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Analysis of the Awareness of Collaborative e-Learning (CeL) in Sri Lankan University Education

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***Abstract*— E-learning introduced new ways of learning using computer and internet, and is rapidly evolving with the development of technology. Learners can actively participate and collaborate in a learning process using either synchronous or asynchronous e-learning. Collaborative e-Learning (CeL) is an effective way of learning which also improves the processing skills of the students.**

In this study, the awareness of the effectiveness of CeL instructional models used in the Sri Lankan university education was analyzed. The population for this research study is the students and lecturers of 15 Sri Lankan National universities where the CeL model is used in the academic curricula. The study was conducted by interviews, phone calls and email among the participants.

The interview results were analyzed and the definition of CeL in Sri Lankan context is defined. Further, the factors affecting CeL, the tools used in CeL, the advantages of practicing CeL, and the challenges that arise when implementing CeL are identified. The factors are then categorized into different types and the critical factors identified. The key challenges faced by the lecturers and students were also identified. Finally, this paper presents recommendations to improve the quality of education in Sri Lankan universities and specifies future research opportunities in this field.

Keywords— **Collaborative e-Learning, collaborative e-learning in Sri Lankan university education, collaborative e-learning instructional models, awareness about collaborative e-learning**

I. INTRODUCTION

All over the world, the shift in learning approach is towards collaborative learning methods by considering the facts such as how students are learning and the best method for students to gain knowledge for the long-term existence. Currently Collaborative e-Learning (CeL) is widely practiced in developed Western countries and in Asian countries it has been considered with high potential for effective learning. CeL is undoubtedly an effective way of learning. It can make learning programs more interesting, meet students' diverse needs, improve students' academic achievements and provide students with a relaxed environment in which to study. However, a teacher should use it in a proper way according to the teaching conditions to make it effective [1].

Even though collaborative learning has been a well-known concept in the Sri Lankan education for a long time, it is a new concept in e-learning to integrate it together to get the most learner performance out of it. The tutor-mentor development program, which used a community-building model to train online tutors and mentors in higher education institutions and professional organizations in Sri Lanka, utilized a blended format of face-to-face and online activities in Moodle. The researchers identified the factors, which encouraged the learners to keep on participating in learning and then grouped the factors into three main categories: (i) general enjoyment, interest and motivation, (ii) collaborative learning and community building and (iii) knowledge building. In contrast to the common belief that Sri Lankan learners are interested in traditional face-to-face teaching and not interested in interactive online learning, the findings revealed that the interactive online design model provided the learners with satisfaction, and motivated them to use online learning in the current socio-cultural context [2].

E-learning approaches are currently in use at Sri Lankan universities. However, they are mostly implemented in an asynchronous way, so that the collaboration between students is very low. In some other universities, collaborative learning is applied in a traditional teaching way without an online presence. Therefore, it is required to identify the awareness of CeL among the Sri Lankan university lecturers and students in order to identify a better teaching pedagogy to improve the quality of learning in university education. In this research, the awareness about the CeL among the university lecturers, undergraduate students and postgraduate students is identified by considering different aspects such as factors affecting CeL, tools used in CeL, the advantages of having interactive e-learning in the university education and the challenges when implementing CeL. Based on the findings of the research, some recommendations are given to lecturers, students and the university administrative bodies to improve the quality of university education.

II. LITERATURE REVIEW

A. E-learning

E-learning is the process of knowledge building and knowledge confirming through asynchronous and synchronous electronic communication [3]. The two applications of e-learning are fully online learning, which is a form of distant education and blended learning, which is most common in traditional higher education institutes [3]. The two basic types of e-learning are asynchronous e-learning and synchronous e-learning. Asynchronous e-learning supports work relations among the participants even if they cannot be online at the same time through the media such as email and discussion boards. Synchronous e-learning supports work relations among participants at real time through the media such as videoconferencing and online chats. Hybrid e-learning is the

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combination of synchronous and asynchronous e-learning. Synchronous e-learning is emerging rapidly with the recent development of technology and improvements in the bandwidth capabilities [4].

B. *Importance of CeL*

According to Diaz [5], CeL is defined as "constructing knowledge or solving problems through mutual engagement of two or more learners in a coordinated effort using the Internet and electronic communications for their interactions". When considering the three metaphors of learning, i.e., 'learning as acquisition', 'learning as participation' and 'learning as knowledge creation' [6], collaborative learning is one of the main approaches to gain knowledge creation [7]. CeL can positively affect the student learning process in developing countries. Among the four types of interactions such as learner-learner, learner-instructor, learner-content, learner-interface [8], in CeL learner-learner and learner-instructor interactions are considered.

Collaborative learning includes problem-based learning, case-based learning, group works, discussions, reflection and other ways in which students are active participants in the learning process [9]. Students who engage in collaborative learning have a greater likelihood of acquiring soft skills such as the ability to see from their peers' perspectives, communication skills and awareness of their personal strengths and weaknesses [7]. Students face higher socio-emotional challenges when they are engaged in collaborative knowledge construction [10]. Among the factors important for students' educational experience such as social presence, cognitive presence and teaching presence [11], CeL improves the social presence when compared with the traditional way of teaching. A study done by He and Hu [12] reveals that web-based collaborative learning environments enhance students' ability to be cooperative, reflective, creative, caring and critical.

According to the study done by Requena-Carrión et al. [13], an integrated student-centered CeL in universities is needed to improve the communication skills of the students. Further, the study emphasized that the best way of learning is by constructing knowledge via project based methodologies using wiki environments and peer assessment methods using poster presentations.

Not only the students, but also the lecturers benefited through the practice of CeL. CeL course design promoted the instructors' professional development such as improving the confidence and competencies in the course design and providing knowledge about the potential of e-learning technologies and the rationale for using them [14]. The study done among the 34 pre-service student teachers revealed that using web for the interactive discussions is not only enthusiastic to the participants, but also improve the understandings of the subject knowledge of the participants [15].

C. *Factors Affecting CeL*

Previous researches suggest that, CeL can be influenced by many factors. According to Hodgkinson [16], trust and relationship among the group members are the key factors affecting the effectiveness of CeL. Haycock in his study grouped the factors into six categories as follows: (i) factors related to the environment, (ii) factors related to membership characteristics, (iii) factors related to process and structure, (iv) factors related to communication, (v) factors related to purpose, and (vi) factors related to learning resources [17]. According to the study done by Ding et al. [18], the critical factors affecting CeL are as follows: (i) CeL cognition, (ii) information communication, (iii) IT skill, (iv) instructor guidance & supervision, and (v) member relationship.

The study done by Kahiigi [19] suggests a practical way to design and implement CeL in order to support student learning at the university level in a developing country. Further, the study identified the factors, which support the student learning in a CeL environment in the categories such as institutional readiness (44 factors), technology or infrastructure readiness (40 factors) and pedagogical change (45 factors).

D. *Effectiveness of CeL*

Effectiveness of e-learning depends on different e-learning techniques and methods used. Asynchronous e-learning and synchronous e-learning have their own benefits and limitations. Synchronous e-learning better facilitates personal participation of the learners since it increases the psychological arousal and motivation whereas asynchronous e-learning better facilitates cognitive participation of the learners since it increases the ability to process information [4]. According to Bruhn-Suhr [20], the quality of teaching and efficiency of learning cannot be just improved by the usage of computer or internet. The effectiveness improves by the usage of didactical e-learning concepts, integration of multimedia learning modules in already existing learning environments and by the supervision of the learners on the internet.

According to the study done by Ray and Shu-Li [21], it is important to identify the evaluation criteria of e-learning when assessing the effectiveness. They adopted the evaluation criteria suggested by the E-Learning Quality Certification Center (eLQCC) which includes the following five criteria: (i) material contents, (ii) guide and follow-up, (iii) teaching design, (iv) media application, and (v) evaluation and feedback.

E. *CeL in Sri Lankan University Education*

Currently, there are 15 national universities in Sri Lanka including the Open University of Sri Lanka. Other than the Open University of Sri Lanka, still traditional face-to-face teaching is considered as the primary teaching approach in all the universities [22]. Hewagamage et al. [23] when explaining the challenges in implementing a blended learning environment for the University of Colombo School of Computing stated that participation from all stakeholders, in addition to a positive attitude and ICT awareness are needed for the success of blended learning. The study done by Gamage et al. [24] among the 23 universities and institutions

in Sri Lanka revealed that, with the improvement of interactivity, the quality of e-learning will improve. Further, it identified that 86% of Sri Lankan universities and institutes prefer blended learning and that students still need the physical present of the classrooms. They advised combining traditional classroom-based teaching with collaborative methods to use new technology and to interact with the peers in the universities. In addition, a study done among 400 Sri Lankan undergraduate students of Sri Lankan universities proved that an effective level of e-learning is achieved through higher levels of interactivity [25].

III. METHODOLOGY

The population for this research study is selected from the students and lecturers of 15 Sri Lankan National universities of different faculties and departments where CeL is used in their academic curricula. Finally, based on CeL usage in the universities, 10 universities were selected for the study. The universities are University of Moratuwa, University of Colombo, University of Peradeniya, University of Sri Jayewardenepura, University of Ruhuna, Rajarata University, Sabaragamuwa University, Uva Wellassa University, Wayamba University, and Open University of Sri Lanka. Based on the availability of the lecturers and students, the interview was carried out through different modes, such as face-to-face interviews, telephone interviews and Skype interviews with selected twenty lecturers and twenty students. E-mails are also used to get the answers from ten other lecturers and ten other students.

The interview questionnaire was prepared to identify the awareness of CeL among Sri Lankan university students and lecturers in the aspects of CeL tools usage, factors affecting CeL, benefits of CeL and challenges of CeL. The research instrumental used in the interview is given in the Table 1. The results of the research were analysed using statistical methods.

Question	Purpose of the question
(Q1). What is collaborative e-learning (CeL) in your point of view?	(i)To define the scope of CeL
(Q2). What are the e-learning tools you have used for teaching or learning?	(ii) To identify the awareness about CeL tools and approaches
(Q3). What are the factors affecting CeL?	(iii) To identify the factors affecting CeL
(Q4). What are the benefits and advantages of CeL compared to traditional teaching?	(iv) To identify the advantages of CeL
(Q5). What are the challenges or issues faced when implementing CeL?	(v) To identify the issues & challenges of practicing CeL

Table 1: Research Instrumental

IV. RESULTS & DISCUSSIONS

A. Define CeL

Based on the literature review and analysis of the results for the question Q1 from Table 1, CeL in university education is defined as the learning using any electronic tools or any electronic resources by keeping the lecturer-student interaction and student-student interaction synchronously or asynchronously.

B. Factors Affecting CeL

From the analysis of the results of the question Q3 in Table 1, several factors, which affect the effectiveness of CeL are identified. They are categorized into nine groups such as students' skills (6 factors), students' attitude (7 factors), lecturers' skills (5 factors), lecturers' attitude (6 factors), availability of non-electronic resources (7 factors), electronic tools & electronic resources (4 factors), government & administration (3 factors), subject content (3 factors) and teaching approach (5 factors). The analysis results are given in Table 2.

	Students' skills related factors	% of Votes
F1	ICT knowledge of the students	8.33%
F2	Communication skill of students	2.08%
F3	Writing skills of the students	0.69%
F4	English language skills of the students	1.39%
F5	Understanding level of the students	1.39%
F6	Team working ability of students	1.39%
	Students' attitude related factors	
F7	Willingness of the students	6.25%
F8	Perception of the students about e-learning	3.47%
F9	Learning styles of the students	0.69%
F10	Emotions & facial reactions of the students	0.69%
F11	Motivation of the students	4.86%
F12	Techno fear of the students	0.69%
F13	Amount of interaction between students	0.69%
	Lecturers' skills related factors	
F14	ICT knowledge of the lecturers	2.08%
F15	Lecturer's ability to interpret students' emotions	0.69%
F16	English language skills of the lecturers	0.69%
F17	Communication skill of lecturers	0.69%
F18	Lecturers' evaluating criteria	0.69%
	Lecturers' attitude related factors	
F19	Willingness of the lecturers	2.78%
F20	Perception of the lecturers about e-learning	0.69%
F21	Lecturers' reactions to students' feedback	0.69%
F22	Lecturers' motivation to students	2.78%
F23	Lecturers' guidance to students	1.39%
F24	Amount of interaction between lecturer and students	0.69%
	Availability of non-electronic resources related factors	
F25	Availability of infrastructure	3.47%

F26	Availability of necessary lecturers	0.69%
F27	Availability of support staffs	0.69%
F28	Availability of fund in the university	1.39%
F29	Students' financial condition	2.78%
F30	Time availability of the lecturers	1.39%
F31	Time availability of the students	4.17%
Electronic tools & electronic resources related factors		
F32	Availability of electronic resources	8.33%
F33	Internet connectivity	6.25%
F34	Students' capability to handle electronic tools	1.39%
F35	Lecturers' capability to handle electronic tools	1.39%
Government & administration related factors		
F36	Government regulations	0.69%
F37	Financial support from the government	2.08%
F38	Government's support to e-learning implementation	0.69%
Subject content related factors		
F39	Subject content	6.94%
F40	Degree of subject load	0.69%
F41	Accessibility of the learning material	2.08%
Teaching approach related factors		
F42	Teaching approach	3.47%
F43	Flexibility of using local languages	0.69%
F44	Lecture occurring time	0.69%
F45	Learning environment	1.39%
F46	Size of the student group	2.08%

Table 2: Factors Affecting the Effectiveness of CeL

The summary of the results is given in the Figure 1. It reveals that electronic tools and resources related elements are the most critical factor (17.37%), followed by students' attitude-related factors (17.36%). Students' skills-related factors (15.28%) and the availability of non-electronic resources (14.58%) are the other major factors affecting the effectiveness of CeL. The findings identified that the students' attitude-related factors such as their willingness, learning styles, perception, motivation, etc. are some of the key factors affecting CeL which is in consistent with the study done by Arachchi et al. when examining the learning styles and domains of the Sri Lankan community. They suggested that learners need to be able to access more content online, and need to be able to self-learn, since the country needs more self-motivated and positive thinking learners for its future development [26].

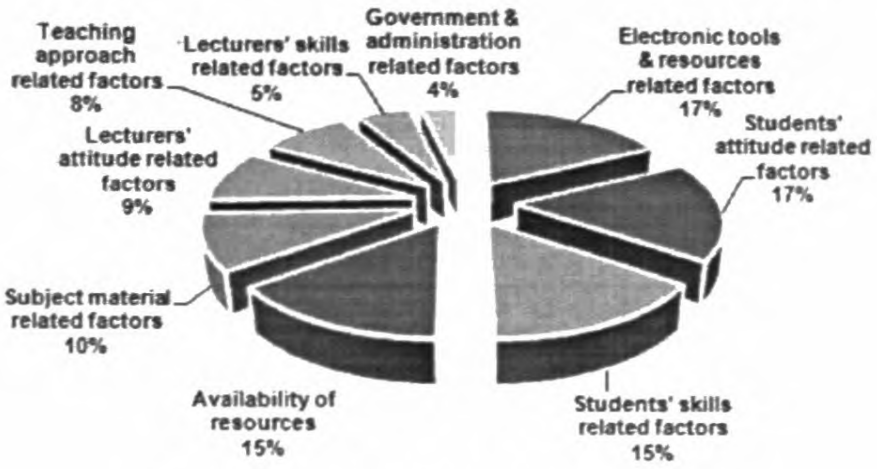

Figure 1: Factors Affecting the Effectiveness of CeL

The study done by Sridharan et al. suggested that the effectiveness of e-learning in higher education is highly influenced by factors such as technology, electronic tools and management of learning resources which is consistent with our research findings [27]. Further, the findings reveal that apart from the technology and tools related factors, the willingness and ICT knowledge of the students also highly influence the effectiveness of CeL.

C. Tools Used in CeL

In e-learning, the proper tool should be utilized to facilitate the learning process. The question Q2 from Table 1 is used to identify CeL tools, which are widely used in the Sri Lankan universities and the effective tool, which can be used to improve the quality of learning. The research findings reveal that two types of e-learning tools are commonly used. Namely, production tools, which can be used during the design and development phase of e-learning content development, and learning tools, which can be used during the delivery of the learning process. The Figure 2 and Figure 3 show the usage of electronic tools in the universities.

The findings reveal that presentation tools (33%) are the mostly used production tool followed by simulation tools (20%) and content management system (15%). In addition, the most widely used learning tool is the open source learning management system, Moodle. Consistent with the study done by Zafra et al [28] in analyzing the performance of students when using the virtual learning environment as Moodle based platform, this research also revealed that most of the lecturers and students find Moodle to be an effective e-learning tool. However, to be effective, Moodle-based learning needs to be blended with traditional teaching. In addition, the course design needs to be appropriate to the subject content. Further, continuous evaluation from lecturers is also required.

The findings of the results suggest that wikis constitute an effective CeL tool, which provides a framework for students to improve communication skills and to build knowledge. This is consistent with the research done by Requena-Carrión et al [13]. The study done by Ellis [29] pointed that, in the traditional face-to-face learning the collaborative learning environment is created via working together of students groups whereas in e-learning, online forums provide the collaborative learning environment due to its student-centric, asynchronous, written form nature. The results are consistent

with the above study such that the student-centric nature of the online forums not only supports the students to collaboratively learn in an online environment, but also outside the online environment.

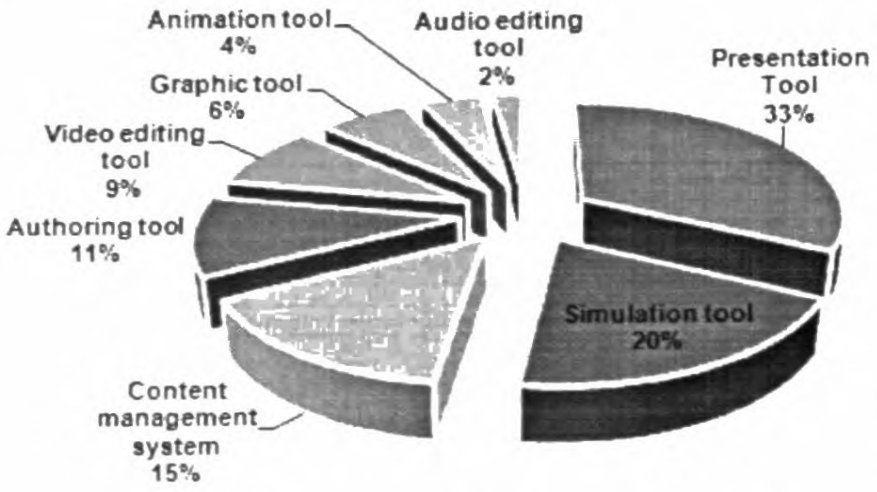

Figure 2: Usage of Production Tools in the Universities

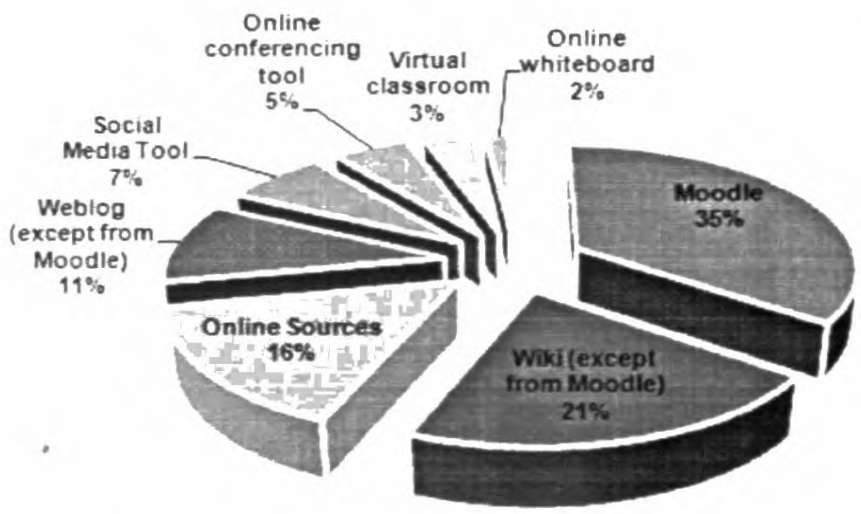

Figure 3: Usage of Learning Tools in the Universities

Even though the e-learning tools are widely used in the universities in the engineering faculties, some other faculty lecturers are still using only the traditional face-to-face classroom teaching. The below comment is from a lecturer of the Agricultural Department.

The findings reveal that in most Sri Lankan universities, other than IT and Engineering faculties, the usage of electronic tools are limited to Moodle and content management systems only. Lecturers have a perception that students' do not like any sort of e-learning and prefer instead to deliver the lectures in traditional ways. However, the responses from the students indicate that even though they do not want to completely go towards e-learning, they would like to have combination of traditional teaching and CeL.

D. Benefits of CeL compared to other teaching approaches

The question Q4 in the Table 1 was used to get answers about the awareness about the benefits and advantages of the CeL in Sri Lankan context. The findings are grouped into 14 categories (B1-B14) as given in Table 3.

ID	Benefits of CeL	% of Votes
B1	Eliminate the time barriers	14.04%
B2	Using e-learning tools can share the ideas easily with peers	12.28%
B3	Eliminate the geographical barriers	11.40%
B4	Using internet can get enormous amount of information	10.53%
B5	Can improve the teaching quality (delivery speed, etc)	8.77%
B6	Getting familiarize to new technologies and tools	7.89%
B7	Improve the social interaction	7.02%
B8	Improve the processing skills of the students	6.14%
B9	Can save money by eliminating the paper, printing costs, etc	5.26%
B10	Improve the speaking skills and writing skills of the students	4.39%
B11	Can collaborate with many students at the same time	4.39%
B12	Can overcome the issues of traditional teaching	3.51%
B13	Lecturers can monitor students' activities online	2.63%
B14	Syllabus can be updated frequently	1.75%

Table 3: Benefits of CeL

As per the research findings, one of the main advantages of CeL compared to the traditional classroom learning is its capability of eliminating the time and geographical boundaries. Unlike in traditional classroom learning, with CeL there is no need to be present in the same physical location where the lecture is being held. Therefore, it saves time for the lecturers as well as the students. In a traditional classroom environment, the lecturer delivers lectures to students by presenting to the classroom. However, CeL provides the opportunity to connect a skilled lecturer from a distant location to the classroom using electronic tools. Therefore, CeL helps extend the classroom without any geographical barriers.

The comments from the lecturers emphasized that allocating the same time slot for many students is difficult in the traditional way of teaching. Since classrooms normally accommodate a large number of students, and if the lecturer asks questions from a few students and they are able to respond with the correct answer, the lecturer may feel satisfied with the teaching. However, there is a possibility that the majority of the students are still not clear about the content. Therefore, not all the students in the classroom can be satisfied. However, using e-learning tools like blogs, Google Hangouts, Skype, forum posts, online chats, etc., lecturers can allocate the same time slot to many students. Further, in a CeL environment, after giving group tasks to students, a lecturer can monitor all the students online. Therefore, they can

evaluate each student's performance individually and electronically. This is an advantage of CeL compared to traditional learning. However, this does impose additional workload for the lecturer.

Further, some of the lecturers stated that CeL is providing chances for students to be actively involved in problem solving and to be a part of the solution. This enhances the social interaction among students and enhances their soft skills such as team working skills, learning about how to coordinate, how to accept others' views, how to agree on something, etc. This is consistent with the study done by Sing et al. [7] which revealed that CeL improves the processing skills, soft skills, and problem solving skills of the students. Consistent with the study done by Gunawardena et al. [30], the findings reveal that an organized learning community and the learners' support required when students engage in problem solving of some open ended critical questions. By using CeL, lecturers can encourage the students and get them to write the answers in discussion forums. As per some of lecturers, writing skills are currently somewhat weak in the learning community. However, even if initially students make mistakes, gradually they can improve their writing skills.

Below are some of the comments from the Engineering faculty lecturers when they were asked about the benefits of CeL blended with traditional teaching. It emphasizes the fact that they prefer CeL approaches in their curriculum.

"It is more interesting than traditional teaching because students do not feel bored."

The below comment from a Physical Science Faculty lecturer reveal the fact that some lecturers still prefer the traditional teaching methods instead of CeL since they think that by electronically communicating they cannot convey their emotions and also cannot understand their students' emotions which arise due to the lecturing.

The findings from most of the undergraduate students reveal that they can further improve their knowledge by conducting online discussions among themselves and by accessing the enormous amount of learning materials available online. Some of the students stated that by using collaborative online tools, the syllabus of a subject can be updated frequently according to the updates in the particular field. Therefore, students can access the learning materials at any time they want from learning platforms such as Moodle. At the same time, it also reduces the printing costs since the material can be viewed on-screen. The response received from a student indicates that some students prefer CeL because of the interesting nature of it.

Some post-graduate students stated that CeL practices give exposure to new technologies and tools. It also allows the participants to build the contact beyond the boundaries. By using the Internet for discussions, students can find out more about the subject content apart from what the lecturer taught. In addition, engaging in the online discussions and sharing the knowledge among participants is also easy.

E. Challenges in Carrying Out CeL in the Sri Lankan Universities

The question Q5 in Table 1 is used to identify the issues and challenges faced by the Sri Lankan university lecturers, undergraduate students and post-graduate students when practicing CeL. The answers are categorized into 13 different categories and the critical challenges identified based on the high occurrences from the interview results. The results are given in the Table 4.

ID	Challenges when implementing CeL	% of votes
C1	Providing the necessary resources	16.47%
C2	Providing required internet connection	15.29%
C3	Improve the awareness about CeL	14.12%
C4	Getting administrative support	10.59%
C5	Additional work load for the lecturers	9.41%
C6	Overcome cultural aspects of students	8.24%
C7	Overcome the perception of the participants	7.06%
C8	Improve the interest to use CeL	4.71%
C9	Overcome cultural aspects of lecturers	4.70%
C10	Improve the quality of the content	3.53%
C11	Ensuring the information security	2.35%
C12	Getting government support	2.35%
C13	Classroom attendance requirement	1.18%

Table 4: Challenges in Implementing CeL in Universities

As per the Table 4, the key challenge stated by most of the lecturers and students is providing the necessary resources such as electronic tools, infrastructure, required time, support staff, learning materials, etc., which are required to carry out CeL (C1=16.47%). The next key challenge is providing an uninterrupted internet connection for the students and lecturers to carry out the e-learning activities in classrooms (C2=15.29%). Improving the awareness among lecturers and students about CeL teaching practices, electronic tool usage and the benefits of having a blended teaching is the next challenge (C3=14.12%). Getting support from the university administration to obtain funds and carry out the e-learning activities is the next key challenge identified (C4=10.59%). In Sri Lanka, the challenges C1, C2, C3 and C4 are highly influencing CeL in tertiary education.

The case study done by Andersson [31] in the UCSC program BIT among the students, staff and facilitators from

the year 2004 to 2007 identified the following seven major challenges for e-learning in developing countries: (i) student support, (ii) flexibility, (iii) teaching and learning activities, (iv) access, (v) academic confidence, (vi) localization and (vii) attitudes. This is identified by the four challenges C3, C6, C7 & C8 in our research findings.

Some of the comments from the lecturers, which emphasize the challenges faced by them when they practice CeL are given below.

"For universities, regulations need to be flexible enough to support CeL activities."

"When going online, lecturer need enormous amount of time to achieve the same thing as in normal classroom teaching".

"One of the hardest things to overcome when implementing CeL is the cultural aspect. Our students are passive learners rather than active learners. But CeL to be successful, we need to have active learners"

"Some lecturers are not happy about e-learning. The students are ready for CeL. Even if the students are not ready, lecturers can let them use it".

The comments are supporting the facts such as getting administrative support, additional workload of lecturers, overcome the cultural aspects of the students and overcome the perception of the participants as the challenges faced by them when practicing CeL. Some of the comments from the students, which emphasize the challenges from their point of view, are given below.

"In developing countries, it is difficult to implement because of lack of electricity, internet & computer knowledge."

"As an MBA student I didn't face lot of challenges. But during my undergraduate studies, I didn't have a laptop"

"If we are in the classroom we can capture the lecturers when we need clarifications. However, in CeL we depend on their e-mails. Therefore, sometimes they do not get back to us as fast as we want to."

"Sometime, it's difficult to get correct decision because everyone shares their own ideas in the web forums."

The above comments support the facts such as providing the necessary resources, getting the assistance from lecturers as quickly as students require, improve the quality of the lecture content as the challenges faced by some of the students.

The findings reveal that most first year undergraduate students have little exposure to e-learning practices and approaches since they come from a background of pure traditional teaching in the school. Due to lack of awareness, they perceive e-learning as a self-learning mechanism which does not involve the help of a lecturer and, for this reason, they do not prefer it. However, final year undergraduate students have more interest and confidence to practice CeL blended with their traditional teaching. Post-graduate students have more exposure to novel technologies and CeL practices compared to other students. When considering the subject stream, engineering and IT students currently have more awareness about CeL practices.

V. Conclusion

The research identified the factors affecting CeL and it was categorized into nine. Findings reveal that, electronic tools and resources related factors, students' attitude-related factors and the availability of non-electronic resources related factors are the most critical factors affecting CeL. Further, the findings reveal that the most used production tools are presentation tools, simulation tools, and content management systems. The most widely used learning tools are Moodle, wiki (except from Moodle) and online sources.

The findings reveal that different level of university students have different perception about the importance of CeL in their academic curricula. Students' awareness about ICT, exposure to different electronic tools, availability of required electronic resources and subject content are some of the reasons for the different perception.

Further, the findings reveal that some lecturers do not like to include CeL approaches in their curriculum because they perceive that, their superiority over the students will affect if the students get equality in the CeL environment when discussing open-ended questions. Further some lecturers do not like to use CeL since it increases their workload by requiring them to answer students whenever they ask for clarifications, prepare the learning materials and keep them up-to-date with the advancements of technology, monitor and evaluate each student's individual performances, provide necessary feedback to students, etc. Therefore, some lecturers feel that it will take lot of their time when compared to a limited time of classroom teaching. In addition, some lecturers do not like to include CeL simply due to a lack of awareness and interest.

On contrast, some lecturers do strongly believe that, with the advancement of technology CeL needs to be blended with the traditional teaching in the Sri Lankan universities. The students will get exposure to novel technologies similar to other developed countries and some developing countries. Therefore, when they go overseas for further studies, the performance of Sri Lankan students will not suffer due to a lack of awareness about CeL.

VI. Recommendations

The perception of lecturers needs to be changed to have effective CeL approaches in the university curriculum. Lecturers need to motivate the students to engage in CeL by providing them the required facilities and by reduce their techno fear. Students need to change their attitude towards CeL to get the most benefit out of it, in case if they prefer traditional face-to-face teaching than CeL.

The necessary trainings and ICT awareness sessions need to be provided to the lecturers and students. The universities need to be accommodated with the required e-learning

facilities as well as with required support staffs to independently run the e-learning systems without depending on the academic staffs. Further, the university administration and the government need to provide their support to incorporate CeL in the universities.

VII. Future Research

CeL in the university education is an emerging area in Sri Lanka. Future research can be done in the areas such as identifying the change in perception of CeL over time among undergraduates, postgraduates and university lecturers, developing a framework to analyse the effectiveness in CeL, analysing the effectiveness of CeL, and identifying effective CeL instructional models, etc.

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