theory or change) willingly and enthusiastically (Google online).

Therefore, for the purpose of this research inhibiting eLearning factors is defined as factors which prevent teachers from willingly and enthusiastically accepting the implementation of eLearning in secondary education.

Technological, individual, organisation and institutional factors should be considered when examining ICT adoption and integration (Sherry & Gibson, 2002). As cited in Buabeng-Andoh (2012), Stockdill and Moreshouse (1992) and Rogers (2003), identified user characteristics, content characteristics, technological considerations and organisational capacity as factors influencing ICT adoption and integration into teaching. Balanskat, Blamire & Kefalla (2007) identified the factors as teacher-level, school-level and system-level barriers. Furthermore, teachers' integration of ICT into teaching is also influenced by organisational factors, attitudes towards technology and other factors (Buabeng-Andoh, 2012).

Teachers' decision of embracing eLearning is also dependent on non-manipulative and manipulative school and teacher factors. Non-manipulative factors are factors that cannot be directly influenced by the school, such as age, teachers' experience, computer experience of the teacher or governmental policy and availability of external support for schools (Ten Brummelhuis, 1995). Whereas,

manipulative factors refers to the attitudes of the teachers towards teaching and ICT, ICT knowledge and skills of the teachers, commitment of the school towards the implementation process and availability of ICT support (Ten Brummelhuis, 1995).

Shraim & Khlaif (2010) cited that the barriers (inhibitors) are categorised as external (first-order) or internal (second-order), (Keengwe, Onchwari, et al, 2008). According to Snoeyink and Ertmer (2001), first order barriers (inhibitors) include, lack of equipment, unreliability of equipment, lack of technical support and other resource related issues. Second-order barriers (inhibitors) include both school-level factors, such as organisational culture and teacher-level factors, such as beliefs about teaching and technology and openness to change. The inhibiting factors for the purpose of this research will be categorised as **teacher-level, school-level and system-level inhibitors**.

## Methodology

### Research Model/Design

This study adopted a mixed-method approach and employed a critical meta-analysis design to explore the factors inhibiting teachers embracing of eLearning in education.

### Data Collecting Tools

#### *Search Process*

To identify relevant literature for this study, a combination of title, keywords and snowball searching was carried out. ERIC, Google Scholar, ProQuest, A+Education, NZCER and PsychINFO were the key database which were searched for articles in peer reviewed journals using the keywords: 'teacher', 'eLearning', 'influencing', 'ICT integration', 'online', 'technology', and 'barriers'. The search was extended to conference proceedings, papers and reports using the same keywords for greater reliability. The search parameters were kept within the timeframe of 2010-2017. However, the relevance of some of the studies required the inclusion of articles beyond the timeframe. The searches obviously produced a large number of articles in the first instance. However, the application of the filters 'secondary education' and 'inhibiting factors' significantly reduced the number of articles. This suggested that there still needs to be more research done in this sector.

#### *Inclusion and Exclusion Criteria*

This study has a key focus on inhibiting factors and it is contextualised in the secondary education sector. Studies which did not meet these criteria were excluded from the meta-analysis in the first instance. However, during the analysis process, some studies with relevant objectives (inhibiting factors) but a focus on post-secondary or tertiary education sector were included in the meta-analysis. Nanayakkara (2007) investigated the factors that influence or inhibit the adoption of eLearning systems in the universities, institutes of technology and polytechnics in New Zealand. The context and the relevance of this study qualified for its inclusion in the research. Nichols (2008) carried out his research on eight universities, two polytechnics, and four other education institutions from both New Zealand and overseas. Thus, it was included with its focus on global and local context. The remaining studies which were included had adopted various research methods and were based on secondary education context.

Close and repeated readings of the selected studies were carried out to identify recurring themes and categorise them by coding (Creswell, 2014).

### *Coding Procedure*

Once a study qualified for further review, the process of coding was applied. Selected group of studies were numbered and assigned unique codes individually based on the author's initials and the dates of publication, followed by a brief description and findings of the study (Preliminary Coding). Additional alphabetical coding was then carried out using a letter or letters to identify: factors inhibiting (FI), factors promoting (FP), modern ICT tools (MT), traditional ICT tools (TT), strategy (ST), teacher-level inhibitors (TcLI), school-level inhibitors (ScLI) and system-level inhibitors (SyLI).

The coding was then applied to the selected studies (n=17) to extract the data. The coded data was then transferred to an Excel Spreadsheet and Excel was used to filter and sort the studies according to the assigned codes.

### **Data Analysis**

A combination of manual sorting, computer assisted tabulation using excel and comprehensive meta-analysis tools were used for analysing the data. The focus of this study was on qualitative description rather than statistical analysis. With this in mind, the researcher adopted the method of numerical counts as opposed to percentages for analysis of recurring inhibiting factors from one study to next. The final coding result of inhibiting factors was converted to percentage figures for easier discussion of the results.

Tables are utilised in the discussion and findings section to illustrate a comparison of the inhibiting factors including a focus on secondary education sector. There is also a focus on the context, research type, methods and summary of the key study findings.

Scope and limitations of this study

The key focus of this study is on the factors inhibiting teachers' embracing of eLearning in secondary education. A comprehensive search of the education database was carried out in order to select seventeen (17) eLearning studies with a focus on secondary education. With the increasing interest in this area of research and advancement of eLearning, it is highly possible that the meta-analysis process overlooked some relevant studies undertaken in this area. Therefore, it is acknowledged that this study may be limited in scope due to the limitations imposed by the study type and the length. The researchers' genuine intention is to provide an account of the prevalence of current factors inhibiting teachers embracing of eLearning in secondary education. However, there is no guarantee given the stated limitations that their wishes could be upheld.

### **Findings and Discussions**

The focus of this section is to present a qualitative description of each study included in the meta-analysis. It begins with an overview followed by an attempt to critically analyse the studies. There is a detailed analysis of categorisation of the factors and presentation of factors inhibiting the embracing of eLearning in secondary education.

#### *Overview of Articles Studied*

There were seventeen (17) articles selected for this review to provide answers to the study questions. All the articles primarily focussed on eLearning (ICT, online learning or online education). The initial categorisation of the articles placed them in groups according to their research design. Table 1(below) illustrates further the grouping of the selected articles. The closer reading of the articles warranted a preliminary summary to establish the context and outcomes of the articles so that they could qualify for the meta-analysis of the inhibiting factors. The final coding illustrates the grouping of commonly

occurring inhibiting factors into three categories. These categories are teacher-level inhibitors, school-level inhibitors and system-level inhibitors. The categories have been adopted from Balanskat, Blamire&Kefalla (2007) who identified the factors as teacher-level, school-level and system-level barriers.

**Table 1:** Grouping of study by approach

| Study Approach | Count | Author/Year  |
|----------------|-------|--|
| Qualitative    | 5     | Buabeng-Andoh, C. (2012).<br>Khan, M., Hossain, S., Hasan, M., & Clement, C. K. (2012).<br>Underwood, J., & Dillon, G. (2011).<br>Afshari, M., Bakar, K. A., Luan, W. S., Samah, B. A., & Fooi, F. S. (2009).<br>Nichols, M. (2008).   |
| Quantitative   | 8     | Nanayakkara, C. (2007).<br>Shraim, K., & Khlaif, Z. (2010).<br>Sipilä, K. (2014).<br>Kotrlík, J. W., & Redmann, D. H. (2009).<br>Hung, W. C., & Jeng, I. (2013).<br>Tella, A., Tella, A., Toyobo, O. M., Adika, L. O., & Adewuyi, A. A. (2007).<br>Bukaliya, R., & Mubika, A. K. (2011).<br>So, T., & Swatman, P. M. (2006). |
| Mixed method   | 4     | Singh, G., & Hardaker, G. (2014).<br>Ndibalema, P. (2014).<br>Agyei, D. D., & Voogt, J. (2014).<br>Bukaliya, R., & Mubika, A. K. (2012).   |

### Analysis of the Studies

The studies analysed for the purpose of this research had a common purpose or goal. All authors were trying to establish the most significant factors inhibiting the uptake of eLearning in secondary education and in some instances post-secondary education and training.

Factors that discourage the use of ICT by teachers are categorised into teacher-level, school-level and system-level barriers (Buabeng-Andoh, 2012). Teacher-level barriers include lack of teacher ICT skills; lack of teacher confidence; lack of pedagogical teacher training; lack of follow-up of new and lack of differentiated training programmes. The school-level barriers comprise absence of ICT infrastructure; old or poorly maintained hardware; lack of suitable educational software; limited access to ICT; limited project-related experience and lack of ICT mainstreaming into schools strategy. The system-level barriers include rigid structure of the traditional education system; traditional assessment; restrictive curricula and restricted organisational structure. Buabeng-Andoh (2012) asserts that knowing the extent to which these barriers affect individuals and institutions may help in taking a decision to tackle them (Becta, 2004).

Nanayakkara (2007), through a study carried out at tertiary level, revealed three key groups of factors: individual, system and organisational, affecting the adoption of eLearning systems. The sub-factors under the individual factor are individual characteristics and individual perceptions. According to Nanayakkara (2007), development of skills and knowledge are part of individual characteristics and influence of colleagues, the system relationship to the quality of face to face teaching, the system

relevancy to face to face teaching and the effects of school culture for eLearning technologies are part of the individual perceptions. The sub-factors under the system factor are LMS characteristics and external system characteristics. The LMS characteristics identified are: the availability of appropriate functionalities, flexibility and content design tools of the LMS, its usefulness and its user friendliness. The external system characteristics are: the availability and capacity of ICT infrastructure, reliability of ICT infrastructure and availability of other administrative systems such as online enrolment, distance library services, distance student support services, online assessment and a secure medium to post student results to complement the delivery of online classes (Nanayakkara, 2007). The subfactors for the organisational support factors are organisational support and organisational characteristics. The organisational support factors are: training and support to design and deliver online content, staff time allowances, incentives and rewarding mechanisms, ICT training and helpdesk support. The organisational characteristics factors identified are; the need for faculty wide e-learning strategy, organisation culture towards e-learning, institutional leadership and institution wide strategy and funding priority for e-learning development (Nanayakkara, 2007).

In their study focussing in Palestine, Shraim & Khlaif (2010) highlight challenges to the implementation of eLearning as digital divide and technical limitations of the network, lack of eLearning skills, lack of autonomy, poor time management, workload pressure and language. The authors propose for transformation to an eLearning approach be considered. According to Shraim & Khlaif (2010), socio-technical and organisational factors are crucial to successful implementation of eLearning.

The key focus of the fourth study chosen for this review was on the examination of how the organisations' diffusion structures, systems and processes influenced the individual adoption of eLearning. Singh & Hardaker (2014) in this study show that individuals are more likely to be persuaded by interpersonal communication and social networks through homophilous groups. Their review of the macro-level studies, listed the diffusion through role of eLearning strategy, diffusion through social networks, top-down and bottom-up approaches to diffusion, role of management and supporting infrastructures. Micro-level studies revealed attitudes towards technology, demographic factors, resources (time) and locus of control of eLearning as some of the inhibiting factors (Singh & Hardaker, 2014).

Khan, Hasan and Clement (2012) contextualised their research in Bangladesh, where they looked at the barriers to successfully integrating ICT into classrooms. The study found out that the barriers to implementations include: lack of ICT supported infrastructure and lack of resources, insufficient funds, vision and plan, political, social and cultural factors, corruption, teachers attitudes and beliefs about ICT, lack of knowledge and skills, lack of time, poor administrative support, lack of appropriate staff training and quality training for teachers and school principals, lack of qualified ICT coordinators who will assist teachers to integrate ICT in classrooms and labs and favourable school culture (Khan, Hasan & Clement, 2012).

Underwood and Dillon (2011), in their study, asked: Are the teachers the problems or the solutions to the perceived failure of ICT to deliver the potential of ICT in classroom? This study had suggested three ways forward and stated that a good teaching system aligns the teaching method and assessment to the learning activities stated in the objectives, so that all aspects of this system work together in supporting appropriate student teaching (Lebrun, 2007). The suggested strategies are:

1. A *laissez-faire* approach - where no reasonable voice is arguing that technology be removed from the classrooms, the 'naysayers' would suggest a minimum emphasis on technology and certainly a cut in funding (Oppenheimer, 2003).
2. Bend the technology to the system - while few reject technology outright, there are those who argue for the status quo in education; that is technology should be accepted where it fits current educational structures and practices.



3. Merge and evolve - digital technologies are requiring us to think differently about how learners learn and how teachers teach. From this perspective we need to think about how schools or learning ecologies are organised, including the role of technology to support meaningful student achievement (Underwood & Dillon, 2011).

Sipilä (2014) investigated teachers' perceptions about how information and communications technology (ICT) is being incorporated into teaching and learning, the level of teachers' digital competence and what factors, in their opinion might be hindering the use of ICT in schools. This study gives indications that half of the teachers consider themselves to be both unqualified and unprepared to use ICT in education in a way that could add value to teaching and learning. The findings indicate that at the moment teachers do not have the means or knowledge to fully use ICT in promoting learning. ICT in education is not ultimately about what kind of technology is provided to teachers, it is about having the right kind of equipment on hand for the learner and providing him/her with pedagogically grounded learning methods and tools (Sipilä, 2014).

So and Swatman (2006) conducted an inductive study designed to evaluate the eLearning readiness of teachers in Hong Kong's schools. They identified six factors through interpretative labels. These factors according to their characteristics are students' preparedness, teachers' preparedness, IT infrastructure, management support, school culture and preference to meet face to face. The remarkable difference of this study compared to the rest was its focus on gender differences. The findings of the initial survey suggested that only in higher 'band' secondary schools do teachers feel confident they are ready to take on eLearning in the classroom - and even there, female teachers' confidence appears to lag that of their male colleagues (So & Swatman, 2006).

Afshari, et al (2009) reviewed factors that influence 'teachers' decisions to use ICT in the classroom and highlights models for integrating technology into teacher training programs. The factors were categorised as non-manipulative and manipulative school and teacher factors. Non-manipulative school and teacher factors comprise of teachers' characteristics and parent and community support. Manipulative school and teacher factors include availability of time to experiment, reflect and interact, available support for using computer in the workplace, school culture, computer attributes, level and quality of training for teachers and school principals, attitude towards computer, computer competence, effective training program and models for integrating technology into teacher training programs (Afshari, et al., 2009).

Nichols (2008) reported on the findings from an exploratory study of institutional change and eLearning, highlighting factors that assist diffusion and identifying factors that appear to have very little, if any, influence on diffusion. The data from this exploratory survey suggest that barriers to sustainability include a lack of strategic ownership; a lack of support from senior management; a culture not ready for innovation (evidenced by poor, initial VLE adoption by faculty); misconceptions about what eLearning is; an awkward fit for eLearning activity within existing institutional systems, coupled with an inability or unwillingness to change those systems and poor or ineffectual professional development (Nichols, 2008). The author asserted that if such barriers to diffusion are not addressed, eLearning will remain a peripheral function that will involve only a small group of faculty.

Kotrlik and Redmann (2009) carried out a survey to study secondary technology education teachers' use of technology in instruction. The outcome revealed that technology education teachers' have substantially adopted technology for use in instruction but they are not making the maximum use of technology. According to Kotrlik and Redmann (2009), technology education teachers are experiencing minor barriers to technology integration and some technology anxiety as they strived to integrate technology in their instruction. Barriers to technology integration, technology anxiety, and use of colleagues as a training source combine to explain a large proportion of the variance in technology

adoption. Technology adoption increases as the barriers and technology anxiety decrease, and as technology teachers use colleagues as a training source (Kotrlik&Redmann, 2009).

Hung and Jeng (2013) investigated future educational technologists' intentions to participate in online teaching by using Ajzen's Theory of Planned Behaviour (TpB). The first factor that decreased respondents' intention to participate in online teaching was inadequate instructional support. Instructional support focusses on designing learning activities that meet pedagogical needs and creating effective assessments for learning. Its goal is to improve the quality of learning outcomes and facilitate instructors and students' online experience (Hung &Jeng, 2013). The second factor is insufficient design and development opportunity and curriculum integration during the respondent's program of study. Key factors that affected respondents' intention to participate in online teaching are instructional support, curriculum integration, appropriate instructional models and standards in teaching and assessment (Hung &Jeng, 2013).

Adeyinka, et al., (2007) employed a descriptive survey method to assess secondary school teachers' use of ICT's and its implications for further development of ICT's in Nigerian secondary schools. The most significant barriers relevant to this research were linked to staff attitude and training staff in use of ICT, access and ICT skill in general, lack of time, skills and knowledge.

In another review (Ndibalema, 2014), the author presented the findings on teachers attitudes towards the use of ICT as a pedagogical tool in secondary schools in Tanzania. The findings outlined inhibiting factors as lack of high quality resources and well-designed ICT infrastructures, poor internet connectivity, insufficient training, inadequate resources and infrastructures and teachers attitudes towards computers and intention to use the computer.

Agyei and Voogt (2014) examined the extent to which beginning teachers were able to transfer knowledge and skills about designing and enacting ICT-enhanced activity-based learning activities (ICT-ABL) gained in the professional development program. Their finding categorised factors in two clusters. Cluster one was Learner Characteristics (personal factors related to teachers knowledge and skill, commitment, availability of time and their dissatisfaction with the status quo which influence transfer) and cluster 2 was School Environment Characteristics (school-related factors: school culture, availability of resources, rewards and incentives and participation in decision making which directly or indirectly influence transfer)(Agyei &Voogt, 2014).

Bukaliya and Mubika (2011) carried out a study with the aim of identifying areas of ICT competence and areas of weaknesses among secondary school teachers. The challenges that were brought to limelight in their study were lack of adequate computer hardware, limited knowledge on how to make full use of ICT's, limited understanding on how to integrate ICT's into teaching, lack of software and hardware knowledge, inadequate trained ICT teachers, no electricity in most rural schools and fear of technological equipment (Bukaliya&Mubika, 2011).

In another study utilizing the mixed method approach, Bukaliya and Mubika (2012) administered descriptive survey design to find out what factors have impeded the implementation of computer education in schools. According to Bukaliya and Mubika(2012), the challenges which impeded the implementation of computer education in schools include lack of budgeting allocation for computer education and procurements, lack of support in availing funds from Central government, negative attitudes from both teachers and parents and lack of qualified and trained teachers to teach, unwillingness from few qualified teachers to teach the subject, lack of in-service computer-training programmes for teachers , phobia of computers and lack of meaningful support from stakeholders to implement computer as a subject.

### *Categorisation of Inhibiting Factors*

The meta-analysis process prompted the need to categorise the inhibiting factors in thematic groups for the purpose of coding and discussion. Balanskat, Blamire and Kefalla (2007) identified the factors as teacher-level, school-level and system-level. Sherry and Gibson (2002) claim that technological, individual, organisational and institutional factors should be considered when ICT adoption and integration. This study reviews the factors inhibiting the teachers embracing of eLearning in secondary education. Therefore, the researcher adopted Balanskat, Blamire and Kefalla's (2007) concept and categorised the inhibiting factors as **teacher-level inhibitors, school-level inhibitors and system-level inhibitors**.

The teacher-level inhibitors include: lack of ICT skills, lack of teacher confidence, lack of time, lack of pedagogical teacher training, lack of follow-up of new training programmes, and lack of differentiated training programme. The school-level inhibitors include: lack of well-designed ICT infrastructure, old or poorly maintained hardware, lack of suitable educational software, limited access to ICT, limited project-related experience and lack of ICT mainstreaming into schools strategy. Finally, the system-level inhibitors include: rigid structure of traditional education system, traditional assessment, restrictive curricula and restricted organisational structure.

### **What factors inhibit teachers' embracing eLearning according to the current literature?**

Based on the meta-analysis of the literature, the factors have been grouped in three categories. These categories have been adopted from Balanskat, Blamire and Kefalla (2007) who identified the factors as teacher-level, school-level and system-level barriers (inhibitors).

#### **a. Teacher-Level Inhibitors**

The factors that make up this category in this study are:

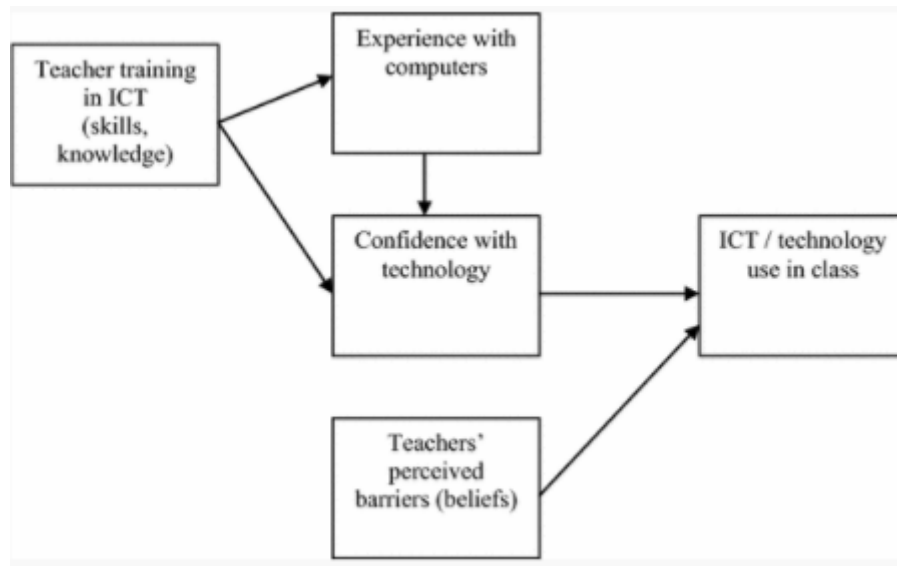
1. Lack of teacher confidence
2. Lack of ICT skills
3. Lack of time
4. Lack of differentiated training programme
5. Lack of pedagogical teacher training
6. Lack of follow-up of follow-up of new training programme.

**Table 2:** Teacher-level inhibitors (n=17)

| <b>Factors</b>  | <b>Count</b> | <b>Percentage (%)</b> |
|---|--------------|-----------------------|
| Lack of teacher confidence                                | 17           | 100                   |
| Lack of ICT skills  | 15           | 88                    |
| Lack of time  | 14           | 82                    |
| Lack of differentiated training programme                 | 10           | 59                    |
| Lack of pedagogical teacher training                      | 9            | 53                    |
| Lack of follow-up of follow-up of new training programme. | 5            | 29                    |

Table 2 illustrates the result of the meta-analysis in which the factors have been placed from most frequently occurring to the least. In the meta-analysis (n=17), lack of teacher confidence (self-efficacy) appeared 100% of the time. All the review presented that teacher self-efficacy is a key factor inhibiting embracing of eLearning in secondary education. In a study by Ross, Hogaboam-Gray and

Hannay(2001) as cited in Rossacci(2016), it was reported that students who had a teacher with high self-efficacy acquired advanced technology skills, while students who had a teacher with low self-efficacy only learned the basic technology skills. Furthermore, Nikolopoulou and Gialamas(2015) showed that teachers' confidence with technology had a direct significant effect on the factors "lack of support" and "class conditions"(number of computer and number of pupils in class): those teachers who had greater/higher confidence with technology, perceived as minor the barriers related to support and class conditions. This is illustrated in Figure 2 below as cited in Nikolopoulou and Gialamas (2016).



**Figure 2.** The hypothesis model

The second most occurring factor in the meta-analysis was lack of ICT skills at 88%. This result affirms that investment in upgrade of teachers ICT skills should be high on the agenda of the school managements. Bingimlas (2009) reported that lack of confidence, lack of competence and lack of access to resources were major barriers for successful integration of IVT in teaching and learning environment. This finding is consistent with Pelgrum (2001), who found that teachers' lack of knowledge and skills was the second most inhibiting obstacle to the use of computers in schools. The level of technology adoption and integration increases with the higher levels of skills acquisition. Knezek and Christensen (2000) hypothesized that high levels of attitude, skills and knowledge (proficiency) and tools would exhibit higher levels of technology integration in the classroom.

The third inhibiting factor at teacher-level at 82% occurrence was lack of time. Developing countries, where there is shortage of teachers have huge demand on time. Khan, Hasan and Clement (2012) assert in their study in Bangladesh, that developing countries have a shortage of teachers and they are already burdened with heavy workload. In these circumstances teachers do not have time to design, develop and incorporate technology into the teaching and learning situations (Afshari, et al., 2009; Beggs, 2000; Newhouse, 1999; Ihmeidah, 2009). Nanayakkara(2007) in a study of Learning Management Systems(LMS) also concluded that release time for staff to engage in eLearning development is the highest determinant of intention and usage of a LMS.

The other common teacher-level inhibitors are lack of differentiated training programme (59%), lack of pedagogical teacher training (53%) and lack of follow-up of new training programmes (29%). There need not be more emphasis put on these factors as the growing body of literature on teacher-level inhibiting factors for embracing of eLearning in secondary education point towards technology training

and professional development. The inhibiting factors identified here are all interrelated and have an impact on each other.

The finding that these factors are key teacher-level inhibitors is consistent with the study by Adeyinka, et al., (2007). Most significant barriers to ICT use in education are teachers expertise, lack of knowledge, attitude, training staff in use of ICT, access and ICT skills in general (Adeyinka, et al., 2007).

### b. School-Level Inhibitors

The factors that make up the list of inhibitors in this category are:

1. Lack of well-designed ICT infrastructure
2. Lack of suitable educational software
3. Limited project related experience
4. Lack of ICT mainstreaming into schools strategy
5. Limited access to ICT
6. Old or poorly maintained hardware

**Table 3: School-Level Inhibitors (n=17)**

| Factors   | Count | Percentage (%) |
|---|-------|----------------|
| Lack of well-designed ICT infrastructure        | 13    | 76             |
| Lack of suitable educational software           | 12    | 71             |
| Limited project related experience              | 11    | 65             |
| Lack of ICT mainstreaming into schools strategy | 11    | 65             |
| Limited access to ICT                           | 9     | 53             |
| Old or poorly maintained hardware               | 8     | 47             |

ICT infrastructure featured prominently in the all the studies and scored at 76%. Trailing closely was lack of suitable educational software at 71%. These factors are closely related to each other as they are directly dependent on the way in which the funding is prioritised in secondary schools. This finding concur with Ndibalema (2014) that teachers believe that ICT could be used as a pedagogical tool in improving their teaching when there are adequate resources and infrastructures. Afshari, et al., (2009), state that it is crucial to involve those who have a stake in the outcomes, including teachers, parents, students, and the community and allow them to assist in the creation of the vision by contributing their knowledge, skills and positive attitude. Being visionary and having a common goal will address the other factors of limited project related experience (65%), lack of ICT mainstreaming into schools strategy (65%), limited access to ICT (53%) and old and poorly maintained hardware (47%).

Khan, Hasan and Clement (2012), highlight that lack of resources within educational institutions are another major hindrance to the implementation of ICT and recommend that stakeholders and school authorities need to be provided with adequate facilities and resources for effective implementation of ICT. Shraim and Khlaif (2010) in concluding their research on eLearning approach to secondary education in Palestine suggest that the Ministry of Education (MOE) needs to set up a clear plan and undertake critical assessments of ICT infrastructure in schools, in order to bridge the digital divide between schools in urban and rural areas, Accessibility, connectivity and digital divide are

chronological issues that can be improved over time by rapid advances in technology, however, focus must be on socio-technical and organisational factors for successful eLearning implementation (Shraim and Khlaif, 2010).

### c. System-Level Inhibitors

The factors in this category are:

1. Restricted organisational structure
2. Rigid structure of traditional education system
3. Traditional assessment
4. Restrictive curricula

**Table 4:** System-level inhibitors (n=17)

| Factors   | Count | Percentage (%) |
|---|-------|----------------|
| Restricted organisational structure             | 8     | 47             |
| Rigid structure of traditional education system | 6     | 35             |
| Traditional assessment                          | 6     | 35             |
| Restrictive curricula                           | 6     | 35             |

All the factors in this category scored less than 50% in the analysis. This is an indication that more than 50% of the studies reviewed, which comprised of cross-country study, have emphasised that system-level inhibitors are slowly diminishing or have totally diminished. This result suggests that governments are increasingly recognising the importance of eLearning and providing the support and guidance to educational institutions to embrace eLearning.

However, there remains a need for educational policies to be re-aligned to include eLearning for the success of eLearning. In a study conducted in Tanzania, Ndibalema (2014) argues that the use of ICT as a pedagogical tool in improving the quality of teaching seems to be a critical situation among teachers. "There is little evidence on how ICT as a pedagogical tool has been successful in schools. The problem is compounded by the fact that there are no clear ICT educational strategies put in place to improve the pedagogical skills for teachers", (Ndibalema, 2014). He calls for the educational policy makers to put into consideration various concerns from educational stakeholders so that they bring workable strategies that would serve as lessons for improvement of educational practices. Furthermore, Khan, Hasan & Clement (2012) reiterate that as ICT is a relatively new field in the Bangladesh education systems, more in-depth research should be conducted related to integration of ICT into classroom situations, to show that ICT can make their lessons more interesting, easier and efficient.

### **What impact do the factors have on the implementation of eLearning in secondary education as outlined in the literature?**

The inhibiting factors identified in this research have been categorised as major factors in the embracing of eLearning in secondary education by many researchers.

Teacher-level inhibitors are the key factors in the way of success of eLearning. These inhibiting factors need to be addressed so that they evolve as success factors for eLearning. Critical Success factors (CSFs) are "that thing that must be done if a company (organisation) is to be successful" (Freund, 1988). Volery and Lord (2000) as cited in Selim (2005) drew upon the results of a survey conducted

amongst 47 students enrolled in an eLearning based management course at an Australian university that there are three CSFs in eLearning: technology (ease of access and navigation, interface design and level of interaction); instructor (attitudes towards students, instructor technical competence and classroom interaction); and previous use of technology from student perspective. Teacher-level inhibiting factors have the potential to derail the implementation process of eLearning and impact on the engagement and achievement of learners.

Liaw, et al., (2006) assert that neither media nor technology but only positive attitudes towards that media or technology can improve the quality of learning or teaching. "Thus, understanding users attitudes towards learning technology, including instructors attitudes enables us to make learning more effective, efficient and appealing" (Liaw, et al., 2006).

### **What strategies are available in the literature to minimise the risks associated with the inhibiting factors and promote eLearning?**

In each study chosen for this meta-analysis, the author(s) has/have presented strategies to address the inhibiting factors and promote eLearning. The major factors are teacher-level, school-level and system-level inhibitors.

Buabeng-Andoh (2012) concluded that if teachers' attitudes are positive towards the use of educational technology then they can easily provide useful insight about the adoption and integration of ICT into the teaching and learning process. Additionally teachers' professional development is a key strategy to successful integration of computers into classroom teaching. Buabeng-Andoh(2012) further suggests that ICT-related training programs develop teachers' competencies in computer use(Bauer & Kenton, 2005; Franklin, 2007; Wozney et al, 2006), influencing teachers' attitudes towards computers (Keengwe&Onchwari, 2006) and assisting teachers' reorganise the task of technology and how new technology tools are significant in student learning(Plair, 2008). Shraim and Khlaif (2010) suggested that transformation to an eLearning approach requires a holistic approach to be considered.

With regard to suitability of software, Khan, Hasan & Clement (2012) suggested local software companies, in addition to government initiatives, should be encouraged to work together with teachers to produce Bangla software programs suitable for the teachers and students who do not know English. This may be a suitable strategy to explore in countries where English is a second or third language. In this regard, Mumtaz(2000), stated that software designers and teachers should work together and observe critically how a range of teachers teach in classrooms and how appropriate forms of software supporting different skills and ways of teaching and learning can be better developed for teachers to use in subject teaching. Nichols (2008) reiterates that the first goal for eLearning strategies should be to achieve the status of 'sustainable embedding' for eLearning within their institutions as sustainability, the state of proactive, scalable and self-perpetuating eLearning is evidence of transformation and provides a stable platform for further innovation.

The above summarises some of the strategies and best practices highlighted in the literature. However, it is once again re-emphasised that teachers are the closest to the eLearning tools in the classroom environment (physical or virtual) and learners at their disposal. They are the best people to accept, adapt and implement or reject, retract and repel the eLearning in secondary education.

### **Conclusion and Suggestions**

Teacher-level inhibitors are lack of ICT skills, lack of teacher confidence, lack of time, lack of pedagogical teacher training, lack of follow-up of new training programmes and lack of differentiated training programmes. Teacher-level inhibitors feature prominently across the studies analysed at

about 70%. According to Rossacci(2016), the issue of time and content specific technology implementation practices can be addressed by teachers independently investigating how other teachers plan and implement technology regardless of if there are necessary supports in place or not. Teacher self-efficacy appeared to be the most common inhibiting factor for eLearning embracing. According to Kim (2008), faculty who have higher levels of trust in supportiveness of institution and having a higher level of self-efficacy, are more likely to find the eLearning technology easy to use. Teachers need to be felt supported and empowered by schools to not only upskill them in eLearning but to boost their self-confidence through constant role-modelling and coaching to be felt appreciated. The school-level inhibitors have been identified as lack of well-designed ICT infrastructure, old or poorly maintained hardware, lack of suitable software, limited access to ICT, limited project-related experience and lack of ICT mainstreaming into schools strategy. Developing countries (Sipilä, 2014; Afshari, et al., 2009) need better resources to reduce the impact of the inhibitors identified here, as infrastructure and connectivity play a crucial role in embracing and implementing eLearning.

The system-level inhibitors have been identified as rigid structure of traditional education system, traditional assessment, restrictive curricula and restricted organisational structure. The authors of most of the studies analysed, reiterated the need for governments to align their policies and processes towards adoption, implementation and integration of eLearning in secondary education. It is very encouraging to note that factors at this level featured in the count at only 30%, reflecting that countries studied through the meta-analysis have mobilised resources and designed policies to address the impact. Now that education is hugely moving out of the physical classrooms into the paradigm of Education 3.0, device and connectivity need to be key areas of focus so that education can be provided anywhere anytime.

This research had limitations as the researcher selected limited number of studies with a cross-country focus to identify the key inhibiting factors. It must also be noted that due to parameters around time and scope, some relevant studies may have been omitted unwittingly as all databases were not searched.

Further research is recommended to find out the effect of teachers' computer self-efficacy on eLearning in secondary education as well as the impact it has on student retention, engagement and achievement. Yeşilyurt, Ulaş, and Akan (2016) found that teacher self-efficacy positively and significantly affects academic self-efficacy, computer self-efficacy, and attitude toward applying computer-supported education. It is recommended that this area of research be undertaken to provide strategies for greater uptake of eLearning in secondary schools particularly in New Zealand by teachers'.

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