

# An Electronic Supervision System Architecture in Education Environments

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## Abstract

In current era, information and communication technologies (ICT) have become cheaper and affordable for almost every organization. In the meantime, the huge involvement of technologies in the educational environment also creating complex issues for the teachers and administrative supervisors. Making all information and communication resources useable and available need a comprehensive training for the teachers and supervisors as well. As those professionals are the main supporter and guider for upcoming growing generation. From the training and communication perspective in this paper proposed a convenient way of communication by building an Electronic Supervision System Architecture (ESSA). The main purpose behind ESSA is to build an educational collaborative environment between supervisors and teachers which include several kinds of tasks to perform such as; skill development, experience sharing, group meeting & tasks, and discussing about teaching and administrative strategies. On the other side, it will provide the complete and open access to the supervisors to look after the working of their teachers/employees by using ESSA interface. It will also make less effort to communicate with each other which ultimately reduce the workload and will offer the assistance in their tasks by discussing in more efficient manner.

**Key words:** E-Supervision, Education System, E-Supervision Architecture

## 1. Introduction

Nowadays, ICT investment has become essential for almost every organization. The technology is for making more work with less efforts but not too complex. In this study the major purpose is to describe the background of this field, and propose the model for using the technology in an efficient manner in the educational environment. The way of education also has been scattered in the different direction such as; on campus education and online education. But the basic ideas behind of every education are learning which is based on active participation. As (Hong et al., 2009) explained about learning is a series of contribution in several educational practices and common learning actions. It described that the supervisor and teachers must use ICT components in the efficient manner to share more experience and improve their working activities. Therefore, in this research focusing on ESSA to provide the platform for better learning and less efforts.

Common components for any electronic systems are communication, online discussion, software and hardware sharing, effective and fast environment and networking. At all there is a need of proper use, accessibility and availability of all resources at anytime. (Stevenson et al., 1996) discussed about the importance of online conversation between users of any educational environment. It describes the discussion between student to teacher, and teacher to supervisor can be public and private depend on the issues which are talking about. Moreover, for creating proper learning environment the major thing is that everybody must know about the use of technical resources. As (Timothy et al., 2001) stated that “the instructors need to be comfortable and familiar with the technology and the tools. Interactivity is a strong motivator to learning”.

Despite of existence of modern technologies in computer world, web-based and internet-based applications such as; (MASACAD, 2007; BrainBank, 2006) presume more appropriate and appealing. Hence web based application are generally useful for almost every electronic system (e-system). Within any e-system, collection of appropriate tools

and applications are being developed to allow e-system to take place quite effectively in an environment and support the components and technologies. But the major reasons behind of the development of e-systems are to provide robust electronic services. Rapid and automatic services increase the user satisfaction and trust. (Martin et al., 2010) specially developed the model for increasing robustness in any automatic e-system. It described the necessity of self organization and self management in e-systems. Therefore in this paper we are presenting a model for e-supervision for the educational environment for building an efficient interface between the different type of users.

In this paper we discuss the design of e-supervision system that can be apply in education environment. The supervisor plays significant role for building professional and learning environment. Furthermore, (Jude et al., 2012) described the role of supervisor helps to serve as insightful practice using which the supervisee can ask and enhance their tasks. Therefore the supervisor must show his positive attitude and experience which can help the supervisee to increase his knowledge and proper work. Finally technology is there in between of supervisor and supervisee to keep in touch, perform their tasks and create learning environment in between of them. In this study E-supervision is there to help the supervisor and supervisee to connect with each other in more efficient manner. Moreover it will also destroy every barrier between them by providing easy to talk and discuss on their matters.

The e-supervision initiated as a major tool for increasing the distance learning and use of technologies in productive manner. Therefore there is more believe on better education in future, not only on-campus education, but will more and more be reliant on web-based and on-line education (Hsiung et al., 1999). In order to continue with developing electronic education and learning system, there is a need to provide comprehensive background about supervision process. The key components of the electronic educational learning environments can be described as; interactive materials, digital resources including libraries, course and student management. Whereas, in the proposed model of E-Supervision model will have more key components that include teacher and supervisor management, appropriate software, and feedback evaluation.

E-Supervision system, in its simplifying version, is a web-based system using multi-agents technologies with client/server approach to access and receive information from databases to help supervisors and supervisees in their activities. It will facilitate with many issues such as reduce visiting to schools, increase time to do administrative works, easy access all information about the teachers & their working. In addition, it will increase the communications with the teachers on any issue.

In the succeeding section the background and related work presented to make more understanding in this topic. Furthermore, in the methodology section presented the discussion on Education Supervising Model (ESM), generic Electronic Education System Model (EES), and finally we derived and proposed the model for ESSA generic Electronic Supervision System Architecture (ESSA) for building e-supervision educational environment.

## **2. Related Work / Background**

### *2.1 E-Supervision*

Supervision is defined as collection of the elements of direction, guidance, oversight and coordination of the activities of the trainees. According to (Jutta et al., 2006) “supervision can be defined as a process of advice, information and learning for social work. Learning means applied learning as well as cognitive learning. Normally the process takes place face to face”. On the other hand e-Supervision offers a way of a person's supervisor to supervisee that person at geographically distant sites. E-supervision can also consider as virtual supervision as supervisors are connected to the scattered organizations virtually. (Samuel, 2006) presented about the virtual supervision of engineering graduate students. Particularly in education it also provides an opportunity for enhanced collaboration between the supervisors, teachers, students and their schools. In addition, (Jutta et al., 2006) described about e-supervision that “it’s a process of learning, cognition and understanding. It gives new perspectives for acting as a professional. It is training on professional behavior and personality development, to find the role, to develop self consciousness and enforcement”.

E-supervision in online perspective requires several expertise must have in the users to use in the better way. (Gary, 1998) described about the requirements of effective online supervision in perspective of supervisor and supervisee as follows:

- Have skill in navigating online.

- Have basic typing and spelling skills.
- Be able to express self in the written word.
- Be able to express concepts/ideas without the use of non-verbal cues.
- Have excellent communication skills.

Using e-Supervision can provide several benefits. Benefits in the sense of using technical resources, coordination between the supervisors and supervisees, and better management. Following are some benefits organizations can achieve by using e-supervision model.

**Simplicity** - e-Supervision is a simple and straightforward process for those who are familiar with Internet interaction tools and who have good typing skills.

**Convenience** – e-supervision is done in the comfort of one’s home or office. No travel is involved.

**Ease of expression** - some issues are easier to express online as opposed to face-to-face.

**The potential to be both time-and cost-effective** - in addition of reduced costs in accessing and using a lot of supervision and reduced travel expenses, substantial time savings also be considered which may increase ease into other administrative tasks. Because the supervisor can schedule multiple teacher supervisory sessions per day. (Gary, 1998) also described on the same point that with the ability to supervise from his or her office, the supervisor can make efficient use of the time when he or she is not directly supervising.

**Quick and continuous access to information** - it is easier for supervisors, teachers, and other employees to check on multiples information at the click of a button (Olga, 2003).

**Better management** - e-Supervision facilities speed up supervision cycle and increase the efficiency of these processes, as large variety of information management (Olga, 2003).

**Individual time in communication** – (Jutta et al., 2006) “Everybody takes as much time as necessary to work out the questions, to write about problems and to give or to reflect feedback”.

## 2.2 Supervision Business Process

The supervision system process is the collaboration working among several educators in education situation that is to increase the affectivity, performance, and competency of educational process level. The supervision business process is described below. The supervision process consists of the several elements such as:

- a) Supervision with induction to the collaboration working and giving professional knowledge, skills, and attitudes to supervisors and teachers.
- b) Assessing, performance management, training, and development the competence and performance of the supervisors and teachers to undertake the specified task. Withal the supervising, review for teachers.
- c) Putting the plans, suggestions, observations and strategies for curriculums, teaching and supervision process.

## 2.3 The Hierarchical scheme of Administrative Supervision System (HASS)

Ministry of girl's education, Kingdom of Saudi Arabia, consists of two major departments under its supervision; Administrative Department and an Occupational/Functional department. The hierarchical scheme for the Administrative Supervision System shown in Figure1. Using the last three-level in next sub-section described the responsibilities for each of them which provide their occupational approach\*.

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\* Gathering information by doing interviews in the supervision centers in Jeddah and Makkah and by visit websites of Ministry of Education <http://www.moe.gov.sa/>

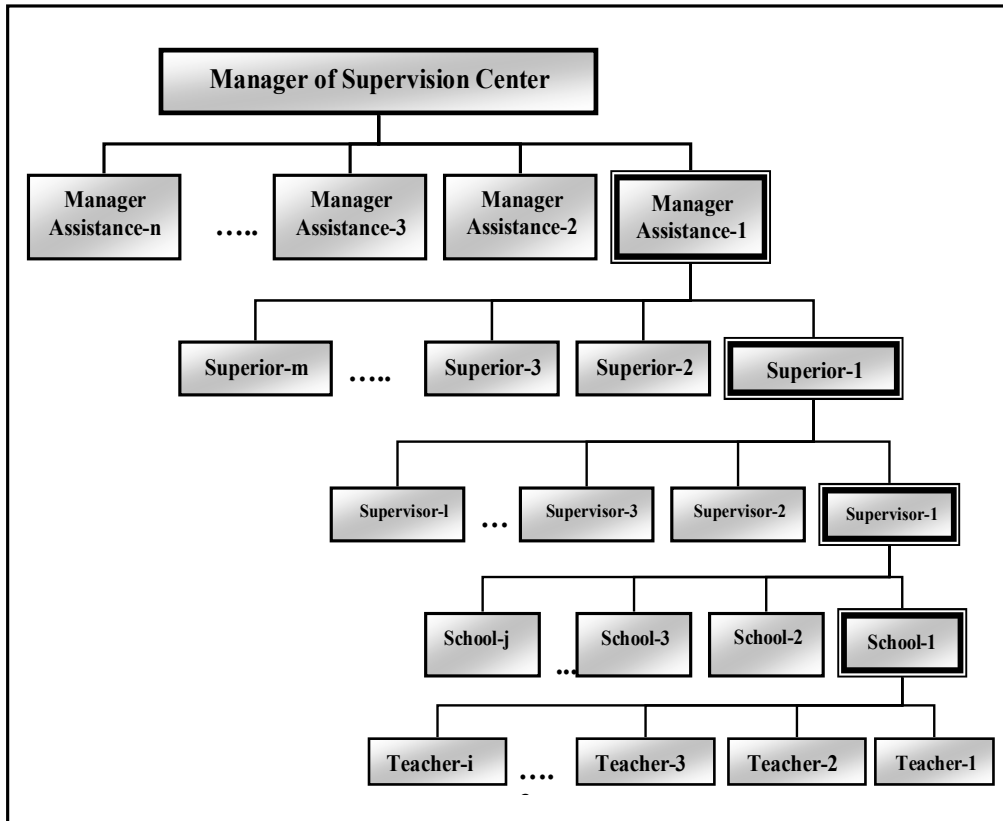


Figure 1. The Hierarchical Scheme of Administrative Supervision System (HASS)

### 2.3.1 Roles and Responsibilities:

Using the figure.1 (HASS), in this section providing the roles and responsibilities of head teacher, supervisors, and the teacher as follows:

#### The Head-teacher

- The head-teacher has the statutory duty of deploying and managing all non teaching staff and allocating particular duties to them in a manner consistent with their conditions of employment.
- Establishing the strategic operational framework, ensure its consistent application across the school and monitor outcomes and standards and allocate responsibilities for its operation across the school.
- Ensuring that teachers have sufficient time allocated to undertake the system of supervision of supervisors (LEA, 2005).
  - Attendance to teacher class and observing progress of teachers then writing report about them.
- Assessment with several supervisors the performance of teachers during semesters at their school each one in her/his department.
- Meeting with supervisors to address several issues include teacher's assessment, solving many problems, and knowing the regenerating of other issues.

#### The Supervisors

- Must be subject to the direction, supporting and supervision of a teacher.

- Having the skill expertise and experience to carry out the specified work.
- Visiting to a school and briefing of visiting then writing report of it
- Assisting teacher to progress in preparing the teaching materials, skills, performance, and etc.
- Determine the frequency, timing and duration of planning meetings and advice when reviews are appropriate and - when the teacher's presence in the classroom is necessary.
- Assessment with head-teacher the performance of teachers during semesters at their school each one in her/his department.
- Meeting with head-teacher to addressing several issues include teacher's assessment, solving many problems, and knowing the regenerating of other issues.
- Making different training and workshops for teachers to develop the teaching performance during semesters.

#### The Teachers

- Planning and Preparing Lessons and delivery lessons to students.
- Assessing the development, progress and attainment of students then reporting them.
- Using and producing several teaching technical tools then participation in different activities.
- Managing the class, supporting skills, appraising other teachers or extra curricula activities.
- Responsible for the progress of the students in the class over the course of the academic year (LEA, 2005).

### **3. Methodology**

#### *3.1 The Educational Supervising Model (ESM)*

In this paper we proposed an idea of ESM which is specially built for the educational institutes. The basic idea of ESM is taken from (Chen et al., 2005) where they presented the idea of E-Homebook system-A web based interactive education interface. They designed the interface for the interactive education systems where the essential components are teachers, students and parents (Chen et al., 2005). They presented the scenario of teacher-student-parents interconnected to each other by single online interface. Whereas in our methodology presented the ESM in which the essential elements are supervisor-teacher-head teacher.

According to the previous discussion about the hierarchy of administrative supervision system under the education environment three major components in the hierarchy are supervisors, head teachers and teachers [figure-1]. Using the same criteria we proposed an ESM under the educational environment includes teachers, supervisors and head-teachers are the essential components. All of the three parts connect tightly, cooperate with each other and keep the core-supervising performance growing. In figure 2, the ESM model presented with three major components and their relationship with each other. This model shows the relationship in the form of supervisor-teacher-head teacher and whole scenario is known as supervising environment.

#### *3.2 Relationship between E-Supervision and E-Learning*

Information and communication technology (ICT) innovations created a new dimension of learning which provide several tools and technologies. In particular, for educators, ICT is playing essential role for building their professional career and growth. Nowadays ICT is everywhere in education where particularly educators are getting benefits and by using this they can be learned, recorded, discussed and evaluated. Many institutions of education are trying to integrate new technologies of information and communications into current curricula or to develop new paradigms for learning.

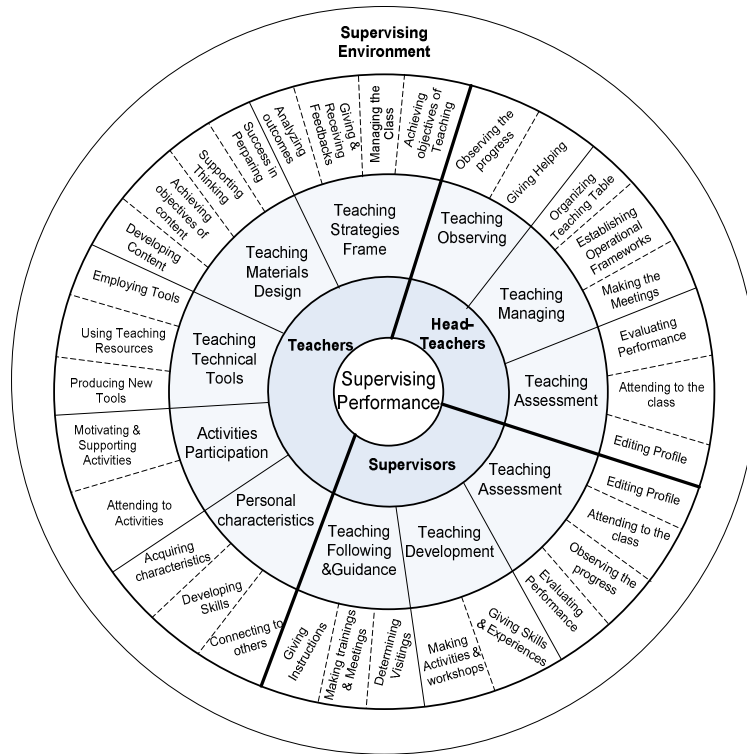


Figure 2. The Educational Supervising Model-Modified by Author (Chen et al., 2005)

The E-Learning is one of new stage of education which using e-mail, chat, website, video-conferencing, and others technologies to enhancing and facilitating learning for students and teachers. As students and teachers need necessary and important task call supervision under which they acquire professional knowledge, skills, and attitudes. The broad meaning of educational teaching include visiting, trial teaching, teaching practice, guidance personal teaching, and administrative learning. On the other hand, E-Supervision has got a new stage of educational teaching which using e-mail, chat, website, video-conferencing, and others technologies to enhancing educational teaching process.

The E-Learning and E-Supervision are using the same technological tools to establishing and performing so we consider they have similar mechanism process but downright they differ in the business processes. Accordingly, we built our E-Supervision model level on the top of E-Learning model level as it presents in the following figure 3.

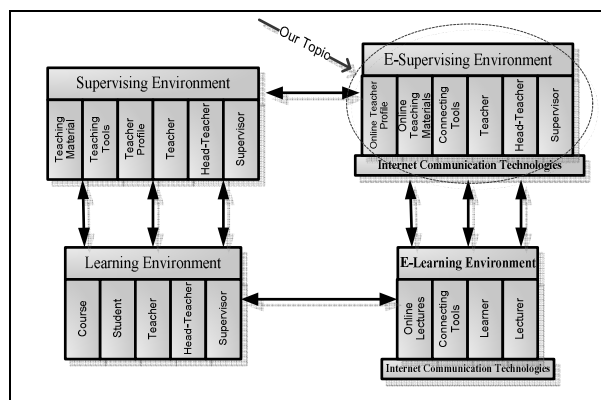


Figure 3. Components of E-Learning and E-Supervision Environment

### 3.3 The Proposed E-Supervision System Architecture (ESSA)

According to the previous discussion in the methodology sections, finally we are proposing E-Supervision System Architecture (ESSA) in Figure 4. Our model (figure 4) modified from the E-Homebook System (EHS) presented by (Chen et al., 2005). In EHS the basic idea is play around the three basic components; teacher, students, and parents. Whereas we presented the ESSA modified from EHS (Chen et al., 2005) for building an e-supervision environment where all the three major components; supervisor, teacher and head teacher connected together through an online interface. In figure 4, the ESSA model is divided into two technical areas: client and server. In the client area the system contains individual interfaces to all of the end users including teachers, supervisors and Head-teachers. In the server area the system is divided into three major components: web server, E-Supervision environment, portfolio supervision system, and MS SQL server 2000 query area. In the succeeding section discussed the detailed functionality of some major components of our model ESSA.

#### 3.3.1 The Detail Functionality of the ESSA Components:

The Supervision Agent is to set the standards monitor and assess the teacher's performance in the teaching either on-line or on-visiting supervising. It gives multi-dimension measures to help supervisors to effective figure out the performance. On-line supervising gives the teacher's behavior performance in instruction agent. On-visiting supervising figure out the performance grade on school.

The Guidance Agent is epitome of guidance manage system (GMS) which include guide and plan teachers to specific schools, guide teachers to select specific strategies to teaching, how to design standard teaching materials. Moreover it guide supervisors to the appropriate schools which need special attentions and it also searches and provides all services about schools, tools, courses, and forms.

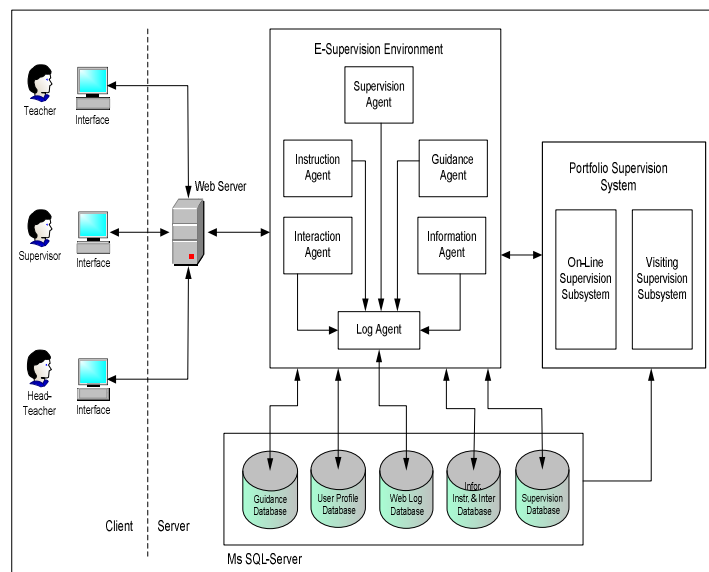


Figure 3. The E-Supervision System Architecture (ESSA) - Modified by Author (Chen et al., 2005)

The web server is the combination of hardware and software, which is use for send and receives all the request and send it to particular location. In the mean time it will also save all the information send and receive from any location to the any location. It has some set of software or scripting language to perform all of these tasks.

The Interaction Agent works as view exchange platform among teachers, supervisors, and head-teachers. It includes some interaction technologies such as e-mail, messenger, video-conferencing, and chat-room.

The Information Agent is process and gives the latest information through the whole users. It includes new

announcement and handles in school activities, training, tutorial, and workshop and so on. Also, it cooperates with supervision agent to provide the complete final assessment for users.

The Instruction Agent is like a supervision manage system (SMS) which includes the several instruction messages delegate to all the profiles available in the systems. The instructions about course management systems, examination and other type of services are the major tasks of instruction agent.

The Log Agent is automatically record the frequencies and time consuming into log database, also record, trace, and analyze all activities and access information on web sites. Therefore, the on-line behavior automatically recorded by log agent which is given the on-line supervising through portfolio.

The Portfolio Supervision System "Portfolio Instrument" can be defined as the constructive instrument of assessment to evaluate the teaching portfolio which systematically includes teaching plans, written and oral reports, student assignments, teaching dairies, student counseling records, and students' grades ( Kuo, 2000; Thomas et al., 2004). It belongs to qualitative assessment for evaluating teacher performance so that teachers collect and integrate personal portfolio of teaching activities in intern on a long-term basis.

#### 4. Discussion

The main purpose of this paper is to describe the importance and working of the e-supervision system in any educational environment. It aims to investigate the design and requirements for building electronic supervision by applying principles found in E-learning to increase interaction between teachers and supervisors. Therefore it can describe now the major goal of this paper is "To build an E-Supervision system that helps supervisors and teachers to communicate easily and efficiently in their work and to put the foundation towards a fully integrated management information system for the educational environment".

Therefore in this paper we modified the EHS (Chen et al., 2005) which is specially built for having connection between teacher, students and parent. On the other hand our model called ESSA, is particularly designed for making proper online supervision using several technical tools and accessories. By implementation of this model the supervisors should know all of the problems and difficulties confront of teachers then find the solutions or advices continually and accessibly. In addition, a supervisor in his/her daily routine work loses lot of time, effort, and cost to do supervision in their regions. And they spend their lot of time in doing visits in all of the connected branches. Because of it they remain with the less time to perform their intra-campus tasks such as administration work.

Finally, the ICT always use to solve problems in less time, effort, and cost and it helps to simplify several processes in effective manner such as e-supervision process. We consider the E-Supervision will reduce all of the work around half of the previous workload. Further more, if E-Supervision system will generally be applied in all regions of the country then it may suppose to connect and communicate with other institute also under the main education ministry. Then educational system supposes to be an integrated, most effective, and strongest than ever.

#### 5. Conclusion & Future Work

Traditional supervision subsystem (On-visiting Supervision), where supervisors observe, guide, develop, trace, and record all activities, progress, and performance of teacher through many visits to the school so that it gives a qualitative and quantitative data accordingly. In this paper we presented the On-line Supervision (e-supervision), which gives only quantitative assessment, is recording automatically all teachers' activities by log agent that account towards assessing teaching abilities. The information inside web logs is collected from recording, tracking, and analyzing all of activities in ESSA architecture. This will provide a comprehensive guidance and help to the supervisor, teachers and head teachers. Implementation of this architecture will improve in several other manners.

In future to achieve the goal and objectives of the proposed model we will apply the questionnaire and survey strategy from the educational institution and universities working in the Kingdom of Saudi Arabia to improve our model. Feedback from the professional teachers and staff working under the ministry of education, and survey will help us to improve the architecture by using the real data. Ultimately this e-supervision architecture (ESSA) can also be helpful for the ministry to supervise all the educational institutes and organizations by using online interface.



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