Distance Learning Student Participation in Online Supplementary Courses of a Science Degree Programme - A Pilot Study

K.D.V.F. Siriwardana

The Open University of Sri Lanka, Nugegoda, Sri Lanka
*Corresponding author**

Abstract: **This study was conducted in 2018 in distance learning students. The objectives of the study were to: identify the views on the importance/usefulness of Online Supplementary Components on educational experiences of the students at Level 3 (First Year) of the Faculty of Natural Science B.Sc. Degree Programme, identify the student participation in Online Supplementary Components offered by the Faculty of Natural Science at Level 3 in the B.Sc. Degree Programme, identify any associations between Leaner Support Programmes and student participation in Online Supplementary Components at Level 3 of the B.Sc. Degree Programme, identify any associations between geographical regions and student participation in Online Supplementary Components at Level 3 of the B.Sc. Degree Programme.**

This is a telephone questionnaire based sample survey, using closed questions. The population of the study was the 1327 students who enrolled to the *B.Sc. Degree programme(BSDP)* in the academic year 2016/2017 (conducted from 1st March 2017 to 21st February 2018 in the regional centres at Colombo, Kandy, Matara, Jaffna, Anuradhapura, and Batticaloa) in the Faculty of Natural Sciences in the Open University of Sri Lanka. In this study, the *On-Line Supplementary Components (OLSC)* offered in the discipline based courses at Level 3 in the BSDP were considered. The faculty learner support progamme - Peer Assisted Study Sessions (PASS) was conducted, in all disciplines only in Colombo and Kandy regional centres. Randomly selected 107 students, who were active learners, comprised of 42 students (Kandy -12, Colombo -30) who attended the PASS and 65 students (Anuradhapura -3, Batticaloa -4, Colombo -30, Jaffna -5, Kandy – 17, Matara -6) who did not attend the PASS, were interviewed. Stratified random sampling technique was used to select the sample.

Overall, 94% students agreed that OLSCs are important/useful for their educational experiences. Therefore developing OLSCs for more courses in the BSDPs has to be encouraged. However, majority of students have used the OLSCs to 'download the past papers' (82%) and 'Scheduling /Administrative matters' (67%). The online participation to some of the activities such as 'using online supplementary materials', 'answering of quizzes', 'interacting with the teacher for academic matters', 'interacting with the peers for academic matters' are not at satisfactory levels. Large scale studies are recommended to find out the hidden factors curbing the online participation in these activities and take measures to mitigate them. Found statistically significant positive associations with the Learner Support Programme, PASS and utilising the OLSC ($P < 0.05$). Further, introducing online components to Leaner Support Programme designed to motivate the students in developing the necessary skills and using educational technology are recommended. Difference in participation of students in OLSCs was evident between regional centres at Colombo and Kandy ($p = 0.035$). Since the study indicates less online participation in regions away from Colombo, necessary measures, including providing accessibility to communication infrastructure and making awareness on technology, have to be adopted to address the online learning participation of the students in regions remote from the main city.

I. INTRODUCTION

"E-Learning is learning utilizing electronic technologies to access educational curriculum outside of a traditional classroom" (http://www.elearningnc.gov/about_elearning/what_is_elearning/, eLearningNC.gov., 2018). "Online learning, one form of alternate learning, has created a paradigm shift in education, and in particular, the way knowledge is transmitted" (https://www.asee.org/public/conferences/32/papers/10921/download, Sader, 2014, Marupova, 2006). According to Moore(2010) Leaner management systems (*WebCT Vista*, *Blackboard* and *Moodle*) are widely used for E-learning to supplement courses and to provide learners with an alternative learning environment. Furthermore, he describes that new current trend in the higher education sector introduce more online course components to courses without finding that whether students fully utilise online components of courses and tools, and whether students view that online supplementary components add importance to their educational experience. Use of technology in student's personal lives dose not assumes that those students are competent in the effective use of educational technology. If students do not have necessary skills for the use of educational technology and have no motivation in using educational technology, then any planned educational objective would not be met. Moore (1993) identified three types of interaction inherent in effective online courses: learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction. Recent publications have identified another interaction: instructor – interface (the interaction between the teacher and technology) and learner-interface interaction (student's knowledge of the technology)(Danesh,

A., Bailey, A., Bailey, T.,, 2015). Lear, J. L., Ansorge, C., & Steckelberg, A. (2010) found that interactions with peers, instructors, and content help online learners become active and more engaged in their courses.

This is a pilot study. A pilot study was done to test research protocols, data collection instruments, sample recruitment strategies, and other research techniques in preparation for a larger scale study in student participation in OLSCs in distance learning. Also pilot study will give a guide to identify the potential problem areas to be considered in student participation in online learning in distance learning

This is a pilot study and was conducted in the Open University of Sri Lanka**.** A pilot study was done to test research protocols, data collection instruments, sample recruitment strategies, and other research techniques in preparation for a larger scale study in student participation in OLSCs in distance learning. Also pilot study will give a guide to identify the potential problem areas to be considered in student participation in online learning in distance learning

II. CONTEXT OF THE STUDY

The *Open University of Sri Lanka (OUSL),* the only national university in Sri Lanka which delivers the degree programmes through *Open and Distance Learning*(ODL) mode, has also accepted the importance of promoting E-learning. OUSL has introduced online courses in 2003 (Jayatilleke, 2010). By 2010, 74 online courses were offered by the OUSL and most of these courses were supplementary courses with no compulsory component (Jayatilleke, 2010). The Faculty of Natural Sciences of OUSL has already implemented *On-Line Supplementary Components (OLSC)* for most of the courses offered by the faculty, for **B.Sc.** *Degree Programme (BSDP).* Studying the student participation in OLSC of these courses and their views on the importance/usefulness of above OLSC, to their educational experiences, are important to improve the quality of the graduates of the **BSDPs** in ODL mode. A study on student participation in OLSC for a one level 4 course in Zoology, offered for BSDP in OUSL, (Nilakarawasam, 2013) is available in the literature. However, the number of online supplementary courses offered by the Faculty of Natural Sciences has been increased over the years and has offered 64 courses in the academic year 2016/2017. Furthermore interaction between the teacher and technology, and the student's knowledge of the technology has changed with time. Also, the Faculty of Natural Sciences gives some additional support to students on how to use OLSC at the EfIL programme, which is a compulsory three days' workshop for new students who enrolled to the **Level 3** of the BSDP. The EfIL was started in the academic year 2014/2015. Therefore, an updated study on the student participation in OLSC for recent online courses offered by the faculty of Natural Sciences in BSDP is necessary.

The faculty of Natural Sciences offers 6 disciplines namely Botany, Chemistry, Computer science, Applied Mathematics, Pure Mathematics, Physics, and Zoology. It is a compulsory requirement for every student, who registers for the first level of the BSDP (Level 3), to follow three chosen disciplines. All disciplines offered by the faulty of Natural Sciences consist of online supplementary component for at-least in one course in Level 3 of the BSDP. In this study online supplementary components offered in the discipline based courses at Level 3 of the BSDP were considered. In the academic year 2016/2017 BSDP was conducted in the regional centers at Colombo, Kandy, Matara, Jaffna, Anuradhapura, Batticaloa.

Over the past years, the Faculty has identified that a large number of students need additional support to study in the distance mode. With the intention of developing study habits to succeed at OUSL, Lerner Support Progamme - *Peer Assisted Study Sessions (PASS)* is offered by the Faculty of Natural Sciences since academic year 2013/2014. Two studies on OUSL-PASS (Bandarage *et. al*., 2011, Bandarage *et. al*., 2015) indicate that attendance in PASS can influences the student participation in learning in ODL mode, and the performance of the student. Therefore attending PASS may influence the student participation in online courses. Hence the target population in this study, the students who enrolled to the B.Sc. Degree programme in academic year 2016/2017, divided in to two main strata, students attended PASS and students who did not attended PASS. The existing PASS programme does not have any online component.

Objectives of the Study

The objectives of the study were to:

- Identify the views on the importance/usefulness of Online Supplementary Components on educational experiences of the students at Level 3 (First Year) of the Faculty of Natural Sciences B.Sc. Degree Programme.
- Identify the student participation in Online Supplementary Components offered by the Faculty of Natural Science at Level 3 in the B.Sc. Degree Programme.
- Identify any associations between Leaner Support Programmes and student participation in Online Supplementary Components at Level 3 of the B.Sc. Degree Programme.
- Identify any associations between geographical regions and student participation in Online Supplementary Components at Level 3 of the B.Sc. Degree Programme.

III. METHODOLOGY

This is a telephone questionnaire based sample survey using closed questions and a preliminary study. The study was conducted in May 2018 in distance learning students in the OUSL in the Faculty of Natural Sciences. To keep direct contact with the selected students (especially with regional students) the telephone- surveying was selected. The list of phone numbers of the students who enrolled to Level 3 in BSDP was obtained from the IT Division of the OUSL.

The population of the study was the students who enrolled to the B.Sc. Degree programme in academic year 2016/2017. In the academic year 2016/2017, 1327 students had enrolled to the BSDP in Level 3. The academic year was conducted from 1st March 2017 to 21st February 2018. According to Bandarage(2016) 31% of the new registered students are not active learners and with 0% average marks for continuous assessment marks. Those students are called non-starters of the courses. Therefore the active learners (the starters) of the BSDP are approximately 69% of the students who enrolled in the BSDP. Accordingly expected total active learners in Level 3 in BSDP, in academic year 2016/2017, were estimated (915). No point in including the non-starters in to the study. Hence, as an estimated sample size for the pilot study 10% (92) of the expected total active learners were targeted. Data was collected from 107 students from the active learners (12% of the expected total active learners, 8% of the students enrolled to the BSDP in 2016/2017 academic year). The questions were clearly explained to the students in a friendly manner and with each student minimum 20 minutes were spent. Data was recorded to an Excel work sheet.

The 107 student sample comprised of randomly selected 42 students (Kandy-12, Colombo-30) who attended the PASS in academic year 2016/2017 and 65 students (Anuradhapura-3, Baticaloa-4, Colombo-30, Jaffna -5, Kandy – 17, Matara-6) who did not attend the PASS in academic year 2016/2017 were interviewed. Sample was selected under stratified random sampling technique. Students were interviewed over the phone and responses to the following questions were recorded in an Excel work sheet.

Q1: Do you think that adding an online component to a Level 3 discipline base course is important/useful to your learning/ academic work in OUSL? The answer was recorded in five point Likert scale, strongly disagree, disagree, no idea, agree, strongly agree.

Q2: Have you used any online component of Level 3-discipline based courses offered in academic year 2016/2017? If the answer for the Q2 is yes (ie student have participated in OLSC) the response for the Q3 is recorded.

Q3: type of participation for the online component in discipline based Level 3 courses is recorded (downloaded the past papers, scheduling/administrative matters, used online supplementary materials, answered for quizzes, interacted with the teacher for academic matters, interacted with the peers for academic matters). If the student has done one of the 'participating in discussion forums', 'posting questions to instructor' and 'online discussions in moodle for academic matters' recorded that student has participated in ' interact with the teacher for academic matters'. If the student has done one of the 'posting questions to peers', 'answering questions of the peers', 'making comments on peer work', and 'uploading and sharing resources' with the peers' recorded that student has participated in 'interact with the peers for academic matters'.

The PASS was conducted in all disciplines only in Colombo and Kandy regional centres. Therefore, only at Colombo and Kandy regional centres were considered when collecting data from the students who attended PASS. Only Colombo and Kandy regional centres had sufficient student numbers for estimating reliable centre wise statistics. 'Fisher's Exact Test' (McDonald, 2014), Large Sample Test for comparing two proportions(Banneheka, 2012), were used to find associations between attendance of PASS and online participation, and associations between online participation and regions. Statistical software Minitab version 14 and Online Easy Fisher Exact Test Calculator (http://www.socscistatistics.com /tests/fisher/Default2.aspx) was used for statistical analysis.

IV. RESULTS AND DISCUSSION

The response for the Q1 is given in the table 1.

Table 1: Response for Q1

Response for Q1	Strongly disagree	Disagree	No idea	Agree	Strongly agree
Out of students Attended to PASS(n = 42)	-	10%(4)	-	50%(21)	40%(17)
Out of students Not Attended to PASS(n = 65)	-	-	3%(2)	40%(26)	57%(37)
Overall Response (n=107)	-	4%(4)	2%(2)	44%(47)	50%(54)

In overall, 94% of the students in the sample agreed that adding an online component to a discipline base course at Level 3 in the BSDP is important/useful to them. Ranasinghe & Gamini (2010) identified that the OUSL students prefer printed medium than e-learning. Compared to Ranasinghe & Gamini (2010) the results of this study give an indication that the students might have built up a positive perception about online coursers with the time.

The response for Q2 is given in the table 2.

Table 2: Response for Q2

		Used on line component
Percentage of students out of Attended PASS(n=42)		95%(40)
Percentage of students out of Not Attended PASS(n=65)		86%((56)
Overall parentage (n = 107)		90%(96)
Result of Large Sample Test for comparing two proportions using MINITAB 14 *(Null hypothesis: Attended to PASS has no association with the participation in OLSC vs* *Alternative hypothesis: Attended to PASS positively associated with the participation in OLSC)*		
Sample	Participated OLSC	N Sample proportion
Attended PASS	40	42 0.952381
Not Attended PASS	56	65 0.861538
Difference = p (Attended PASS) - p (Not Attended PASS)		
Estimate for difference: 0.0908425		
Test for difference = 0 (vs > 0): Z = 1.68 P-Value = 0.046		

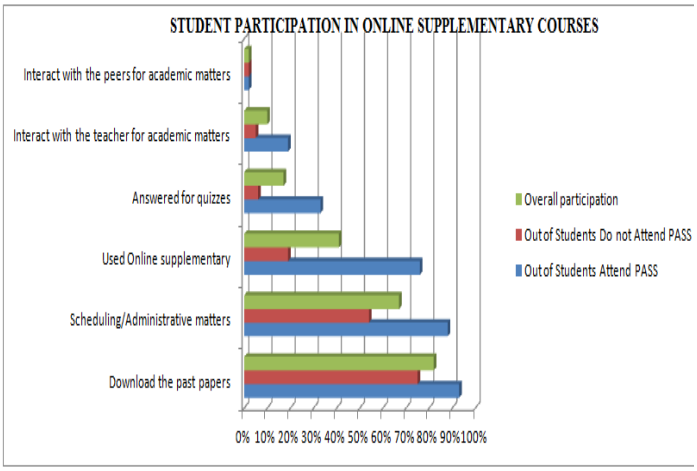
According to the table 2, students who have attended the Learner Support Programme, PASS have utilised OLSCs 9% more than those students who have not participated to learner support programme. Found statistically significant positive associations between attendance to Leaner support programme PASS and student participation in OLSC (p = 0.46).

The response for Q3, types of student participation in OLSC are given in the table 3 and Figure 1.

Table 3: Type of Student Participation

Participation in online component	Participation % out of students attended PASS(n=42)	participation% out of students did not attended PASS(n=65)	Overall participation% (n=107)
Download the past papers	93%(39)	75%(49)	82%(88)
Scheduling/Administrative matters	88%(37)	54%(35)	67%(72)
Used Online supplementary	76%(32)	19%(12)	41%(44)
Answered for quizzes	33%(14)	6%(4)	17%(18)
Interact with the teacher for academic matters – participating in discussion forums- posting questions to instructor and online discussions	19%(8)	5%(3)	10%(11)
Interact with the peers for academic matters - posting questions to peers- answering questions of the peers- making comments on peer work, uploading and sharing recourses with the peers.	2%(1)	2%(1)	2%(2)

Table 3 and Figure 1 indicate that students who have attended the Learner Support Programme, PASS have utilised Download past papers 18%, Scheduling/Administrative matters 34% , Used Online supplementary *57%*, Answered for quizzes 27% more than those students who have not participated learner support programme.



,

Table 4: Results of *Large Sample Test for comparing two proportions using MINITAB 14* Based on Attendance to PASS - *Null hypothesis: participation in online component activity independent from attendance of PASS Vs Alternative hypothesis: participation in online component activity positively associated with attendance of PASS*

Online Component Activity	p value for Large Sample Test for comparing two proportions
Download the past papers	*0.022*
Scheduling/Administrative matters	*0.000*
Used Online supplementary	*0.000*
Answered for quizzes	*0.000*
Interact with the teacher for academic matters – participating in discussion forums- posting questions to instructor and online discussions	*0.014*
Interact with the peers for academic matters - posting questions to peers- answering questions of the peers- making comments on peer work, uploading and sharing recourses with the peers.	*p = 1*

According to table 4, Found statistically significant associations: attendance to PASS positively associated ($p<0.05$) with student online participation for 'Download the past papers', 'Scheduling/Administrative matters', 'Used Online supplementary materials', 'Answered for quizzes' and 'interact with the teacher for academic matters'. Students who have attended PASS have more participated in OLSC than students who have not attended PASS.

The table 5 gives the type of online participation by Regions.

Table 5: Type of Engagement by Regions

Type of participation in online component	Participation %	
	Colombo (n=60)	Kandy (n=29)
Download the past papers	92%(55)	76%(22)
Scheduling/Administrative matters	76%(46)	69%(20)
Used Online supplementary	48%(29)	41%(12)
Answered for quizzes	25%(15)	10%(3)
Interact with the teacher for academic matters - participating in discussion forums- posting questions to instructor and online discussions	15%(9)	7%(2)
Interact with the peers for academic matters - posting questions to peers- answering questions of the peers- making comments on peer work, uploading and sharing recourses with the peers	02%(1)	03%(1)

According to the table 5, students in Colombo have utilised Download the past papers 16% , Scheduling/Administrative matters 7% more than those students in Kandy.

Table 6: Results of the Large Sample Test for comparing two proportions based on Regions - *Null hypothesis: no difference in student participation in OLSC between Colombo and Kandy regions Vs Alternative hypothesis: Student participation in OLSC in Colombo Regional centre is higher than the Student participation in OLSC in Kandy Regional centre*

Type of participation in online component	p value for Z - test
Download the past papers	0.035
Scheduling/Administrative matters	>0.5
Used Online supplementary	>0.5
Answered for quizzes	>0.5
Interact with the teacher for academic matters - participating in discussion forums- posting questions to instructor and online discussions	>0.5
Interact with the peers for academic matters - posting questions to peers- answering questions of the peers- making comments on peer work, uploading and sharing recourses with the peers	>0.5

According to table 6 found a statistically significant regional difference between Colombo and Kandy regional centres ($p < 0.05$) in student online participation for 'downloading the past papers'.

Table 7: Type of Engagement by Attendance to PASS and Regions

Type of participation in online component	Participation % Out of student Attended PASS		Participation % Out of students do not attended PASS	
	Colombo (n=30)	Kandy (n=12)	Colombo (n=30)	Kandy (n=17)
Download the past papers	100%(30)	75%(9)	83%(25)	77%(13)
Scheduling/Administrative matters	97%(29)	67%(8)	57%(17)	71%(12)
Used Online supplementary	80%(24)	67%(8)	17%(5)	24%(4)
Answered for quizzes	40%(12)	17%(2)	10%(3)	6%(1)
Interact with the teacher for academic matters - participating in discussion forums- posting questions to instructor and online discussions	26%(8)	0%(0)	3%(1)	12%(2)
Interact with the peers for academic matters - posting questions to peers- answering questions of the peers- making comments on peer work, uploading and sharing recourses with the peers	3%(1)	0%(0)	0%(0)	5%(1)

Table 7 indicates that Students in Colombo have participated more in OLSC than students in Kandy.

Table 8: Results of the Fishers Exact Test Based on Regions and attendance of PASS - *Null hypothesis: participation% in online component independent from regions [Colombo and Kandy] vs Alternative hypothesis: participation% in online component associated with regions [Colombo and Kandy]*

Type of participation in online component	*p value for out of attended PASS*	*p value for not attended PASS*
Download the past papers	*0.019*	*0.704*
Scheduling/Administrative matters	*0.018*	*0.533*
Used Online supplementary	*0.433*	*0.704*
Answered for quizzes	*0.277*	*1*
Interact with the teacher for academic matters - participating in discussion forums- posting questions to instructor and online discussions	*0.0804*	*0.543*
Interact with the peers for academic matters - posting questions to peers- answering questions of the peers- making comments on peer work, uploading and sharing recourses with the peers	*1*	*0.362*

From Table 8, according to Fisher's Exact test found statistically significant regional difference between Colombo and Kandy regional centres ($p< 0.05$) for the students who have attended PASS in student online participation for 'downloading the past papers', and 'scheduling/administrative matters'. However since the sample sizes are small Fisher's exact test was carried out for this comparison in table 8 and unable to check the direction of the associations that whether the associations are positive. However according to the proportions in table 7 there is an indication that students in Colombo have participated more in OLSC than students in Kandy.

This study indicates that in overall, majority of students have used the OLSC for 'download the past papers'(82%) and 'scheduling /administrative matters'(67%). Though 94% students think that OLSC are important /useful for them, the participation in 'interact with the peers for academic matters' (2%), 'interact with the teacher for academic matters' (10%), and 'answered for quizzes'(17%) are poor. Nilakarawasam (2013) indicates finding time for the online component even with different learning is the major factor behind the poor participation on online. This study indicates that 'attendance of PASS' is associated with participation in online engagement. Bandarage *et. al*. (2011) indicates that "the PASS programme has been successful in developing good ODL study habits in participants". Hence there may be more hidden factors behind the online participation in BSDP.

V. CONCLUSIONS/RECOMMENDATIONS

Overall, 94% of students think that Online Supplementary Components (OLSCs) are important /useful for them. Therefore developing OLSCs for more courses in the B.Sc. Degree Programmes (BSDPs) has to be encouraged.

However, overall, majority of students have used the OLSCs to 'download the past papers' (82%) and 'Scheduling /Administrative matters' (67%). The online participation to some of the activities such as 'using online supplementary materials', 'answering of quizzes', 'interacting with the teacher for academic matters', 'interacting with the peers for academic matters' are not at satisfactory levels. Large scale studies are recommended to find out the hidden factors curbing the online participation in these activities and take measures to mitigate them.

According to the study, found significant positive associations with the Learner Support Programme, PASS and utilising the OLSC. Further, introducing online components to Leaner Support Programme designed to motivate the students in developing the necessary skills and using Educational Technology are recommended.

Clear difference in participation of students in OLSCs was evident between regional centres at Colombo and Kandy. Since the study indicates less online participation in regions away from Colombo, necessary measures, including providing accessibility to communication infrastructure and making awareness on technology, have to be adopted to address the online learning participation of the students in regions remote from the main city.

REFERENCES

[1] Bandarage G.(2016). Prevalence and the effect of non-starters on course Completion rates of the B.Sc. Programme : a preliminary study, *Proceedings of the Annual Academic Sessions of The Open University of Sri Lanka*, Colombo, Sri Lanka ,p1–4.

[2] Bandarage G, Edirisinghe E.A.D.N.D., Rajendra J.C.N., Siriwardena K.D.V.F., Somerathne S., Tantrigoda R.U. , Wattavidanage J. (2015). Effectiveness of a modified version of peer-assisted study session in improving academic performance, *Proceedings of the Annual Academic Sessions of The Open University of Sri Lanka*, Colombo, Sri Lanka ,p1–4.

[3] Bandarage, G., G. W. A. R. Fernando, C. N. Nupearachchi, P. K. D. Peiris, J. C. N. Rajendra, K. D. V. F. Siriwardena, R. U. Tantrigoda, J. Wattavidanage, and S. R. Weerakoon (2011). Experience in implementing a student support programme based on the PASS model for BSc undergraduates at the Open University of Sri Lanka, *Proceedings of the Annual Academic Sessions of The Open University of Sri Lanka*, Colombo, Sri Lanka, p56–59.

[4] Bannehaka B.M.S.G., Statistical Inference, Open University of Sri Lanka, Sri Lanka, 2012, p203-204.

[5] Danesh, A., Bailey, A., Bailey, T., (2015). Technology and Instructor-Interface Interaction in Distance Education. *International Journal of Business and Social Science* , USA, 6(2), *2219-6021 (Online)*

[6] Jayatilleke, B. G. (2010). Communication Model to Knowledge Construction Model: OUSL Teachers'Experience of Online Education.*Proceedings of the OUSL 30thAnniversary International Research Conference*, 20-21 August 2010, Colombo, Sri Lanka, 40-44

[7] eLearningNC.gov. (2018). *About e- learning*. Retrieved from http://www.elearningnc.gov/about_elearning/what_is_elearning/

[8] Lear, J. L., Ansorge, C., & Steckelberg, A. (2010). Interactivity/community process model for the online education environment. *Journal of Online Learning and Teaching, 6*(1), 71–77.

[9] Marupova, R. (2006). Effect of WebCT on Students' Learning Outcomes in an Information Literacy Course., Pearson & P. Bohman (Eds.), *Proceedings of World Conference on Educational Multimedia,Hypermedia and Telecommunications* (pp. 2222-2227). Chesapeake, VA: AACE.

[10] McDonald, J.H. (2014). Handbook of Biological Statistics (3rd ed.). Sparky House Publishing, Baltimore, Maryland. pages 77-85

[11] Moore, K., Lida, S., (2010). Students' perception of supplementary, online activities for Japanese language learning: Groupwork, quiz and discussion tools. *Australian Journal of Education Tecnology* , 26(7), 966-979.

[12] Moore, M. J. (1993). Three types of interaction. In K. Harry, M. John, & D. Keegan (Eds.), *Distance education theory* (pp. 19–24). New York: Routledge.

[13] Nilakarawasam N., (2013). A study on student participation in an online supplementary course in zoology , *Proceedings of the Annual Academic Sessions of The Open University of Sri Lanka*, Colombo, Sri Lanka , p1–73

[14] Ranasinghe, S. & Gamini, L.P.S. (2010). The potential of e-learning in pursing higher education through the open and distance mode: case of the Open University of Sri Lanka. *Proceedings of the OUSL 30thAnniversary International Research Conference*, 20-21 August 2010, Colombo, Sri Lanka, 12-15

[15] Sarder, B., Improving Student Engagement in Online Courses, 121st ASEE Annual Conference & Exposition, Induanapolis, IN., American Society for Engineering Education, June 15-18,2014