

CHAPTER VI

MAJOR FINDINGS, DISCUSSION & SUGGESTIONS

The data interpretation provided abundant background for development of module which resulted in characteristics and framework for the steps in developing the Self Learning Technology Based Module (SLTBM). The feedback provided by Students and teachers for the final product of courseware was found to be excellent. In this Chapter the major findings of the study, discussion, conclusion and future directions are presented.

6.1. Major Findings

- The preferred learning styles should be made available for dental students as the data clearly suggests about the variation in choices exists at same and different level of course. 31.3% had Tri-modal and 29.3% had bimodal learning style tri-modal and bi-modal learning styles get more emphasis whereas we cannot remove uni-modal type of learning pattern as well.
- Mean values of deep approach was found comparatively low when compared to strategic and surface approach of learning. Independent study requires a deep learning approach, where students need to grasp concepts and be able to apply them to new circumstances. Hence the coursework content depth and strategies along with assessment level should increase as the level of learning changes so that learner is kept intuitive and motivated throughout the course work.
- Response of students in association with intrinsic and extrinsic motivation and the grade of students showed high significance and it was found that undergraduate students are more intrinsically motivated which decreases from

interns to graduate level. Self-learning module should act as an extrinsic motivation which may help in higher level of learning. The *task values* response was also higher for undergraduate students and most of them agreed; suggesting that if any task is given to them they can accomplish as a self-learner.

- The inputs from the type of strategies preferred are valuable in developing self-learning technology based module as it suggests that at different levels what type of strategy becomes important and hence the context of the subject, assignments or exercise sheet given at different level should vary.
- The important notes or the content material should be made available in one place as almost 82% agreed /*strongly agreed* that they prefer the lectures where teachers tell them clearly what exactly is important in the notes.
- Students prefer courses where they are encouraged to read a lot hence good amount of suggested reading material shall be the part of course.
- 55% of the students agreed that the video incorporation and audio versions of tutorial will be helpful and hence it can be part of the learning module.
- The preference for virtual course unit or self-directed technology enhanced units which are repeatable, response was found to be interesting as 64.7% stated they agree for such courseware.
- More than 70% of the teachers felt need of further training and practice for using ICT applications. The results of the study provides insight for current status and the steps required for enhancing and supporting dental educators for developing Technology based instructional modules.
- ICT based instructional modules if made available will be of great help till the teachers are trained and a structured scientific process of developing

technology based learning module will help them to develop lessons for their subject.

- Most of the teachers stated that they understand the need for student centered teaching as every student learns at different pace. Hence one method for one student as in didactic lecture may not cater to all type of students in given period of time.
- Teachers stated they are unable to provide reading material in didactics. Whereas the technology based module can incorporate all the important content and reading material that too graded for different level of approaches for learning namely beginner, intermediate and advanced level.
- Most of the teachers agreed to repeated individual practice of exercises and assessment, which may encourage students to learn better.
- Learning outcomes should be mentioned as it helps to focus on learning rather than teaching and provides path for learner to what to demonstrate at the end of a module or course.
- Objectives, strategies and Module Design and Development Process provide an overview of the process, highlight the essential variables in module design and explain the relationships between them; and it is important to stress that this is not a linear process.

6.2 Discussion

This study explored preferences and opinions, regarding adoption of technology based courses among dental students and faculty members. In accordance to the preferences and opinions as found in the study the Development of the module was carried out. Such type of Self Learning Technology based modules should be made available in Dental Education. Based on this research work philosophy can be

generated for Designing a TBLM in Dental Curriculum. In present research work module was developed for a unit lesson as an example to affirm the learners and educators that such type of Module (TBLM) is conceivable as well as showed impregnable outcome.

6.2.1 Student Demography

For the educator, it is important to be aware of various learning styles, approaches and strategies of students at various level of BDS course so as to enhance student's contribution and their success.

6.2.2 Learning Style

For assessing learning styles there are various inventories and index available which have been used in various studies conducted on medical and para-medical student. The VARK scale, Kolb learning style inventory, Felder and Solomon learning style index are the most commonly used scales/inventory in various studies (Lynch 1998; Cook 2007; Slater 2007; Babadogana 2012).

In the present study, VARK scale was used which consist of 13 items which has set of questions through which we can know the preference of learning as more inclination for learning by visualising and better learning by listening, either by self-reading and can be kinesthetic where learning by performing is done. The investigator should select any of them according to their subscales which are needed. VARK questionnaire developed by Neil Fleming (www.vark.learn.com), was used with respect to the perceptual preferences in learning to investigate the learning styles among the dental students in clinical set up Shenoy (2013), Samarakoon (2013) in medical trainees Baykan (2007) amongst first-year medical students using the Turkish version of the visual, auditory, read-write, kinesthetic (VARK) questionnaire. Sinha

(2013) conducted study to explore the learning preferences of the clinical students of Melaka-Manipal Medical College. Shah (2013) investigated learning styles among dental students in two different dental colleges of India.

Present study revealed interesting findings pertaining to the level of learning for their preference for learning styles. The response rate was comparable amongst all the three groups. Majority of the students had a multi modal learning style response. Learning style was sub-categorized into 1) uni-modal, 2) Bi-modal, 3) Tri-modal, 4) Quad-modal. The uni-modal learning style was preferred by 21.3% of the total population and under the sub category, the graduates had 32% of uni-modal learning style. The interns and final year showed very less response in uni-modal type. The most expected type of learning was kinesthetic type, which was more predominant amongst interns and graduates. There was no response for visual type of learning alone by either of the groups.

The most accepted bi-modal type was read/write and kinesthetic learning style. Least preferred was auditory and read/write, which was most preferred by final years. Once the students pass they start doing clinical practice where they require clinical skills for which kinesthetic type of learning is preferred. On the contrary the final year students who have to appear for theory exams prefer auditory and read/write learning style. Here, we can clearly see a shift from auditory and read/write to auditory and kinesthetic and further to read/write and kinesthetic as the level of cognition is changing.

In multi-modal option it was seen that auditory, read/write and kinesthetic mode of tri-modal option was preferred compared to other tri-modal combinations which was almost equivalent to quad modal type of leaning. The statistical association

was between choices of learning style and group of students. It changes from more of uni-modal type of learning to tri-modal type of learning (Deshpande et al 2018).

Similar findings were seen in the studies by Shenoy (2013) and Shah (2013) that most of the clinical students preferred multi modal learning whereas the most preferred uni modal learning was kinaesthetic as was found in present study. The present findings can be due to the predominant way of teaching methods adopted in dental schools. Training of students with didactic lectures, discussions, practical sessions and simulation exercises are various methods employed. The dental education system is most regarded by the medical counter parts and other allied medical fields as the practical teaching and patient work starts at the undergraduate level.

The studies conducted by Baykan (2007) and Lujan (2006) in medical students demonstrated clear predominance of kinaesthetic learners (18% and 23.3%) among unimodal learners whereas almost 64% in both the studies were multimodal. Study done by DAmore (2012) in Australia amongst nursing students and Alkhasawneh (2008) showed similar result where there was increase in multimodal learners with increase in level of course. Sinha (2013) used VARK questionnaire exploring the learning habits of Melaka-Manipal Medical College clinical students in Malaysia. Most [n=99] of the students were multimodal. Kinesthetic modality was the single most important choice [n= 35]. The majority of clinical students are multimodal in their learning choice and their highest single choice is the kinesthetic modality.

Numerous experiments were carried out to clarify the diverse sensory needs of studying students pursuing different disciplines. A 2004 report on dental students (Murphy 2004) found that 56 per cent of dental students were multimodal. A cross-

sectional survey (Kumar 2009) of medical students from another Malaysian medical college conducted in 2009 revealed that 48.6 per cent of medical undergraduates were multimodal. The kinesthetic preference among the mono-modal community was the highest (35 per cent), which is comparable with our findings. Another cross-sectional analysis of preclinical medical students in Saudi Arabia (Nuzhat 2011) showed a 72.6 percent preference for studying multimodality. The same study showed the aural group the largest in the category of mono-modal type. All of these findings showed that students are predominantly multimodal in their preference for sensory learning.

The VARK theory promotes the idea that if their interests are discussed everyone will understand, and VARK also helps teachers to accept differences and resist negative judgment regarding learners (Dunn 2003).

6.2.3 Learning Approaches

Over time, multiple questionnaires were built to show the overall learning styles of the students and their impressions of the teaching-learning environments. In this research questionnaire, developed by the project Enhancing Teaching-Learning Environments (ETL) in the United Kingdom-The Study Skills Approaches Inventory for Students (ASSIST) was used. ASSIST is a valuable resource for providing accessible information relevant to learning which students may represent (Tait 1998). The ASSIST questionnaire asks students about their study habits, and classifies answers based on the three learning strategies, i.e., deep, strategic and surface / apathetic.

Different researches have been conducted to explain the various learning approaches of students studying different disciplines. Strategic approach (SA) and Deep approach (DA) was not significant between interns and graduates whereas for

significant difference was observed for all other groups including for Surface Apathetic approach (SAA). The post hoc table shows that the difference is significant between the Final Year & interns; Final Year & graduates; and interns & graduates. An increase in the SAA to learning was noted in all three groups during the progression of time whereas in an Australian study by Stiernborg (1996) such a trend was not observed in another study conducted in Indonesia by Emilia (1991). Whereas Mean scores for the SAA remained constant among final year and intern in study by Samarakoon (2013). In another recent study by Wickramasinghe (2011), it was noted that pre-clinical students and post-graduate trainees had the highest DA mean, while clinical students had the highest SAA and pre-clinical SA mean.

DA is a systematic approach that places emphasis on recognizing concepts and related ideas, and is considered the predominant learning style in university education. On the other hand, SAA is syllabus-bound shallow learning with an focus on memorizing the route. SA students use deep or shallow learning as necessary for a specific subject in order to obtain the highest grades possible (Marton 1976, Leite 2010). This form of learning is characterized by alertness to assessment and monitoring, resulting in a fragmented comprehension of subject matter, with low topic-wide integration (Leite 2010). Although SAA is more likely to lead to a failure in the final university exams, both DA and SA are more likely to lead to success (Kleijn 1994).

Strategic learning was the prevailing approach to learning in all three classes, that is, pre-clinical, clinical and postgraduate. Postgraduates, however, had significantly higher scores for deep approach and strategic approach than undergraduates ($p < 0.05$), while scores did not vary significantly between preclinical and clinical undergraduates for either approach.

Samarakoon's study (2013) revealed that graduate students had the highest mean scores for DA and SA, while the highest mean scores for SAA among pre-clinical students and clinical students were similar. Similar results were seen in an earlier Australian study (Stiernborg 1996) but study conducted in Indonesia (Emilia 1991) showed contradictory results.

While our research indicates that there are substantial difference between medical undergraduates and postgraduates in learning methods, this does not appear to be the case in non-medical fields. Reasons for these styles and approaches to learning can be multifactorial. In a study conducted in the United States of America by Aaron et al (1999), the need to compete for grades has been described as a factor promoting selective learning among new medical undergraduates. Higher workload with ever tighter course schedules can encourage shallow and evaluation-oriented strategic learning among undergraduates in preference to the deep approach. Another factor which encourages strategic approach to learning may be predictability of assignments. Evidence of any one approach that is more successful in medical school performance is controversial at best; with some studies showing no relationship between examination success and a specific learning approach (Naqvi 2000) and others showing that DA and SAA result in better examination performance (Ferguson 2002). Since the postgraduate community had significantly higher mean scores for the DA and SA, Samarakoon (2013) also supports the argument that in postgraduate entrance exams DA and SA might be correlated with better results.

In a recent analysis (Entwistle, Tait & McCune, 2000), ASSIST data was collected from 1284 first-year students from three long-established and three recently established British universities covering a wide range of fields of study. The central aspect of a fully developed deep approach is the aim to create a personal

understanding of the subject under scientific study, which is then combined with a range of ideas. Learning and study methods offer conceptual abstractions that summarize the results of analysis and simplify the difficulty of daily study. Although these principles have proven useful, observed behavior and case study interviews (McCune & Entwistle, 2000) indicate the significance of the idiosyncratic aspects of the learning of the students and the dynamic effects of various learning environments.

Students of medical, dental and allied health sciences require learning by various means pertaining to the need of their professional course. Once clinical students are aware of their learning priorities, they will build strategies to study more in less time.

6.2.4 Learning Strategies

The CEVEAPEU offers an appropriate construct validity which has been verified by the assessment made by a number of judges as well as by the factorial analysis.

CEVEAPEU questionnaire with two scales, six subscales, twenty-five strategies and 88 items, more robust and comprehensive than those previously available. Learning strategies can be understood as a structured, rational and purposeful whole of what the student is doing to achieve a learning objective in a given social context. Acting strategically means wanting to learn effectively and wanting to design and implement action plans that have been adapted not only to the objectives envisaged, but also to the situations of the context, by selecting and implementing effective learning procedures, skills and techniques (García & Pintrich, 1996) whose effectiveness needs to be assessed in order to change what needs to be modified. Learning strategies include emotional motivational and supportive

elements(' wanting' which involves willingness and an appropriate climate for learning): metacognitive elements ('decision making and evaluating' which involve students ' self-regulation) and cognitive elements ('being able' which involve dealing with strategies, skills and techniques pertaining to data processing).

Specifically, there are six variables with only two items: four in scale 1 (External Attributions, Knowledge of Objectives and Evaluation Criteria, Conception of Intelligence Being Modifiable, and Extrinsic Motivation); and two in scale 2: Storage / Easy Repetition and Managing Resources to Use Acquired Information). All of these variables are important to the construction, and were recognized in the literature (Pintrich, Smith, García & Mckeachie, 1991).

6.2.5 Learning Preferences

Students of medical dental and allied health sciences require learning by various means pertaining to the need of their professional course. (Table 5) Once clinical students are aware of their learning priorities, they will build strategies to study more in less time. As Fleming noted in 1992, knowledge of modal preference has also empowered his university students to focus on sensory preferences and change their study methods accordingly in information, use it and communicate more effectively (D'Amore 2011). Multi-modal student preferences offer options of two or three or four modes to use for learning and interaction with others. Students can utilize strategies based on their preferences to enhance the learning experience (Fleming 1992).

Dental Students would like to use all their senses — sight, touch, taste, smell, sound, etc.— to make learning sessions as ' lifelike' as possible. Students studying clinical science can learn more using the sensory kinesthetic modality. Therefore studying in a classroom will be more in the form of ward observations, examples of

laboratory skills and hands-on training. The VARK, ASSIST and Strategic Philosophy promotes the idea that if their interests are discussed, everyone will learn, and further inspires teachers to accept differences and resist negative judgment regarding learners.

Table 68: Learning means for various Learning Styles

Visual	Aural	Read/Write	Kinesthetic
<ul style="list-style-type: none"> • Images/ diagrams • flow charts • Graphs • Flashcards with symbol and pictures • Concept maps • Drawing scientific process/equations • Take notes, make lists. • Watch videos. • Color code words, research notes. • Use highlighters, circle words, underline. 	<ul style="list-style-type: none"> • Listen to lectures • Likes to read to self out loud • Discuss with peers • Attend conferences • Voice recorder • Association of words to remember facts and lines. • Recording lectures. • Participating in group discussions 	<ul style="list-style-type: none"> • Hand-outs • Class notes • Textbooks • Spend time in the library • Rewrite notes • Use bullet point list • Turn diagrams and charts into words 	<ul style="list-style-type: none"> • Workshops or hands-on seminars • Skills' laboratory • Simulation • Demonstrations • Case presentation • Building models. • Role playing. • Taking field trips, visiting museums. • Studying with others. • Using memory games. • Using flash cards to memorize.

6.2.6 Implications for Dental Educators

From a one-size-fits-all approach to a multimodal approach, teachers should develop their teaching module so that all students should gain optimally. In addition, while investigating a relationship between preferred learning styles and physiology student course results, Dobson 2009 has found substantial linkages between preferred sensory modality and course scores. Knowing the preferred modes of the students may: 1) assist in providing guidance customized to the individual preference of the student; 2) overcome the predisposition to treat all students in a similar way; and 3) inspire teachers to switch from their preferred mode(s) to use others (Lujan HL, DiCarlo SE. 2006).

In dental education system, it mainly includes didactic lectures and practical classes and as when the students advance to final year and through internship, they start working clinically on patients. The knowledge of students preferred learning style can help educators by individualizing the teaching style for the students (Shah 2013). By individualizing the teaching learning method style it may be helpful for the students who are not able to perform well and remedial tutorials can be planned based on their learning style preference by the teacher. This will be also helpful for the educators to match with the student's learning style as well as modify their style of teaching as per the need of student/set of students (Lang 1999; Miller 2001; Collins 2004; Forrest 2004; Laight 2004; Bergman 2005).

One of the definitive trends in teaching is to instruct all students in lecture format because of the ease in passing information is not always right. The results of the present study must convince teachers to use multiple modes of information presentation by using multiple teaching approaches and styles, professors will reach more students because of better interaction between teachers and learners. Each type of learning style has modality specific weaknesses and strengths which can substantiate the reasons for difficulty in learning by students which is supported by the evidence available in scientific literature (Murphy, Gray 2004). Present teaching system needs a shift from the traditional large-class teacher-centric lectures to interactive, small-group student-centric classes. Blend of Theoretical-Conventional-experimental teaching within the system should aim to develop under-graduates and post-graduates as community-teachers (Goswami, S., Sahai, M. 2015). Teaching should involve all sensory modalities so that all types of students can actively participate in the learning session.

6.2.7 Role of Self Instructional Module in Higher education

Self-Instructional module which is Computer assisted was found to be preferred methods of teaching and can be used as an adjunct to traditional education or as a means of self-instruction. Study by Rosenberg (2003) and Howerton et al (2004) also showed similar findings that students preferred computer assisted Instructions (CIA) to lecture format. It is necessary to arrange for students to be able to use university computers and configure every online tool so that it is compatible with older user applications, in order to maximize student access to the online program.

Given the continuing controversy on the learning feasibility of e-learning systems, students are calling for such methods as an alternative to conventional instructional content delivery. The Faculty needs help to encourage them to use the technology efficiently for the benefit of their students. The organization should provide this support, and it is proposed that institutions should nominate, where possible, a supporter of e-learning with strong interpersonal skills to help and promote improvements in the faculty. In a global perspective, the e-learning resources should be open to both students and faculty. Study by Mattheos, et al (2008) promotes open access to e-learning content, platforms, and programs similar to the results of this research. Mattheos 2008 claimed that the standard of such learning materials must have well-defined learning goals and require peer review to ensure validity of content, accuracy, currency, the use of evidence-based data and the use of best practice. To ensure the intellectual rights of creators are secured, the original content must be safe from unauthorized modifications. If dental students, educators or patients are like chameleons adjusting to the ever-changing environment, IT will always remain exciting, because it often transforms and end users as well. Study examined the self-directed learning characteristics of adult students. Different researchers have examined the characteristics of the self-directed learner in the context of teacher

education and have concluded that the task would encourage the production of SDL within teachers and students (Khiat, H 2015; Du Toit-Brits, C., & Van Zyl, C. 2017).

As Eitner, et al. (2008) also stated that Use of the Computer-aided learning (CAL) and computer-aided testing (CAT) in dental studies by comparing these approaches directly with traditional teaching resulted in increased levels of attentiveness, student acceptance and perceived seminar attractiveness. CAL / CAT-mediated teaching also contributed to improved communication, thus enhancing the qualitative and quantitative parameters of knowledge transfer and assimilation of cognitive information. The use of CAL / CAT also enabled the selection, evaluation and interpretation of complex medical data.

6.2.8 ICT in Higher Education System

Education is a very socially oriented practice, and historically, quality education has been correlated with strong teachers with high levels of personal interaction with the learners (Wood, 2010). The use of ICT in education provides more learning environments for students. As the world moves quickly towards digital media and information, the role of ICT in education is becoming increasingly important and this importance will continue to grow and evolve in the 21st century.

The use of ICT in medical and dental education is increasingly growing. As in other disciplines (Jones 1991), the rapid development of computer technology and access to personal computers and smartphones, together with the Internet, e-mail and various applications for medical literature retrieval, have changed the study and practice environments in dentistry (Virtanen & Nieminen, 2002). Bullock, A., & Webb, K. (2015) reported that on -job technology supports postgraduate medical education.

The International Association of Medical Informatics has concluded on guidelines for practitioners to gain information processing and ICT knowledge and skills. The use of new technologies and media has become very popular, particularly among young people, where the use of personal computers, portable laptops, mobile phones, etc., has reached one of the highest levels in the world (Recommendations of International Medical Informatics 2000).

The results of this study demonstrate that most of the dental teachers are well versed with the skills and knowledge regarding the routine and basic ICT skills such as word processing, PowerPoint, using internet and e-mails. However, they failed to possess the necessary skills for using ICT applications such as video and audio recording, using projectors. Very few teachers had an experience of using online course materials. The results of this study are in concurrence with the previous studies demonstrating the variable response among the dental teachers regarding the ICT skills. With the advancements in the field of communication technology, the dental teachers have to keep pace with it, to make best use of the ICT for imparting the holistic education to the students (Ray 1999, Grigg 1999).

Most of the dental teachers used computers and smartphones regularly for various personal as well as professional tasks (Walmsley 2003). The teachers possessed the better knowledge and skills of the tasks used more routinely. However, this has little impact on their skills and knowledge of ICT in dental educational setup. There seems to be a wide gap observed in their own perceived ICT skills and actual skills for specific tasks evaluated through this questionnaire.

The results of this study can be considered as representative of Indian scenario as the respondents were from different colleges across the country. The teachers

included were from the different specialties and academic levels. Hence, the sample was diverse and representative. The questionnaire designed covered varied skills and competencies and was predictive of current status as well as future needs to upgrade/refine ICT skills and knowledge. The outcome of this study is in concurrence with the views expressed by Mattheos (2005). Mattheos et al. (2002) stated that the positive attitude toward computer literacy was observed among the dental teachers with varied competence levels. The role of ICT in dental education is well understood by all the dental faculties despite different levels of skills and knowledge and different academic positions.

The exponential advancements taking place in ICT pose the challenge for the dental teachers and students. The present technology oriented teaching–learning environment requires a good deal of attention, which is lacking in today’s dental and medical schools. More efforts and investments are needed so that the best out of the technology is tapped and can be employed to improve the quality of oral health education (Mattheos 2002, Mattheos 2005).

The shift from conventional teaching and curricula to the competency and performance-based curricula are well supported and encouraged by emerging instructional technologies. For the same, the dental teachers need access to a variety of information sources, forms, and types. The learning settings need to be student-centred with access to information. The ICT based instructional modules and an online course provides learner freedom to learn at any time and wherever they want (Deshpande 2016, Naik 2016). The learning should be problem and inquiry based. In such environment, teachers can be coaches and mentors rather than content experts.

6.2.9 Shortcomings in present Medical Education System (Pedagogical and Evaluation)

The high complexity of the new inpatient care program has created an instructional atmosphere for both residents and students that has moved away from the principle of thoroughness in patient assessment and care — a key dictum of residency training since the system started. Medical learning innovations that take advantage of technology, leverage big data analytics, and are competency-based will enhance educational experience (Feldman A M and Ludmerer K M 2017). Innovative strategies recently implemented at several academic medical centers may help to rebalance the workload of physicians, which could go a long way toward improving both education and patient care.

Studies have shown that Clinicians consider the amount taught is inadequate and results in adverse changes to the competency of practicing physicians (Humaira G 2018). Many educators agree that the objective of any subject taught to medical students should be to prepare clinicians to be better able to diagnose and manage diseases. Also the availability of full-time medical teachers is becoming difficult and teaching has largely been taken up by educators who are hired for their research skill and not for their expertise in medical teaching.

Many shortcomings and obstacles that hamper the progress of EBM adoption have been identified as: poor command over language and poor computer literacy, ICT in one of the major deficiencies; many teachers are close to retirement, and the educational methods they use are obsolete and hardly anything to boast about; surveys revealed that more professors would remain in universities if they were provided more opportunities to improve their careers and may expect sufficient remuneration; there has been controversy between educators and students for a long period of time over

whether conventional or modern methods of teaching science and related disciplines are better.

While many educators regard e-learning software as a useful resource for capturing and displaying PowerPoint presentations, there are several other opportunities to use this technology (Chan C H and Robbins L I 2006). The use of software in improving teaching in the classroom will depend on the specific teaching task, and this requires considerable educator forethought and planning. The course will be taught solely online or will also provide face-to-face communication with instructors are crucial aspects that should be considered during course planning. If the software is then used as an adjunct to classroom or clinical instruction, it can be used to disseminate learning materials from a wide variety of sources. Programs can create electronic "working hours" to facilitate ongoing contact so the students can go electronic for "live chats." Internet-based learning software is another resource in the armamentarium of the instructor. Educators also need to use sound educational pedagogy to build effective instruments of learning.

Medical education faces problems and challenges in the countries regarding quality education. From September 2015 to December 2015, they collected cross-sectional data from various sources including medical colleges on medical education issues for a span of three months (Deswal BS and Singhal VK (2016). The data were analyzed and examined in depth to identify potential solutions and measures needed by the regulatory body, including government, institutions, administration, faculty, and students of medicine. They noticed that Indian government is emphasizing raising admission and training of medical students to achieve doctor-patient ratio. Every year one third of these physicians leave India for residency training and/or practice abroad. Therefore, the standard of Indian medical education and of the researchers it creates

has consequences for the entire world. An exponential number of medical colleges; a skewed distribution of these throughout the country; devaluation of merit in admission, especially in private institutions; the capitation fees; admission of the suboptimal standard of poorly motivated students; an alarming shortage of medical teachers, with those who exist being untrained in modern teaching learning technology; great shortage of patients/clinical content in many institutions; obsolete curriculum; a less than satisfactory method of assessment and inadequate oversight of internships all lead to this downward trend (Deswal BS and Singhal VK (2016).

Changes are happening in the medical sector at every point and medical education is no exception. Nirale A (2008) highlighted that patients have increasingly become 'smart' and 'well-informed' about health, illness and treatment options as a result of moving toward a more accessible society with ready access to medical knowledge through the Internet and other media. Certainly new subjects and content have been added to the curricula but there has been a reluctance to eliminate older topics, perhaps restricting the course's potential to grow as planned. He suggested that the theory classes should not repeat again all practical topics. And it is important to re-evaluate the relevance of some topics in contemporary medical practice. Lectures on these topics should be completely cancelled and certain topics or subjects should be set aside for self-study, though still part of the syllabus.

When we take a fresh look at existing developments in medical education, we can see some main problems that can be changed by introducing: outcome-; implementation of innovative learning technologies; introduction of new courses; selection of instructional strategies; creation of personnel and medical education professionalism.

No single, "best" curriculum exists. For an inclusive curriculum, there should be more flexible learning environments in which the specific learning needs of the students are understood and therefore the program will be adapted to suit those needs. Portals for education have an improved contact and interaction forum as facilitators and accomplices for teaching and learning processes (Oblinger, 2001). Both areas reflect Portal Strategy target dimensions.

A central concept of learning, interaction in the world of an educational platform includes teachers, students, and administrative support. The portal will give its users faster access to information, as well as more accurate information. In doing so, the application framework is managed, which dispenses information resources in multiple formats and media. Such services may either be communicated synchronously or asynchronously, pushed via transmission, or accessed on demand. As these requirements change, the consistency and essence of services will change as well as the impact on the learning process (Pickett & Hamre, 2002). Therefore the complexity of a portal's communication channels regulates information quality, and the flow and exchange of resources.

The goal of the technology is to help good pedagogy effectively (Dede, 2005). Interaction means connected, mutual information generation and ability enhancement between students and teachers, and between students and students (Oblinger, 2001).

On the one hand, the educational portal provides an interactive space for larger numbers of students to share a shared learning experience, while on the other hand, to allow an individual student to have a special, personal interaction with a teacher or with another student, no matter where they are located. More significantly, these

learning experiences can be of much higher quality than would be possible without an advanced, interactive platform for communication and interaction (Collins, 2003).

In addition, as teaching and learning methods evolve along with more collaborative, self-directed approaches to student participation in the education process, so will the basic roles and relationships between teachers and students often change (Oblinger, 2003). Students can benefit not only from the unified interface but also from improved learning opportunities tailored to specific learning needs and preferences, reflecting an increasingly student-centered viewpoint (Oblinger & Oblinger, 2005).

Therefore, the features of e-learning systems (ELS) involve incremental or continuous changes to reach educational standards based on learning behavior and preferred modes of communication and interaction.. These can be learned from comprehensive just-in-time student tests and program preparation in terms of curriculum and application development in order to better understand the learning effect of different courseware (Becker, Delfmann, & Knackstedt, 2004) (Olds, Moskal & Miller, 2005).

In addition, a corollary of evolving habits of teaching, learning, communication and interaction, redefining ELS positions in furthering and adapting the educational process, present a strategic problem at portals. The strategy must recognize that teachers will serve as architect, consultant, expert, guide, instructor, asset, or reviewer depending on the emphasis of the principle of education. Students may be apprentices, builders, listeners, mentors, peer teachers, team members, or writers (Oblinger et al., 2005).

Finally, there seems to be limitless technical potential to adapt an ELS to particular requirements according to specific learning standards and role models (Dede, 2005). Notwithstanding the great opportunities, an education portal approach can hardly succeed without considering the willingness of both teachers and learners to use the technology (UNESCO, 2002a).

It is important to be aware of the theories which underpin learning when designing learning modules. Every theory is based on specific assumptions about the purpose of learning and it is suggested that you should define your own learning theory as the methods you might use to improve learning would derive directly from your own orientation (Carlile and Jordan (2005). In addition to taking consciousness to various theories to learning, it is collectively important to remember that there is no universal means of learning. Brown and Atkins (1991) suggested that students should use various approaches to perform specific tasks. They stress the importance of 'learning for-comprehension' and 'learning for-knowledge' orientations, with learning between the two being an uninterrupted phase of growth. It is important for course curriculum creators to be aware of deep and surface approaches to learning concepts when developing courses. Lots of analysis have been performed on the relation between courses and learning methods (Marton and Saljo, 1976; Entwistle, 1981; Gibbs, 1992; Ramsden, 1992; Biggs, 1999). There are implications in terms of module design arising out of these studies. Incorporating the following into your module plan will give you a greater chance of encouraging a deep learning approach.

Concepts such as 1) consistent contact with information and others; 2) linked new concepts to previous knowledge; 3) providing students with straightforward explanations and a strong knowledge base; 4) coordinating students in a practical workload; 5) providing students with opportunities to explore topics in depth so that

they can appreciate the material themselves; and 6) Confirming an appropriate formative and summative assessment approach will resonate with teachers in today's higher education setting and have consequences for our range of learning and teaching strategies and how we assess learning. A consciousness for these types and approaches to learning should remain elementary to the whole process of developing the module.

Constructive Alignment: the Importance of Coherence

Constructive alignment is a curriculum design strategy that maximizes quality learning conditions by having such alignment throughout the process, from the formulation of learning outcomes to the selection of assessment teaching methods.

"The fundamentals of positive alignment are that an honest teaching program aligns pedagogy and assessment with training practices directly within the goals such that all facets of this methodology are unified in promoting effective student learning." (Biggs 1999:25)

There are three factors involved in the process of promoting the curriculum constructively:

1. Defining the learning results;
2. Choosing the methods of learning and teaching which can lead to results getting achieved;
3. Assessing the learning outcomes for pupils.

Thinking in terms of content with scholars specifying classes in terms of what is learned was the conventional way of explaining modules and programs in higher education. Recent developments, however, have prompted a move toward an

outcome-based approach to course design with learning being characterized in terms of what students can do at the end of a lesson or program. The use of learning outcomes will indicate the learning material of a curriculum or course that is expected to result. A learning goal is a description of what is required of the learner to understand and/or be able to do at the end of the stipulated learning period. Learning outcomes focus on learning rather than teaching, and are not about what the teacher would be providing but what the learner will demonstrate at the end of a lesson or course. Learning findings should be written taking into account the extent of descriptors applicable to the amount of study, and if appropriate professional body requirements.

It will help students understand better how much they should expect to learn at the end of a module and be able to do so. It was proposed that a task would have learning outcomes between four and eight, and that a whole curriculum should have up to twenty-five (Moon 2003).

6.2.10 Teaching for Learning

There is a necessity to explore a range of teaching methods and concentrate on the methods and groupings of methods that can best gather the engagement with learning activities that leads to understanding (Ramsden 1992). Even the finest designed modules, with very meaningful learning outcomes, can fail if the teaching methods utilized are inappropriate to encourage and support the learners towards meeting the anticipated learning outcomes.

A teaching strategy is fundamentally about supporting student's learning. In giving thought to how, as instructors, we can teach in order to confirm that our students are engaging with the training method, it is necessary to emphasise on the

type of teaching strategies employed to achieve this end. Firstly, understand the aims of module, learning outcomes and content material. Then, concentrate on how best students can be involved in making sense of the material through active engagement and application (Higgs and McCarthy 2005).

6.2.11 Assessing Learners

In regard to assessment, it's steered that the elemental principles are that the assessment strategies should be in unison with the training outcomes of the module and may foster a deep approach to learning. Assessment is mostly thought of in terms of either being Formative and/or summation. Formative assessment is employed to tell each student and teacher on how the learner is progressing. Integral to the present method is that the feedback that students receive from the teacher and should be used to improve each; the training of scholars and also the teaching practice. Summation assessment is employed to grade students at the end of a module or to accredit them at the end of a programme. ("What are learning outcomes? – Centre for teaching support & innovation," 2015)

Formative assessment also is used to contribute to continuous assessment for students in order to have the maximum opportunities to learn in a module, as well as some option for a formative assessment which does not contribute to the final grade. Students can then obtain feedback which permits them to fill any gaps in their knowledge or skills.

Brown (1999) encourages giving consideration to a wide range of possible assessment methods. A range of assessment methods will assist in selecting an suitable assessment taking into account the link between learning outcomes and assessment, within the context of module (Lesson plan).

Assessment should be given serious deliberation and reflection and the choice of assessment methods should clearly relate to the learning outcomes. There will be seldom one method of assessment which satisfies all learning outcomes for a module and hence it is recommended that in developing assessment strategy, a variety of methods are included.

In a modular program, there is also a tendency to crowd the assessments with the result that students hand in several assessments at the halfway point and at the end. This is also an unnecessary burden for students, and it is important that the assessment timetable is carefully prepared in advance within a study program so that students do not experience this challenge.

This study indicates that increased use of web-based self-tests can be associated with greater operational learning in dental education by virtue of the testing impact, and that the use of tools for learning by dental students changes significantly throughout their education. These are issues important to many dental schools facing full-time staff shortages to teach a congested curriculum and pursuing improvement both in their instructional programs and on how they are taught.

In developing the modules focus should be provided to the form of learner support required to achieve the learning outcomes.

6.2.12 Evaluation Mechanisms

The design and development of modules is also an on-going process to assist in the analysis and advancement of the module and an assessment system should be used to elicit relevant details. This should be focused on standards that are developed jointly and concerned with collecting information about the module's consistency and efficacy. Evaluation should be an important part of the creation of the program, and

not just a retrospective process learned before, during and after the process. The selection of methods should be decided by considering, for example, to whom the assessment is for, the calculation of the assessment, the reliability requirement of the data collection and the amounts of available resources. A variety of methods can be used (Neary 2002; Posner and Rudnitsky 2006). It is necessary to consider at what point data will be collected and how to select the student and/or stakeholder sample when planning assessment strategy. It is also recommended that if students have been interested in data collection; carry out the correct modifications and feedback on the data will be made.

In their qualitative research DeBate (2011) revealed both perceived advantages and drawbacks to the dental and dental hygiene faculty members' adoption of e-courses. Considered as a whole, the subthemes found in this study reflect the following concerns among participants regarding e-courses: 1) incompatibility with current curriculum and culture; 2) considerable time commitment; 3) difficulty with respect to the production and maintenance of e-courses; and 4) low relative professional advantage over conventional course delivery. However, for students who are independent learners, the participants perceived relative advantages of e-courses and defined most of the similar student e-learning benefits previously reported by dental and dental hygiene students. Accordingly, results from this exploratory study indicate that in order to increase the probability or speed of e-course adoption among the dental and dental hygiene faculty, it is important to match the innovation (e-courses) with its end-users (the faculty members) and to consider the context of the dental and dental hygiene system (culture) in which e-courses are to be disseminated. Most participants reported inadequate training in the development of e-course and the use of information technology for teaching. Therefore, many participants reported

using the Web as a platform for PowerPoint presentations and conventional course materials only. This result is in line with the expectations of students that faculty members have made little effort to use e-learning beyond exchanging PowerPoint files.

We postulate many innovation creation approaches that could serve as focal point to promote the implementation of e-course in dental schools and dental hygiene programmes. First, in terms of innovation growth, end-users (members of the faculty of dental and dental hygiene) should play a major role in defining an effective audience for e-courses and should be involved in providing input on the content and design of such courses. It is therefore important to establish and encourage collaborative alliances and pluralistic strategies between those who advocate innovation (deans, program managers, and other university managers) and those who embrace innovation (faculty members). For example, their study participants indicated that e-courses may not be appropriate for all the courses. Having faculty members subsequently provide feedback on which courses might be better suited for e-delivery would increase the probability of consistency with the current curriculum. Second, the study participants suggested that the e-courses are not appropriate for all types of learners. Perhaps these faculty issues could be resolved if the e-course was built using a blended learning approach (i.e., using both conventional and online teaching methodologies). A hybrid approach will help meet a variety of learner needs, and is consistent with the opinion recorded among dental and dental hygiene students that e-learning should strengthen rather than replace traditional learning and teacher interaction.

Pahinis (2008) stated that participants in their sample suggested time as a major obstacle to the creation and implementation of e-activities. Consequently,

administrators of dental and dental hygiene may grant course release time or teaching stipends for training faculty members in e-course strategies and e-course growth. Research on advancement of education suggests that the acceptance of e-courses can be increased by decreasing perceived difficulty and time commitment and by increasing the relative advantage over current course delivery. (Oldenburg 2002) This can be accomplished through the provision of training and technology assistance to faculty members involved in designing and implementing e-courses. DeBate's (2011) study findings suggested that universities would establish relationships with departments of information technology and instructional resources to promote faculty preparation and support for technology.

6.2.13 Methods and Tools

In a TBL setting, the instructor-centric mode includes synchronous events, like web conferences with a lecture at its centre. It can even embrace pre-recorded lectures or narrated tutorials that are disseminated on-line, or via CD-ROMs. These lectures commonly deliver a record of subject content material that learners read, view, listen to, and, sometimes, respond to. The contact between learner and expert should be frequent if the learner community is small; however tends to be rare in most cases.

In a content-centric TBL model, students usually interrelate with content that is embedded in a learning system that runs either from a compact disk on a computer or from a web-based system where the content be located in a remote web server and is accessed via the Internet. In present model, there is little learner-expert interaction or learner-learner interaction.

In a learner-centric TBL model, the learner is the navigator and key decision-maker, and therefore learner's interests and necessities drive the learning process.

The teacher acts as a tutor and facilitator who will help the learner to attain the educational objectives. The educational environment is open, and learners are permitted to rove in search of learning objective that facilitate them construct their understanding of the given topic. A learner-centric model is well aligned with constructivist learning pedagogy that maintains that students learn best after they actively participate in their learning and build their information, rather than just act as passive recipients of knowledge (Technology-Based Learning Strategies).

All three modes of delivery are effective at transferring factual information. However, investigation suggests that a learner-centred approach ends up in higher content retention, improved student motivation, and lower dropout rates.

Asynchronous learning in an exceedingly TBL atmosphere needn't occur at a mere time and isn't connected to a particular learning event. Self-paced asynchronous applications embrace web-based and computer-based courses that learners use at their own pace. Expedited asynchronous applications vary from a straightforward e-mail dialog or a discussion via a bulletin board to a comprehensive virtual learning atmosphere wherever the trainer posts readings, video and audio content, and assignments, and so monitors students' progress over time. Asynchronous learning conjointly tends to stress the role of the community of learners of a given subject.

It seems as though dental education has made less use of the courseware than certain other areas. There are several explanations why web-based research materials are increasingly being implemented in dental education. A longstanding complicating factor remains the lack of standards among educational technologies. Rada and Schoening (1997) observed that "the interactive education technology has been non-standard for much of its 50-year existence. The web does, however, include a

common educational technology forum that facilitates the decomposition of educational technology resources into exchangeable components. TBLM was therefore held to the low end of available technologies that are easily adaptable and achieve learning outcomes for better adaptation. Hence for better adaptation TBLM has been retained to the low end of available technologies which is easily adaptable and achieves learning outcomes.

6.3 Conclusion

The world of education is changing through the proliferation of technological advances across the globe making Technology based learning increasingly viable and accessible. TBL has complemented the way we learn to make it more effective and measurable.

Styles of learning and approaches to learning vary among medical students, as well as undergraduates and postgraduates. The learning approach has indicated a significant change in postgraduate students towards deep and strategic learning. A similar difference in undergraduate students, however, was not observed during their transition from first year to final year. Differences in learning styles and approaches to learning have important consequences in designing successful medical curricula for both undergraduate and postgraduate students.

Study concluded that teaching should involve all sensory modality so that all types of students can actively participate in learning session. It is important for the teachers and learners to be aware of their learning approaches and strategies to improvise teaching learning process as educators we need to analyse and understand how to approach all students by understanding the multiple modes of information presentation. We can be more efficient and effective if we are aware of students

learning style and approaches and aid in assistance for their determinations. This study also explored the ICT skills among the dental teachers at various dental teaching institutes in India. The analysis of the ICT skills and knowledge through the questionnaire reflects the current state of integration of technology in teaching–learning. The results of the study are the predictor of the future and if the constructive interventions are undertaken, ICT can well be amalgamated with the future dental curricula in India.

International experience indicates that ICT adoption and traditional campus environments transformation are typically a gradual process (UNESCO, 2002a). The generic strategies can also be used either as a continuum of stages for portal development implementation or as an ad-hoc framework to direct a portal strategy in the context of a careful combination of strategic priorities in order to outscore certain stages. Whereas the requisite resource investments at portal service and technology level will increase the bigger move toward a more virtual campus approach from an established institutional context through its educational goals and its technical readiness (UNESCO, 2003).

Limitations

Our study had few limitations. Firstly, there is very little proof that learning styles actually make a distinction to learning or not. Whatever information on learning styles and approaches available warrants its use to tailor curricula to suit the bulk of students. Secondly, our study was cross sectional instead of longitudinal. Hence we were solely able to describe variation between the three cohorts studied, and no firm conclusions can be drawn concerning changes in learning styles and approaches over a period of time for same cohort.

However, the data are likely to accurately represent many of the facets of technology-based curriculum development typical of representative of the dental student and dental faculty. In ADEA reports the introduction of web-based learning into the dental curriculum was strongly promoted. In dental education there has been increasing support for e-learning over the past decade, as many deans have described it as a planned breakthrough in curriculum. If the goal of growing web-based learning in dental curricula is to be accomplished, faculty members should be encouraged by the characteristics of e-courses found in this report. Improving the connection between innovation and end-users is crucial to the widespread acceptance and application of courses based on technology. That could be achieved by educating instructors in the production of e-course and/or by supplying e-materials that could be slowly applied to the current courses, thus allowing for small scale adoption.

6.4 Future Directions

It can be stated that Technology based online learning (TBL) provides constructive options to students searching for alternatives to conventional face-to-face classrooms. It provides the opportunity to adopt multiple learning tools as well as document and evaluate educational objectives. This offers access to 24/7, self-paced learning and the opportunity to participate in lifelong learning. The advantages of TBL will continue to grow as the use of learning management systems, video conferencing, blogs, virtual and game-based realities and other technologies expand opportunities for students and develop skill sets allowing them to meet their educational aspirations and lifetime goals.

The challenge of an education portal approach is obviously nothing less than the challenge of introducing conventional systems into a wave of technology. Study

provides framework to further the teaching, learning, communication, and interaction capacity of Technology based Learning module in systematic way, adapted to the specificities of Dental Curriculum.

We hope that the findings of these investigations will provide new insight as

- To how learning can be facilitated by new learning environments, thereby contributing to the comprehensive understanding of how learning takes place.
- To help the dental instructors in developing appropriate learning approaches and explore opportunities so that they will be able to make the educational experience more productive.
- To meet students' needs, variations in the teaching, learning and the examination could be implemented.
- To learn about importance, issues and problems in order to design effective educational program for dental students based on their learning preferences.
- In Planning for e-Resources standardization and extension.

Such changes would expand learning and the choices for individualizing learning, study approaches and remediation of courses.