International Journal of Innovative Research in Medical Sciences (IJIRMS)
ISSN (Online): 2455-8737, Vol. 01, Issue 06, Page No. 220 to 231
Available online at – www.ijirms.in

How Using Technology Enhanced Learning Could Help Modernise Traditional Large Group Teaching or Lecturing

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Abstract

The efficiency of lecturing or large group teaching has been called into question for many years. An abundance of literature details the components of effective teaching which are not provided in the traditional lecture setting, with many alternative methods of teaching recommended. However, with continued constraints on resources large group teaching is here to stay and student's expect and are familiar with this method.

Technology Enhanced Learning may be the way forward, to prevent educators from "throwing out the baby with the bath water". TEL could help Educator's especially in the area of life sciences which is often taught by lectures to engage and involve students in their learning, provide feedback and incorporate the "quality" of small group teaching, case studies and Enquiry Based Learning into the large group setting thus promoting effective and deep learning.

Keyword: - ???

Life Sciences and Nursing students

It has been recognised that as nursing practice becomes more autonomous there is an increasing need to apply bioscience knowledge in practice (Eraut et al, 1995). Despite the emphasis on social and behavioural sciences in the 1980's it is acknowledged nowadays that life science knowledge is essential for nursing competence and should form a substantial part of the knowledge base for nurses (Clancy et al, 2000). However, nursing students often find the concepts difficult to understand and question their relevance to practice (Davies et al, 2000).

The difficulty of teaching and learning life science in nursing is multifactorial (Efstathiou, 2012). Akinsanya and Hayward (1980) and Al-Modhefer and Roe (2009) suggest that the depth taught to nursing students is inappropriate; Courtenay (1991) also explains that teaching of life sciences is often with large lecture groups where students are at different academic paces. Larcombe and Dick (2003) and Montgomery et al, (2009) note that the widening of entry criteria for nursing courses has also contributed to the difficulties as students are not always well grounded in science before entering higher education and there are also increasing numbers of mature students who have no scientific background at all. In addition life science is often taught in large classes to first year nursing students creating a further challenge because of the complex concepts that need to be explored and the students' lack of confidence in learning (Al-Modhefer and Roe 2009).

There is evidence to suggest that students sometimes have difficulty in comprehending much of the lecture material and tend to focus on the details rather than understanding the concepts (Cain et al, 2009). However lecturing is the most common method of teaching groups as it is perceived to be efficient and economical particularly with large classes of students (Race, 2001).

The challenge for the lecturer was to deliver curriculums in such a way as to promote deep learning and understanding, and engage students enabling them

to link theory to practice to meet the NMC progression points (NMC, 2010). Recent advances in educational technology can go some way to assist the lecturer in this task.

Effective Teaching

Fry, Ketteridge et al (2000) provide evidence of key components of teaching that promote effective learning. These include the view that lecturers may have to modify their teaching styles to match the learning approach of many students: that students have to engage with what they are learning by being motivated and interested, and that students are more motivated when offered a choice of what to learn. Blumberg (2004) states that lecturers need to know where students are starting from so that they can set the correct level and fill in gaps, that prior knowledge needs to be activated, that students must have some responsibility for their learning, feedback (especially formative) is important, and that didactic teaching should be reduced in favour of learning environments that suit different learning styles. Blumberg (2008) encourages lecturers to establish what learners already know so that what is delivered better matches their learning needs.

Brookfield (2006), Coffman, (2002), Weimer (2002) and Blumberg (2008) all identified several factors that make adult education most productive. These can be summarised as: establishing a climate conducive to learning, ensuring relevant learning activities, engaging learners in the design of learning, encouraging self-direction in learners, the lecturer functions as a facilitator rather than as a didactic instructor, accounting for individual learning styles.

Clynes and Raftery (2008) describe how adults require active involvement in their learning, needing feedback to adjust their efforts. Moore and Kuol (2005) argue that lecturers must utilise both formative and summative assessment, with formative assessment being confidential, focused on the needs of the learner, given privately, promptly and individually to ensure the greatest impact. Moore and Kuol (2005) argue that formative assessment is only truly formative if the feedback given is used to improve performance, with the learner in the central role. According to Newble and Cannon (2001), the aim of formative assessment is to get the students to acknowledge their strengths and weaknesses. If students are to improve they must have a concept of their learning goal, the ability to compare actual with desired performance, and the ability to act in such a way as to close the gap (Brookhart, 2001).. There are challenges therefore to provide students with rapid, private, individual feedback especially when large numbers are involved and time and other resource constraints (Clynes and Raftery, 2008).

Literature would suggest then that good lecturers who adopt a learner-centred approach create an environment in which students can learn effectively and efficiently to promote deep effective learning (Spencer and Jordan, 1999; Bain, 2004). With student centred learning, students have responsibility and an active role; they are required to make choices about what and how they learn , the lecturer is a guide, mentor and facilitator of learning. Student centred learning provides intrinsic motivation, greater flexibility, more formative feedback and promotes an emphasis on lifelong learning. This is distinct from the traditional lecture method where the students are passive recipients. Decisions are made by the lecturer as to what will be taught, with the emphasis on the student receiving information. This approach is relatively inflexible which does not promote deep learning (Trigwell, Prosser and Waterhouse 1999; Costa et al 2007).

Lecturing

Despite the fact that lectures or large group teaching have long been criticized for their passive nature (Bassey, 1968; Cowan, 1981 and Bligh, 1998) they are still the most widely used and accepted method of education in tertiary education (Race, 2011). It is most likely that lectures will remain as the most common, economical and efficient method of teaching to large numbers of students (Light, 1991).

Lectures are used in conveying information to large audiences with little interaction from students, while allowing the instructor to have maximum control of the learning experience, but this fails to provide the instructor with feedback about the extent of student learning (Di Leonardi, 2007). The efficiency of lectures has been called into question with Bligh (1998) suggesting that in the long term large group

teaching is not effective in terms of student learning; that 40% of lecture time is wasted, and often only 20% of the information presented can be recalled later. In classical didactic lectures, students are frequently seen as passive recipients of information, without any engagement in the learning process, and therefore their attention wanes quickly after 15–25 minutes (Conoley et al 2006). Conoley recommends introducing a learning activity or change in teaching technique, even just a small break every 20 minutes to significantly increase the learner's attention.

Newble and Cannon (2001) state that evidence continues to mount that although the lecture is as effective as other methods to transmit information (but not more effective), it is not as effective as other methods to stimulate thinking or to change attitudes, which are the objectives that university lecturers wish to aspire to (Bain 2004).

Traditional didactic lectures also have the potential to merely facilitate passive learning, where students are only recipients of information presented by the lecturer, without any active engagement in the learning process (Gulpinar and Yegen, 2005). Learners demonstrate limited attention spans and low retention rates of factual information in lectures where they are passive in the learning process (Fischer et al, 2004; Gulpinar and Yegen, 2005).

Therefore, it has been suggested that lectures are not suited for teaching higher orders of thinking or instructing skills and for influencing students' attitudes (Bonwell, 1996; Keyser, 2000; Kumar, 2003). For lecturers, critical thinking has become a benchmark of how students perform and are evaluated and is the foundation judging competence in clinical practice (DiVito-Thomas, 2005). Nursing research evaluating the development of critical thinking in novice nursing practice and nursing students is limited. The continual struggle by educators to improve critical thinking demonstrates the need for innovative teaching interventions that aid in the development of critical thinking as nursing students enter into practice (Forneris and Peden-McAlpine, 2007). Many educators feel lecturing does not provide for critical thinking, application of knowledge, or active problem solving, but given constraints of time, class size, efficiency, effectiveness, and comfort, the traditional lecture is the only logical choice (Delpier, 2006; Mikol, 2005).

Other methods of teaching

Lecturers are being encouraged to use new teaching and learning paradigms to meet expanded needs and learning styles of students as well as requirements of technological advances (Shovein et al, 2005; Amerson, 2006; Hoffman, 2008). Although many educators cite traditional lecture as the most effective teaching methodology in terms of preparation time, class size, efficiency, and personal comfort (Delpier, 2006; Mikol, 2005), they continue to search for more effective ways of teaching (Martens and Stangvik-Urban, 2002).

There is growing international evidence to support the use of Enquiry Based Learning as a learning approach as it offers the potential to bridge theory and practice, through student identification and evaluation of practice related problems (Price, 2003). EBL promotes problem-solving skills in students and is advantageous in contemporary nursing and midwifery practice, which requires individual practitioners to be proactive, enlightened, emancipated and to have the skills to transform knowledge into practice; attributes which are consistent with the skills and qualities of the future graduate nurse (NMC, 2010).

Methodologies, such as EBL, support an active student role in learning and assist students to move from a basic understanding of information at the knowledge and comprehension levels to a higher level of understanding. Teaching through case study is regarded as a superior teaching methodology when compared with lectures in promoting a learner's critical thinking skills (Kim et al 2006). Other research has found no strong correlation about the effectiveness of lecture compared with other methods. Some studies have found no significant difference in objective measures of learning by EBL, versus learning by lecture (Beers, 2005).

Lectures giving one-way information will suit some students' learning style, but other students learn better if "cognitive conflict" methods such as case studies are used, while others who prefer discussion or group

work learn better using that approach (Quinn, 2007). Literature supports interactive teaching methodologies as promoting increased understanding and application of knowledge as well as retention of factual knowledge (Costa, Rensburg, and Rushton, 2007) and provides an opportunity for students to apply knowledge, evaluate learning needs, hone problem-solving skills, and critically evaluate resources (Lonser et al, 2006).

Despite the implication that case studies have not been well received by students or faculty, the literature indicates that case studies are an effective teaching strategy that involves students, allows for an alternative learning environment, and provides an opportunity for students to apply knowledge, evaluate learning needs, hone problem-solving skills, and critically evaluate resources (Lonser et al 2006). Case study as an interactive teaching methodology requires students to become active learners, think critically, and extend classroom knowledge into the clinical realm (Draude, 1996). Henning et al, (2006) present a descriptive analysis of how educators can change their courses from lecture based to a case study approach. They provide a map showing educators how, when, and to what degree they can involve students in positive learning outcomes. Additional benefits of case studies include improved group interaction through open dialogue, added rapport within the classroom to enrich the learning environment, and a more memorable experience (Herrman, 2002 and Henry, 2006). Ciesielka (2003) found that the use of case studies in teaching elicited a very positive response from students who found the exercises to be stimulating and motivational. Issenberg (1999); Freidrich (2002) and Gordon et al, (2004), demonstrated how case studies can be used to simulate patient care and that other forms of interactive based learning such as discussion can evoke deep learning.

Marmots (2008) demonstrated quite categorically the benefits of breaking away from lectures to other methods (e.g. case discussion and small group discussions) which showed positive outcomes in terms of learning and student evaluation. There is an abundance of literature from the 1980's to present day quite categorically demonstrating the "small group" teaching such as tutorials are superior to large group teaching/ lectures in a range of outcomes such as student enjoyment (Costa, 2007) retention of information (Fisher et al, 2004) and active participation by students (Oakley et al 2004). Race (2010) states that in an ideal world all teaching would or should be in small groups, and there is growing evidence that EBL provides many benefits for student learning.

However, there can also be disadvantages to small group teaching, especially if they are a repeat of the lecture, are didactic, non-participative and if there is a lack of good group dynamics (Wood, 2003). Good small group teaching should involve discussion, interaction, allow students to ask questions and clarify their knowledge and most importantly should build on concepts introduced previously that students have had time to dwell on and research themselves in order to promote deep learning (Davis and Harden 1999; Norman and Schmidt, 2000; Albanese 2000).

The literature therefore gives some clear indications of how to be an effective teacher, which is far removed from conventional didactic lecturing. However, there may still be a necessity for "good" lectures.

The case for "good" Lectures

Lectures are a time efficient method of presenting information to large groups of students (Uhari et al, 2003). They can provide an introduction to a subject, build on existing knowledge, provide different points of view, include up-to date research and where relevant add personal experience (Brown and Manogue, 2001). A carefully structured lecture can also be an effective way to combine and present information from multiple sources on complex topics (Richardson, 2008). Lectures are an efficient use of increasingly limited resources in response to greatly increased student numbers and will remain an integral part of tertiary education for some time to come. As a teaching strategy, the traditional lecture is one to which most students have adapted throughout the educational process to provide them with the necessary information for their classes (Bain, 2013) Further, experience indicates that students have an increased comfort level with this traditional teaching methodology partly because they can remain in a passive role. Students report a preference for receiving didactic instruction that provides the information they

believe they need to know. Many students indicate a decreased comfort level with non-traditional teaching methods because of a need to be prepared, become an active participant, and change their role from passive to active learner (Delpier, 2006).

The literature also supports the use of lecture as an effective teaching methodology for clarification of difficult concepts, organization of thinking, and promotion of problem solving (Naismith and Steinert, 2001). Bergsten (2007) found from the students' open comments in the study that one main reason for the "success" of a lecture is given to the lecturer as a person, being able to engage and inspire the students.

A study by Hubbard (1997) found that lectures can provide "worked examples" in lectures for students to reflect on and discuss in tutorials, and that this was more important than details being conveyed by the lecturer which could easily be read by the students themselves. Also, lectures can make a strong visual and auditory imprint, assaulting the senses, and increasing retention.

If the lecturer can successfully reframe the delivery from being strictly one-way communication and engage learners, then it can be a successful tool in the learning process (Di Leonardi, 2007). Similarly, Bain (2004) supports a "modified" lecture as appropriate for clarification and simplification of difficult material and inspirational for students but warns that the best educators do not rely solely on lecture for instruction. A quasi-experimental study by Baumberger-Henry (2005) demonstrated no significant difference in learning between cooperative learning, case study, and lecture. However, the study showed that students in the case study and cooperative learning groups did report better self-perception of their problem-solving and decision-making skills. Active learning, in contrast, is considered a powerful way to enhance learning, as improved learning occurs when strategies are used to encourage active student participation (Newble and Cannon 2001).

Since learning is actually a dynamic process and the students who are actively involved in the learning activity will learn more than students who are passive recipients of knowledge, a well-organized lecture can provoke thought and enhance clinical thinking if it aims at arousing students' curiosity, motivating them to learn, and guiding them into creative thinking (Brown and Mangoe, 2001). Thus, instead of passive listening, a two-ways interaction accomplished between the presenter and the participants by interactive lecturing in 'right hands' is said to increase the effectiveness of lecturing in delivering a mass of information (Steinery and Snell, 1999; Stunkel, 1999).

Student's Views on Lectures and teaching strategies

It is interesting to note that the literature also seems to suggest that while lectures are being poorly rated by most students, students of nursing and life science seem to like them especially in first year (Al-Modhefer and Roe, 2009). As a teaching strategy, the traditional lecture is one to which most students have adapted throughout the educational process to provide them with the necessary information for their classes (Race, 2006). Students have an increased comfort level with this traditional teaching methodology, partly because they can remain in a passive role as they are not expected to answer questions etc. Students report a preference for receiving didactic instruction that provides the information they believe they need to know. Many students indicate a decreased comfort level with non-traditional teaching methods such as use of case studies and EBL because of a need to be prepared, become an active participant, and change their role from passive to active learner (Delpier, 2006).

Al-Modhefer and Roe's (2010) study suggest that when nursing students come into university for the first time, they appear to favour lectures with a preference for clear and organised instruction. Although these results are from a single higher institution cannot be generalized, further evidence support's lectures as the favourable means for teaching and learning life sciences (Davies et al 2008) with 72% of students agreeing that lectures contributed to their learning and understanding of life science. A recent study found that students felt "overwhelmed" at the prospect of having to embark on on-line or self-directed learning, and wanted "old school" lectures to base learning on (Charbonneau 2012). Leamnson (1999) noted that first year students in particular want lectures and tutor

contact to guide their learning and fear being "left alone". The same author writes of how all students and again in particular first year students report the importance of experience as part of their learning. "They need to experience concepts as their lone learning is not developed enough for connections to be made simply from reading" (Leamnson, 1999).

Technology Enhanced Learning

Changing lifestyles and more demanding schedules are forcing more students to reap the benefits of academic instruction remotely (Gillet et al, 1997; Glen 2006). The attendant demand for distance education is growing exponentially and has been for some time (Vetter and Severance 1997; Lowry and Johnson 1999 and Twomey, 2004). The availability of increasingly powerful communication and information technologies have opened the way for enhancing traditional teaching and learning in both distance and conventional education using synchronous and asynchronous tools (Latchman et al, 1999; Salmon, 2002).

Technology Enhanced Learning (TEL) is the term used to describe all those circumstances where technology plays a significant role in making learning more effective, efficient or enjoyable (Goodyear and Retalis, 2010). Many different types of technology can be used to support and enhance learning. "Technology" in its broadest sense includes hardware*;* such as interactive whiteboards, smart tables, handheld technologies, tangible objects, and software for example computer-supported collaborative learning systems, learning management systems, simulation modelling tools, online repositories of learning content and scientific data, educational games, web 2.0 social applications, 3D virtual reality, etc. Technology continues to change dramatically, with the majority of university students now owning a mobile phone or other hand held device which gives them access to the internet (Castells 2006).

Using technology as a teaching tool in lectures

Many teachers believe that life sciences cannot be taught using interactive techniques, while some believe that undergraduate students, due to their more limited basic knowledge, cannot participate in an interactive lecture (Haigh, 2004). However, there is also current opinion that conventional lectures should be replaced by 'structured interactive sessions' (Steinery and Snell, 1999; Race, 2006). Moreover, interactive techniques allow teachers to receive feedback on students' needs, on how information has been assimilated, and on future learning directions, while students receive feedback on their own knowledge or performance (Laurillard, 2002).

Therefore interactive lecturing is a way to benefit from the strengths of small group learning in large group format (Steinery and Snell, 1999; Kumar, 2003; Bain, 2004). 'Active learning' involves students in doing things and in thinking about what they are doing (Keyser, 2000). In order to get the students involved, many learning/ teaching models and techniques may be used, including experiential learning, cooperative learning, problem-solving exercises, writing tasks, speaking activities, class discussions, case-study methods, simulations, role-playing, peer teaching, fieldwork, independent study, library assignments, computer-aided instruction and homework (Keyser, 2000; Legan, 2001; McLaughlin and Mandin, 2001; Micheal, 2001; Haigh 2004 and Johnson et al 2010).

Among many teaching models that have been suggested to make the lectures more interactive, is the expository model. The expository model encourages meaningful learning. The teachers present material in a carefully organized, sequenced and finished form. In this model, one of the major components in constructing the lecture is to provide the students a framework or a 'big picture' of the lecture to enable the students to receive the most usable material in the most efficient way, organizing knowledge into hierarchical and integrated patterns, from the general to the specific and completing the lecture by the reinforcement of the cognitive schema (Chung and Huang, 1998; Ivie, 1998; Zarotiadou and Tsaparlis, 2000). Aspects of technology enhanced learning are an example of an expository model.

Black and Watties –Daniels (2006) reviewed the literature relating to technology enhanced learning in teaching in general and found a large amount of literature supporting technology as an enhancement to the learning environment, but no literature specific to

nurse education. Simpson (2003) discussed how technology was transforming nurse education e.g. simulation patients, yet none were being used in the traditional lecture setting. Kennerly (2001) suggests using interaction in lecturing to facilitate student interaction. Walsh and Seldomridge (2006) encourages nurse tutors to move away from the model of delivering all the details to re-structuring content to allow students to discuss and be openly involved in the classroom to promote critical thinking e.g. problem solving tasks and case studies.

The Personal Response System (PRS) is an example of how students can be more actively involved in learning. The PRS provides each student with a credit card sized handset with several buttons on it, which transmits radio signals to a receiver in the lecturer's computer according to which button is pressed. The receiver tabulates the responses and can present them on screen in various formats (e.g. as a pie chart, graph or bar chart) in less than a second from the last response, or when the lecturer clicks the mouse for all to see.

Literature relating to the use of the PRS in nurse education, compared test results of students who used the system with those who had not, and found no significant difference Abdallah (2008). Jenson et al (2008) also report on the benefits of the PRS system in their teaching such as evoking discussion, time saving and developing critical thinking. The incorporation the PRS to a lecture can help facilitate the transition from passive to active learning (Pradhan et al. 2005; Holmes et al. 2006; Caldwell 2007; Duggan et al. 2007; Alexander et al. 2009; Hoyt et al. 2010). In addition, immediate feedback on knowledge and understanding of the material is received in an anonymous, non-threatening manner (Beatty 2004; Menon et al. 2004; Caldwell 2007; Nayak and Erinjeri 2008), discussion is generated (Copeland et al. 1998; Caldwell 2007), and students' attention span is increased (Copeland et al. 1998; Nguyen et al. 2006). Other TEL packages include Labtutor, which lets students see experiments "live" in lectures, thus incorporating the aforementioned aspects of "good teaching" which students rated highly in terms of conceptualising concepts, engagement with material and enhancement of learning overall in the large group setting. (McMullan, 2015).

Conclusion

The literature clearly indicates the components of good teaching and how to ensure deep learning in students. That didactic teaching should not be so heavily used as modern students can access information quickly and easily and trying to deliver too much content in large group lectures is of little benefit. Although small group teaching has many good qualities it can also have drawbacks unless these session are well facilitated and are not nearly a repeat of the lecture. Furthermore, with constraints on time and resources lectures will remain a part of third level education and the literature seems to suggest that one mustn't throw out the baby with the bath water. Well-structured lectures that engage students and involve active learning are not only as good as other methods of teaching they can inspire students and it would seen are actually wanted by students especially in the first year when they can feel overwhelmed at the prospect of self-learning (Beder 1997). It should also be noted that not all students are computer literate; therefore if lecturers are to facilitate learning including distance learning it must be directed. It would seem then that a "good " lecture should introduce the main themes and concepts, involve the students and then direct them on how to continue to learn in a structured and inspired way at their own pace. There must also be adequate feedback built into the module so students do not feel "adrift" when continuing to learn alone.

The literature also reminds us that modern students are "technology friendly". Bain (2013) suggests that students can read and access information faster than lectures can talk, and often their information is more up to date than year after year repeated lectures. Race (2012) stipulates that students have at their fingertips all the knowledge that the tutor has, however Kantanis (2002) reminds us that often students access information via poor "google" searches and do not process the skills of critically evaluating resources. A survey of some 3000 students revealed that students are demanding more technological resources such as videos, gaming, quizzes and learning management systems so they can control their own learning and

complete work at their own pace (Undergraduate Technology Survey 2012). It must be remembered however, that not all students are "tech-savvy" especially mature students (Kevern and Webb, 2004) and that nursing in particular has a larger number of mature students compared to other disciples. So it is imperative that any use of technology and/ or learning management systems must be used with guidance and caution.

Word Count 4458

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