A Framework for Conceptualizing the Current Role and Future Trends of Information Systems in Medical Training

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ABSTRACT

Despite the growing investment in information systems for training in healthcare establishments (HCEs), there is a lack of holistic understanding of the role of information systems in different aspects of medical training. In this paper, the authors attempt to arrive at a framework that summarizes different kinds of training required in HCEs and the role of information systems in each of these areas. The authors contribute to research by systematically summarizing the current role of information systems in medical training and discussing future trends. The authors contribute to practice by providing a technique to assess and plan training activities in HCEs.

Keywords: Health Information Systems, Health Training, Healthcare Establishments, Information Technology, Medical Training

INTRODUCTION

Knowledge is not static. In the field of medicine, for example, knowledge evolves continually. Consequently, information needs to be constantly updated, even after these professionals graduate from the medical schools, in order to make better decisions. For example, operation procedures have changed since the first successful cardiac surgery performed by Dr. Ludwig Rehn of Frankfurt, Germany in 1896. Developments led to operations being performed under hypothermia which was initiated by Dr. Wilfred G. Bigelow in the 1950s, which involved reducing a patient’s body temperature prior to an operation in order to reduce the amount of oxygen needed (Neaf, 2004). And, more recently, robot-assisted heart surgery, where a machine controlled by a surgeon is used to perform surgery in order to minimize the size of the incision made in the patient in order to maximize precision. Therefore, the learning of personnel involved in healthcare establishments does not end with their formal training, but continues throughout their professional life. Since healthcare personnel have busy work schedules, information technologies can assist
in providing flexible, self-service and automatically documented training through simulated e-learning modules. It is therefore no surprise that technological developments have penetrated into the training programs within healthcare establishments (HCEs) (Ward et al., 2001; Ruiz et al., 2006). Significant portions of research budgets in public and private organizations are dedicated to identifying technological solutions that can improve efficiency and effectiveness of healthcare training. For example, the cost of post-hire training of a newly hired nurse may average $15,825 (Waldman et al., 2004); and, by one estimate, the annual cost of training residents in the operating room is $53 million (Bridges & Diamond, 1998).

Although it is hard to draw empirical conclusions on the economic value of professional development in healthcare (Brown et al., 2001), the Department of Health identifies training as a way to maintain standards of care, improve the health of the nation, and recruit, motivate, and retain high quality staff (Department of Health, 1998). Research suggests that trained personnel have lower staff turnover, fewer sick and annual leaves taken, fewer patients’ rights complaints filed, and fewer assaults on staff reported (Smoot & Gonzales, 1995). Moreover, deaths caused due to medical errors are estimated to result in losses of approximately $17 billion annually, some of which may be attributed to failure of implementation and use of systems (Kohn et al., 2000). It has been suggested that 70% of adverse medical events would have been preventable through a systematic approach to training personnel on medical equipment and procedures (Leape et al., 1993; Gawande et al., 2003). Information technology has been suggested as playing a key part with respect to safety in HCEs (Bates & Gawande, 2003; Helms et al., 2008). Hence, one can argue that due to the high cost of error, both financially and through the human quotient, there is room for improvement and the field of information systems can, to some degree, remedy some of these issues.

While there has been significant research on medical training in the fields of medical informatics and computer science, most of them look at the efficiency and effectiveness of one type of technology, such as 3D virtual worlds (Andrade et al., 2010; Creutzfeldt et al., 2010; Knight et al., 2010) or patient simulators (Small et al., 1999; Karnath et al., 2002). The existing literature in Information Systems is fragmented, at best (Chatterjee et al., 2009; Scandurra et al., 2008). This represents a gap in research that provides a holistic view of training in HCEs from a systems perspective. This gap in research may also have repercussions visible in the high turnover rate in the health care industry (Waldman et al., 2004), and the assessment of the effectiveness and efficiency of training in HCEs.

The first step in attempting to summarize the role of information systems in medical training in HCEs is to identify various roles in which systems are now and can be used. In this paper we propose a three-dimensional framework that provides a structure for systematically studying training in the HCE context. While the proposed framework may be used to study training of any kind, the context of this study is medical training. Within this framework, we provide examples of prior methods of training, the extant role of information systems in training methods and techniques, and future directions in which information systems can play a role in the medical industry. We seek to contribute to theory and practice in on-the-job medical training such that our proposed framework serves as a template for conceptualizing and implementing systems for medical training.

LITERATURE REVIEW

Training is tied to learning. How learning occurs defines the methods and techniques that can be used for training. However, there exist multiple paradigms, or philosophical views, of learning (Leidner & Jarvenpaa, 1999). Views of learning, and corresponding learning theories, can be differentiated based on (a) the degree of control of the learner, (i.e., learning by an individual or in a group); (b) type of knowledge...
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