Transforming the Standard Lecture into an Interactive Lecture: The CDEARA Model

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Abstract

The standard way of lecturing where students are passive recipients of knowledge and the lecturer as the provider of knowledgehas been the dominant way to deliver curriculum for so many decades.However many reports suggest that active learning methods can significantly increase learning gains.We report on the testing of a variant of interactive lecture model called the CDEARA Model through a module and a training workshop. This method is most clearly distinguished by the systematic and purposeful integration of a variety of 'simple' activities or techniques which we call Interactive Lecture Tools. We present and analyse a detailed example of the interactions during the workshop and analyse the evaluation of the module and the workshop as a whole.Data indicate an overall positive evaluation of the module and workshop. We conclude that the CDEARA Model is practical, effective, and amenable to implementation.

Keywords: Interactive Lecture, Module, Model, Engagement, Active Learning

Introduction

The standard way of lecturing usually refers to a one-way learning pedagogical model where the students are passive recipients of knowledge and the lecturer as the provider of knowledge. The roles are clear: the lecturer with the knowledge tells the students who lack it everything they need to know. The lecturer speaks, the students listen. This way of lecturing has been the dominant way to deliver curriculum for so many decades especially at the higher education institutions. But does this mean that it is the best way to teach?

While this approach provides an efficient way to teach a large number of students and to cover a lot of materials, it allows for minimal creativity and critical thinking on the part of the students. It has also been shown by numerous researches that the standard lecture setting does little to promote a deep conceptual understanding of physics fundamentals and that a more interactive lecture. Research on student teachers' state of physics conceptual understanding (Nurulhuda Abd Rahman, et al., 2007) shows a lack of deep understanding about basic concept of Newtonian mechanics and the presence of several common misconceptions. The study investigated students learning against lecturers' teaching styles, students' academic performance (CGPA result) and gender and found that all four lecturers involved in the teaching of mechanics have a traditionalist tendency of teaching style and that there was an insignificant learning gain after students have gone through mechanics courses for a semester. In other words, the standard lecturing practices do little in terms of promoting deep understanding and overcoming misconceptions of force and motion amongst students. How can we redesign the standard lecture in order to accentuate its strengths and minimise its weaknesses in terms of promoting learning?

As an alternative, we proposed a way of transforming the standard lecturing to be more interactive so that students will be more actively engaged during lectures. Numerous researches have shown that students learn better when they are actively involved in the process of learning (Bonwell & Eison, 1991; Hake, 1998; Prince, 2004; National Survey of Student Engagement, 2006). Terenzini et al. (1999) found that student learning is most influenced by students' interpersonal interactions with peers and faculty.This was supported by Feiertag and Berge (2008) and Bracy et.al. (2010) that students now are accustomed to interactivity and team collaboration.However, getting students in a large-enrolment class with a fixed seating arrangement to participate actively is a challenge. In addition, most university courses have always been structured to include so much content to be covered in a short period of time. An active participation often means lecturers need to spend more teaching time on certain topics which results in an overall less coverage. This is usually true for many methods that fall under the umbrella of active learning**.** Thus this poses a dilemma amongst certain faculty members. Mazur (1997) recommends covering the more difficult and important material during lecture time and relegating the 'simpler' ones to students to study in their own time. In fact there is a lot of evidence that shows that although lecturers cover many topics students do not gain significant degree of mastery (Meltzer & Manivannan, 2002) and that a more interactive lecture method significantly improves students understanding of basic concepts (Hake, 1998). The real issue then is not the width of coverage but depth of coverage. It has been the usual practice amongst lecturers to either discuss briefly or omit certain topics deemed peripheral to the bigger ideas in a discipline. For example, in the first year introductory physics ac circuits would be considered a not so important topic to cover and discuss in-depth as with topics in modern physics such as special relativity and particle physics, which many lecturers omit. At the end of the day, lecturers have full control over materials covered in their own classes. And if lecturers insist on covering certain topics, they can revert to the standard lecture for that topic for a rapid coverage. However Meltzer and Manivannan (2002) found that consistency in implementing the interactive lecture is very important in ensuring students get the most benefit from the method. Since interactive lecture demands students to be more alert, thoughtful, interact actively with peers and lecturers, some do not automatically welcome the learning experience stemming from this type of method (Chabay & Sherwood, 1995; Laws, Rosborough, & Poodry, 1999). Hence introducing the method mid semester after students are comfortable with the standard way of lecturing may be bad for both students and lecturers' morale.

The CDEARA Interactive Lecture Model

In 1997, Eric Mazur introduced Peer Instruction as a model of an interactive lecture where the standard lecture is punctuated by a series of conceptual type multiple-choice questions which he called ConcepTests. After explaining for about 10 minutes or so, he would put up the question on the screen and then uses the Think-Pair-Share technique which requires each student to think individually for a few minutes or seconds (think), discuss with their nearest neighbour (pair), followed by a whole class discussion (share). Students responses are immediately visible to the lecturer using flash cards or clickers, an electronic device that lets students key in their answers. It is now a widely adopted model of an interactive lecture particularly amongst physics educators. A variant of Peer Instruction was introduced by Meltzer and Manivannan (2002) which they called the "fully interactive lecture". Their goal is to transform the standard lecture in a mass lecture setting into a back and forth dialogue that usually happens in a one-to-one instruction through teaching by questioning. Another variant called Interactive Multimedia Lecture was introduced by Nurulhuda and Noor Azman (2012). The model breaks down a lecture into a series of mini-lectures punctuated by several engaging activities including the use of ConcepTests and multimedia technology.

In this paper we define an interactive lecture as a lecture that is interspersed with activities that enable students to actively participate during the lecture, involving student-teacher, student-student, student-material and student-technology interactions. Since an interactive lecture is still largely a teacher centered approach, for lecturers who are used to the standard lecture, it appears to be relatively easy to implement (as compared to a more student centered approach such as Project Based Learning or Problem Based Learning) and thus exposing the lecturers in as positive experience as possible to make the transition from highly teacher centered standard lecture to a relatively more student centered interactive lecture. Similar to the Interactive Multimedia Lecture, this method breaks the hour-long lecture into a series of mini-lectures interspersed with many 'simple' activities (which we will call the Interactive Lecture Tools, ILT) but nonetheless can be thought-provoking and thus facilitate deep understanding and the development of higher order thinking. We propose an interactive lecture method using the CDEARA model. Figure 1 shows the CDEARA Interactive Lecture Model that embeds ILT which was piloted to a group of 35 lecturers in one of the public universities in Malaysia. This model of lecturing ensures that understanding, thinking and application of knowledge are not left to chance during lecturing.

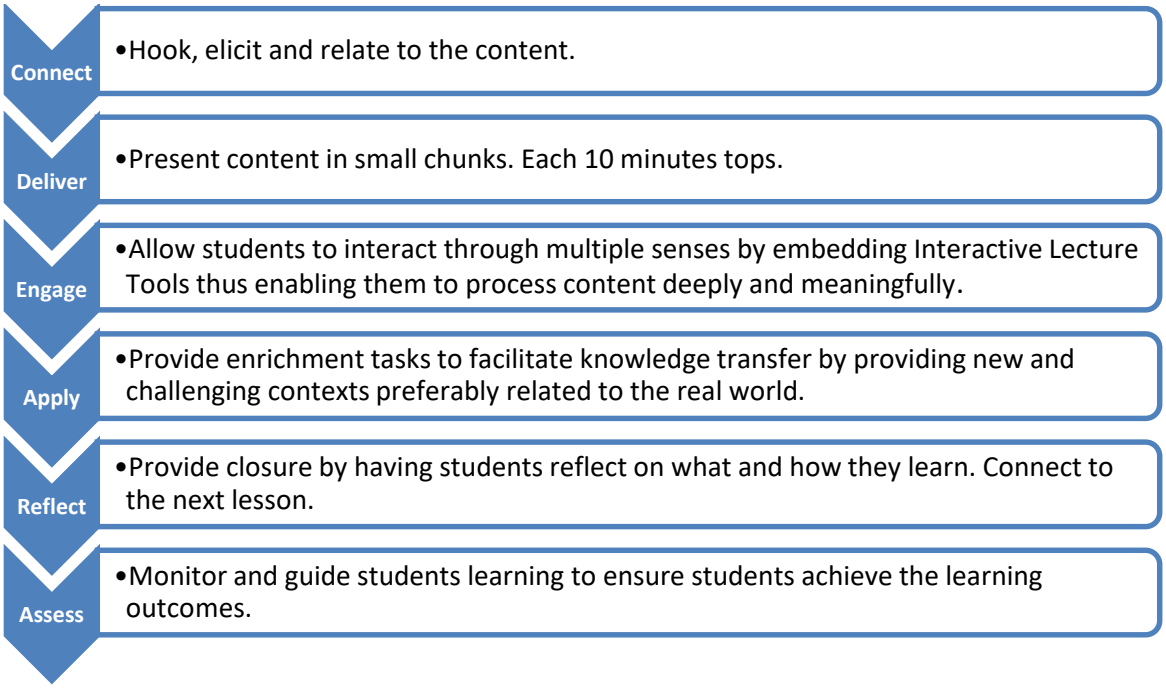

Figure 1 The CDEARA Interactive Lecture Model

Although some parts of the model appears to be sequential (for example the stages connect, deliver, apply and reflect are sequential), others such as engage and assess are stages of the interactive lecture that are executed throughout the lecture. The interactive lecture begins with 'connect' where lecturers make the opening of the lecture interesting (hook) to attract students attention; elicit students prior knowledge that is relevant to the content that will be taught; and state the learning outcomes that students are expected to achieve as a result of the lecture session. There are several ways of attracting students' attention at the beginning of a lesson such as posing a thought provoking question, showing a video clip followed by questioning and doing an interactive demonstration using the technique of Predict-Observe-Explain. At the same time, through questioning, lecturers are able to elicit students' prior knowledge which is a crucial element in the process of acquiring new knowledge. According to the constructivist learning theory, students learn by relating new information to their prior knowledge thus making students prior knowledge explicit as an important part of the 'connect' stage of a lecture.Stating the learning outcomes at the beginning of a lecture creates expectations about learning that helps students know the knowledge and skills they are expected to achieve in relation to the subject matter. A visual organiser that depicts the structure of the lecture material will also help students make the connection between

the learning outcomes and the lecture content. This in turn will help students in organising their note-taking which results in easier retrieval when needed.

The next stage of the interactive lecture is 'deliver'. As usual, lecturing will always involve the lecturer telling or explaining the material to the students. As opposed to the standard lecturing where the one-way telling or explaining can go on for more than 10 minutes, an interactive lecture breaks this stage into small chunks of preferably up to a maximum of 10 minutes or even shorter. According toBurns (1985), students recalled the most information from the first five minutes of the presentation and declined but were relatively constant for the next 10 minutes. At the end of an hour of a standard lecture, attention span drops to 3 to 4 minutes (Johnston & Percival, 1976). Thus to reset the attention,each 'deliver' stage is interspersed with the 'engage' stage where Interactive Lecture Tools are alternately embedded.

Interactive Lecture Tools (ILT) are simple hands-on and minds-on activities or techniques that can actively engage students in a lecture setting where there are limited opportunities for students to physically move around. 'Simple' means the activities or techniques do not require much preparation on the part of the lecturer and they usually lasted a few minutesonly. Examples of ILT include questioning, brainstorming, KWL chart, Think-Pair-Share, Two Minute Paper, Focused Listing, Video Clips, Animations, Plus-Minus-Interesting, Quadrant Activity, Survey, Demonstration, Predict-Observe-Explain, Nearest Neighbour Discussion, Flipcharts, Reflection Writing, ConcepTest (Mazur, 1997), and many more. Students learning experiences are made more concrete and rich as more of Dale's Cone of Experiences (Dale, 1969) nearer the bottom of the cone are embedded through the use of ILT. On the other hand, through standard lecturing, verbal and visual symbols (experiences nearer the top of the cone) which lead to more abstract learning experiences form the dominant part of students learning experiences when they are involve in mostly listening and watching. Dale argues that increasing the richness of experience would lead to greater learning.Hence students are more attentive, more interested in learning about the content, and better primed to create lasting memories of the information in the lecture.

To encourage students to learn meaningfully, three interactive elements need to be present: relaxed alertness, immersion and active processing (Caine & Caine, 1989).Relaxed alertness can be achieved through classroom atmosphere that combines a sense of low threat and significant challenges where students are not afraid of the materials presented and take academic chances.Through the use of appropriate ILT that are organised and structured throughout the lecture, significant challenges can be set up.Explaining the materials non-stop may overwhelmed students thus creating a threatening atmosphere for learning the materials. Immersion is getting students to learn through the environment by engaging them in appropriate experiences using multiple senses. According to Caine and Caine (1990), "the sense students make of their experience as a whole determines the degree of learning"(p. 69). By using several ILTs during the course of a lecture, different experiences are created which calls for the use of different senses in the process of sense making. Simply put, "the more senses that are engaged, the greater the learning" (Costa & Kallick, 2000, p. 87). Active processing allows students time to digest, think about and internalise information that is presented in a way that is personally meaningful.This can be done through embedding ILT such as questioning, use of KWL chart and journaling.

Most of the ILT's are also part of assessment activities that enable lecturers to guide and monitor students' understanding. For example, through Two Minute Paper students state the important points of the lesson; through Focused Listing students might list down the contentrelated to the subject material; through Predict-Observe-Explain students predict the outcome of an event, thus exposing their prior knowledge that sometimes can be misconceptions, and the explaining that students give indicates the status of their knowledge and understanding of the subject matter.

In the 'apply' stage, lecturers set new and preferably more challenging and situated in the real world contexts where students are given the opportunity to apply knowledge and understanding gained from the

'deliver' stage. For example, giving a problem scenario set in the context of the real world for students to solve is an appropriate activity for the 'apply' stage. Not only will students be engaged while solving the problem, it will also enable the lecturers to guide and monitor students achievement of the learning outcomes.

Finally in the 'reflect' stage, students are encouraged to reflect on the materials learned, the process of learning and the thinking that have taken place. ILT can also be used in this stage to engage students in the process of reflection. For example the use of KWL chart where at the beginning of the lesson it is usedto elicit ideas and prior knowledge and making students aware of their target for the lesson and at the end of the lesson is used for writing down knowledge and skills learnt.

Methodology

We did a pilot study on the practicality and effectiveness of the CDEARA Model by developing a training modulebased on the model and conducting a two-day Interactive Lecture Training Workshop to 35 lecturers. Participants were selected through purposive sampling method involving lecturers from seven undergraduate programmes namely Mathematics, Science, Moral, History, Physical Education, Early Childhood and Teaching of English as Second Language Education Programmes. For the workshop, we break them into three groups: group 1 consists of 12 Moral and History Bachelor of Education programme lecturers,group 2 consists of 11 Science and Mathematics programmes lecturers,and group 3 consists of 11 TESL and Physical Education and Early Childhood programmes lecturers.

The training module consists of 5 units:Unit 1 - Getting Started, Unit 2 - Experiencing an Interactive Lecture, Unit 3 - Assessing Learning, Unit 4 - Developing an Interactive Lecture Lessonand Unit 5 - Microteaching, Reflection and Feedbacks. Unit 1 focuses on gearing the participants towards Interactive Lecture activities in the rest of the units. Activities in Unit 1 include stating participants' teaching philosophies (if any), current practices in teaching and learning, prior knowledge about an Interactive Lecture, and setting goals and expectations for the course. Unit 2 guidesparticipants in building an understanding of an Interactive Lecture by experiencing an Interactive Lecture itself. The activities were structured based on the CDEARA model of connect, deliver, engage, apply, reflect and assess. The contents of the unit are the concept of and theories underpinning an Interactive Lecture and the steps in implementing it. Unit 3 deals with assessing learning. Concepts of assessment for learning and of learning were discussed and their alignment to the Interactive Lecture method. Activities include analysing examples of and generating items for assessing higher order thinking and generating observation checklists and rubrics for students' presentation and written work.Unit 4 gives participants an opportunity to design and build a lesson plan to interactively lecture a particular topic in their own courses. Comments and feedbacks sections were included for use during presentation of lesson (microteaching). Finally in Unit 5, participants lecture interactively based on the lesson plans that they have developed and similarly there is a section for writing down comments and feedbacks for the lecture performance. There is also a section on reflection, comments and feedbacks for participants' overall experience attending the workshop.

Since activities in Unit 2 were developed based on the CDEARA model, verbal interactions and written responses during the implementation of Unit 2 provided data on the implementation processfor analyses. In addition written responses in the section on overall reflection, comments and feedbacks from Unit 5 (see Figure 2) provided participants' evaluation of the module and workshop. This section asked participants to reflect on knowledge and skills acquired, evaluate the module particularly the activities presented, and evaluate the facilitator, group members,their overall experiences and future implementation.

Activity 3: Overall Reflection and Evaluation

Content	What have I learned?
Skills	What kind of skills have I acquired? Was I involved in deep thinking? How did I do it? Was it a good way to do it? How would I do it in future?
Activities	
Module	
Facilitator	
Group Members	
Overall experiences	
Future Implementation	Are you planning to implement IL in your future teachings? Why?

Figure 2 The main instrument used to collect data on participants evaluation of the module and training

The data provided us evidence to form a tentative conclusion about the practicality and effectiveness of the CDEARA model through the implementation of the training module. However, the analyses presented here are limited by the relatively small size of thesample used to pilot our module and thus the CDEARA model.In addition we were also unable to investigate in any detailed or satisfactory way lecturers' competence in carrying out an interactive lecture at this point in time due to time constraints that limit the number of participants who actually do the micro-teaching in Unit 5 to just eight (23%) participants. As a result, a more solid conclusion aboutthe effectiveness of the module and thus the model, awaits further research.

Implementation of Unit 2 of the module based on the CDEARA Model

The goal of the two-day workshop was to pilot the CDEARA model and at the same time assist lecturers to transform the standard lecture into a more interactive, student-centered lecture by embedding ILT throughout the lecture. The themes of the workshop include providing hands-on, experiential learning on lecturing interactively,developing lesson ideas and teaching them to gain mastery of skills and confidence,and collaborating with colleagues to improve instruction by sharing knowledge and participating in peer review of lessons. Although there are five units in the training module, the CDEARA model is applied in designing, writing and implementation of Unit 2: Experiencing an Interactive Lecture of the training module. At the end of this unit alone, we aim for the participants to be able to explain the meaning of an Interactive Lecture, identify the different types of Interactive Lecture Tools (ILT) to engage students during lecture and recognise some of the circumstances in which they may be used, and thus provide some basic understanding and know-how to micro-teach in Unit 5 of their training. During the workshop, each participant was given a set of the printed module. Facilitator used a set of presentation slides that are closely aligned and sequenced according to the module.

At the beginning of Unit 1 of the workshop we ask the participants the frequency with which they use the standard lecture during 14-week face-to-face sessions using the scale: 1 (not at all), 2 (rarely), 3 (sometimes)

and 4 (frequently).This data provides us with the awareness of the degree to which standard lecturing is currently being practiced amongst our participants. Figure 3 shows the distribution of responses on the frequency of standard lecturing. 28 participants (80.0%) stated that they use the standard lecture frequently during face-to-face sessions. This finding suggests that most of the lecturers use standard lecturing as the main method of teaching in their classrooms.

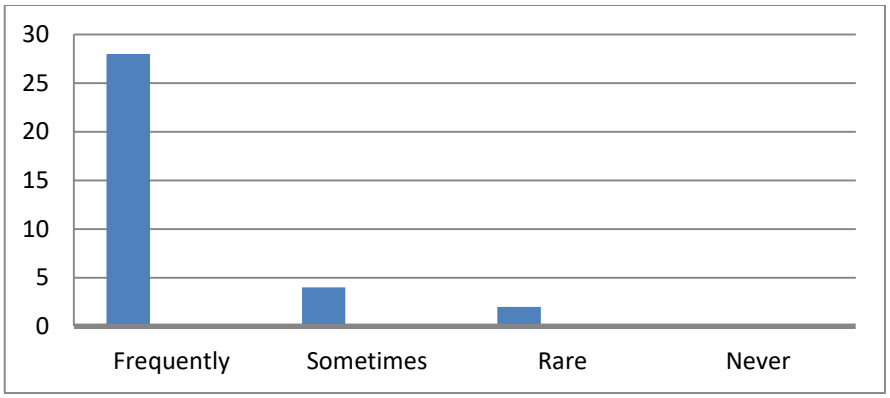

Figure 3 Frequency of using the Standard Lecture

The first stage in the CDEARA model is 'connect'. We start Unit 2 by showing the participants quotations from Microsoft Co-Founder, Bill Gates, and the President of Jensen Learning, Eric Jensen as a form of 'hook'. Bill Gates was quoted as saying "In almost every area of human endeavour, the practice improves over time, ... that hasn't been the case for teaching" while Eric Jensen was quoted as saying "There is no such thing as unmotivated students. There are however, students in unmotivated states".Some of the participants agree that changes in teaching and learning have been slow since the focus of assessment is still largely based on the paper-and-pencil mode. This led to practices that put more importance on the breadth of the curriculum compared to its depth. What little improvement in practice is in the use of teaching aids which basically refers to more usage of ICT during teaching and learning.And some went on to say "standard lecture is alright" since "teaching is very hard to change" and that "using a new technique doesn't mean abandoning the old one". In general participants were in agreement with Bill Gates, which reflect the reality of classroom practices in the institution. This goes to show that although there is a lot of research that has been done to improve practices,it is difficult to apply research-based findings to both policy and practice (Young, 2008). According to Young this is because the findings from research often need to be "contested, debated and tested again" at the policy and practice levels and all the while foster the behavioural and attitudinal changes necessary to put them in practice. In response to the second quotation, it was encouraging to conclude that all of the participants agree that motivation is not inherent in students and that the context in which students are exposed and subjected to are the deciding factor whether they are in a motivated state or otherwise. Most stated that the teaching method used as the main factor influencing students' motivation.

We continue to hook the participants' attention by showing another quotation by OECD (2001); "How people learn is more important than what people learn in the achievement of meaningful learning" (p. 20). We asked the participants whether they agree to the idea and the implications for teaching and learning. One participant is of the opinion that "How and what are inter-related. But must give priority to how" whilst another felt that "How is for long life learning, so is more important". Still another participant stated that "How people learn is more important because with a good learning process, they can transfer the knowledge no matter what they learn". In general participants value more the 'how' over the 'what' of learning. Based on the interactions generated, we conclude that these hooks were effective in generating a lot of ideas and fostering participant-participant and participant-facilitator communications.

We then proceeded to elicit participants' ideas about an Interactive Lecture using the ILT of think-pair-share and KWL chart. Participants were given 2 minutes to write down their prior knowledge about an Interactive Lecture and things that they want to know about it in the first two columns of the KWL chart. They then have to turn to a partner and share their knowledge and practices about an Interactive Lecture and finally share them with the class. In general participants' idea of an interactive lecture is a lecture that involvesa two-way communication between the lecturer and students and the use of ICT. The final activity in the connect stage was the use of ILT of brainstorming using flipcharts. Participants were given a guiding question about the ways in which they can innovate the standard lecture so that their students are more engaged and thus improve their overall learning potential. Participants were given a strip of 1 m x 0.2 m white paper to jot down their ideas and then paste the strips on whiteboards around the training room. Some of their suggestions include the use of teaching aids, thinking tools such as i-Think maps, brainstorming, problem solving activity, group presentation, small group discussion, 5W1H, demonstration, educational games, pairs check, reflection, students generated questions, overview of the lecture structure, and discuss pre-lecture questions.

The second stage of the model is the deliver stage. Slides were used to deliver the concept of an Interactive Lecture, the benefits of using Interactive Lecture and Interactive Lecture Tools. This was followed by 'engage and assess' stage of the model where participants summarised the three most important points of the lecture by using the ILT of Two Minute Paper. Some of the written responses include "Definition of IL", "How to implement IL", "...the meaning of IL and tools to deliver", "How to apply IL in current setting", "How to modify the standard lecture into an interactive lecture", "The benefits of IL", "Understand the meaning of IL and tools to deliver", and "The variety of alternative activities in IL".

The third stage is the "apply" stage where we create an opportunity for the participants to apply their knowledge and understanding about an Interactive Lecture and at the same time, assessed them using the ILT of Think-Pair-Share. We posted an objective question on the slide, gave the participants a few seconds to think individually, show their responses of either A, B, C or D using a flash card, discuss with their nearest neighbour and then discuss as a whole group. This activity was followed by a task of generating the steps in conducting an Interactive Lecture based on the activities that were carried out during this session. The following are some samples of the participants written responses:

Steps in conducting an Interactive Lecture:

"(i) Introduction, (ii) Explanation (deliver), (iii) Activity, (iv) Feedbacks, and (v) Summary"

"(i) Introduction, (ii) Development through lecture, discussion, questioning, and other ILT (iii) Assessment, and (iv) Conclusion"

"(i) Introduction, (ii) Giving lecture and use of ILT, (iii) Apply and Assess"

"(i) Exploration, (ii) Giving information, and (iii) Application"

The final stage of the model is the reflection stage. We posted three questions that include: (i) What have you learned? Fill in the third column in the KWL chart, (ii) Were you involved in serious thinking about your next course of action in using the Interactive Lecture method? Why? How?, and (iii) Are there any questions, issues or problems that you wish to raise?" Some of the written responses for lesson learnt include, "The steps in IL: CDEARA", "Know how to prepare IL to make it more interesting", "The variety of ILT", "Learned content, skills and methodologies in improving IL", "Widen my scope on teaching to be more creative, innovative, active and productive", "More systematic lesson planning" and "Learnt the difference between assessment and measurement". The main issue raised was the coverage of the standard material since more time will be required for student-student and lecturer-student discussion.

Results and Discussion

The purpose of this study was to test the practicality and effectiveness of the CDEARA Interactive Lecture Model through a workshop using a training module based on the model. At the same time, the workshop introduced the participants to tools that promote interaction and engagement during lecturing. The implementation of the interactive lecture through Unit 2 of the Interactive Lecture Training Module produces an overall positive evaluation amongst the participants as described in the above section. The 'connect' stage succeeded in hooking participants interest and eliciting a lot ofresponses.The 'deliver'together with the 'engage'and 'assess' stages lead to knowledge of an interactive lecture, specifically the CDEARA Interactive Lecture Model as evidenced from verbal and written responses throughout the implementation of unit 2 including the 'reflection' stage.

In addition, data collected from the instrument in Figure 2 provided additional support to the practicality and effectiveness of the model. In terms of the knowledge and skills acquired, in general participants stated that they learned the concept of an Interactive Lecture, Interactive Lecture Tools and the steps in implementing the Interactive Lecture through statements such as "I know what IL is and how to implement it in teaching"; "...the tools that can be used in IL"; "I learned a lot in terms of how to conduct IL in order to make it more interesting"; "... skills in effective teaching especially in brainstorming ideas"; and "... skills to use different tools depending on the topic".

Participants also gave a generally positive evaluation of the module particularly the activities presented. Positive statements include "All activities were meaningful"; "Practical and hands-on with different activities"; "Interesting, useful and helpful to apply in my teaching"; "Audience were more active with two way communication"; "Can ensure students achieve the learning outcome"; 'Help the teaching process to achieve learning objective and as a reinforcement tool". Overall, they found the module to be "interesting", "informative", "helpful", "user friendly", "good", "useful" and "have a lot of information about IL and ILT". These statements seems to suggest that the activities which are actually ILTs embedded throughout all of the interactive lecture stages succeeded in engaging the participants through multiple ways of interaction.

Participants also gave an overall positive evaluation of the facilitator.They stated that the facilitator was "great", "helpful", "fascinating", "informative", "knowledgeable", "friendly" "gave clear and detailed explanation", "very good", "excellent", and "accommodative". According to Myers and Martin (2006), interactions in a face-to-face setting that are initiated by the instructor enhance students' perceptions of instructor credibility. Instructor credibility is the degree to which students perceive their instructor to be believable (McCroskey, Richmond, &McCroskey, 2006) that include competence, character, and caring (McCroskey&Teven, 1999). Competence is the perception that the instructor is knowledgeable. Character (or trust) is the perception that the instructor is trustworthy, and goodwill (or caring) is the perception that the instructor is concerned about the student's welfare (Myers & Martin, 2006). An overall positive evaluation of the facilitator suggests that the facilitator implemented the Interactive Lecture successfully according to the CDEARA Model where interaction and engagement are the two main elements that underpin the model.

Last but not least, participants indicated that they planned on using more interactive techniques by embedding several ILTs. Examples of ILTs mentioned include POE, Two Minute Paper, Think-Pair-Share and demonstration. Many stated that ILTs made the lecture more "interesting" and that there are many ILTs to choose from that can be adopted or adapted for a particular lecture. As for the issue about the coverage of the standard material, it is indeed not possible to cover the standard material usually set for the course through

interactive lecture. Students need to take more responsibility for their own learning by having them read the material before coming to class but discussing only part of the material (perhaps the more difficult parts) in the class (Mazur, 1997). Students need to be aware that they are still responsible for all of the material and that they will be assessed accordingly.

Conclusion

We conclude tentatively that the CDEARA Interactive Model is practical, effective and amenable to implementation after testing the model through a training workshop using a training module that was developed based on the CDEARA model. This tentative conclusion is based on participants' verbal and written satisfaction and responses to test-like items in the main instrument. We are well aware that few studies have gone beyond participant satisfaction and that positive outcomes based on objective, performance-based measures such as observation of lecture sessions conducted by the participants a few months after the workshop and the impact on students' learning would lead to a more solid conclusion.We are currently conducting this part of the research as part of a bigger, 5-year longitudinal research project to develop a teacher education model for preparing quality teachers for the future.

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References

Bonwell, C. C. & Eison, J. A. (1991). Active learning: Creating excitement in the classroom. *ASHEERIC Higher Education Report No 1*, George Washington University, Washington DC.

Caine, G. & Caine, R. N. (1989). Learning about accelerated learning. *Training and Development Journal*. **43** (5), 65 – 73.

Caine, R. N. & Caine, G. (1990). Understanding a brain-based approach to learning and teaching. *Educational Leadership*, **48** (2), 66 – 70.

Chabay, R. W. & Sherwood, B. A. (1995). *Instructor's Manual to Accompany Electric and Magnetic Interactions*. New York: Wiley

Costa, A. L. & Kallick, B. (2000). *Describing 16 Habits of Mind*. Alexandria, VA: ASCD.

Hake, R. R. (1998). Interactive engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *Am. J. Phys.***66**, 64 – 74.

Johnstone, A. H. & Percival, F.(1976). Attention breaks in lectures, *Education in Chemistry*, **13** (2), 49 – 50.

Laws, P. W., Rosborough, P. J., & Poodry, F. J. (1999).Women's responses to an activity-based introductory physics program. *Phys. Educ. Res. Am. J. Phys. Suppl*. **67**, S32 – S37.

Mazur, E. (1997). *Peer Instruction: A User's Manual.* New Jersey: Prentice Hall.

McCroskey, J. C. and Teven, J. J. (1999). Goodwill: A reexamination of the construct and its measurement. *Communication Monographs*, **66**, 90–103.

McCroskey, J. C., Richmond, V. P. and McCroskey, L. L. (2006). *An Introduction to Communication in the Classroom: The Role of Communication in Teaching and Training.* Boston: Allyn and Bacon.

Meltzer, D. E. & Manivannan, K. (2002). Transforming the lecture hall environment: The fully interactive physics lecture. *Am. J. Phys.***70** (6), 639 – 654.

Middendorf, J. & Kalish, A. (1996). Teaching Resources Center Indiana University, The "Change-Up" in Lectures, The National Teaching and Learning Forum, **5** (2).

Myers, S. A. & Martin, M. M. (2006).Understanding the source: Teacher credibility and aggressive communication traits. In Mottet, T. P., Richmond, V. P. and McCroskey, J. C. (Eds.) *Handbook of Instructional Communication: Rhetorical and Relational Perspectives*, Boston: Allyn and Bacon, 67–88.

National Survey of Student Engagement (2006). Engaged learning: Fostering success for all students. Bloomington, IN : Indiana University Center for Postsecondary Research and Planning . Retrieved October 13, 2014, from http://nsse.iub.edu/NSSE_2006_Annual_Report/index.cfm.

Organisation for Economic Co-Operation and Development (2001). Preliminary synthesis of the third high level forum on learning sciences and brain-based research: Potential application for education policies and practices. Retrieved October 20, 2014, from http://www.oecd.org/edu/ceri/15302896.pdf.

Nurulhuda Abd Rahman & Noor Azman Razalee. (2012). Kuliah Interaktif Multimedia. In Nurulhuda Abd Rahman (Ed.), *Strategi dan Kaedah Pengajaran dan Pembelajaran*. Selangor: Pearson Malaysia Sdn. Bhd.

Nurulhuda Abd Rahman, Jaafar Jantan, Shahrul Kadri Ayop, Mohd Mustamam Abd Karim, Noor Azman Razalee, Roszairi Haron, & Abu Bakar Rejab. (2007). *The International Journal of Learning*, **14** (1), 255-266.

Prince, M. (2004). Does active learning works: A review of the research. *J. Engr. Educ.* **93** (3). 223 – 231.

Young, J. (2008). Impact of research on policy and practice.Capacity.org, Issue 35. Retrieved October1, 2014, from http://r4d.dfid.gov.uk/PDF/Articles/YoungImpactofResearch.pdf on .