PERCEPTIONS OF STUDENT TEACHERS OF AN ONLINE LEARNING ENVIRONMENT ON OPEN EDUCATIONAL RESOURCES FOR SCIENCE EDUCATION

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INTRODUCTION

The concept of Open Educational Resources (OER) refers to any educational resource that has been designed for use in teaching and learning that is openly available for use by educators and learners, without an accompanying need to pay royalties or license fees (Butcher, 2010). OER include learning objects such as lecture material, references and readings, simulations, experiments and demonstrations as well as syllabi, curricula and teachers' guides and these can be reused, revised, remixed and redistributed (Wiley, 2006). These openly licensed educational materials have tremendous potential to contribute in improving the quality and effectiveness of teaching and learning while providing many benefits for learners and educators.

The advantages of OER can be realized only through systematic design and creation of quality OER that would cater for specific requirements (Hatakka, 2009). The design and development of computer-based learning materials have been identified as a highly challenging and motivating task for educators (Karunanayaka,2005; Karunanayaka,2006). The essential need to pay attention to using appropriate instructional design approaches when developing online courses has also been emphasized (Karunanayaka & Thanaraj, 2010).

The Faculty of Education of the Open University of Sri Lanka (OUSL) initiated a research project to create an online learning environment on OER for Science education. This is developed in the Moodle Learning Management System (LMS) to be offered as a supplementary online course for Science teachers enrolled in the Postgraduate Diploma in Education (PGDE) and Bachelor of Education (Natural Sciences) Degree Programmes. The main aim of introducing this course is to promote use, adaptation and creation of OER by Science teachers. The course will further enable student teachers to gain an understanding about the concept of OER and their significance in the teaching-learning process, identify sources of OER available for Science education, create and share OER with their colleagues.

The research team, together with a group of Science teachers/teacher educators who were postgraduate students of the Faculty, engaged in this project that was conducted in several stages: Analysis, Design, Development, Implementation and Evaluation. Analysis of need, learner, task and context was conducted and decisions were made on designing information, instruction, interaction and interface. The design and development phases involved structuring the content, deciding on the instructional approach, designing graphical user interface, designing navigation structure, integrating course content in different media formats, incorporating strategies to enhance interactivity, and constructing the online course, named "OER4ScEd", in Moodle (Karunanayaka, Fernando & de Silva, 2013).

The course OER4ScEd was developed focusing on the existing Grades 10-11 National Curriculum on Science, relating to topics in three subject areas- Biology, Chemistry and Physics. The content was structured in the Moodle LMS under 06 main sections as follows: 1. An introductory section on OER–to raise awareness, develop skills and facilitate search/use/creation

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of OER; 2.-4. Subject-wise sections with selected OER–Biology/Chemistry/Physics;5. General Resource's section to search and find OER; 6. A section to create / add OER by users. The selected OER in Sections 2-4 were presented under the prescribed competencies in Grades 10-11 Science curriculum in a structured manner, categorized as reading materials, activities and multimedia.

The developed course was piloted with a group of science teachers, who are current students of the PGDE programme, to find out their perceptions of the online course "OER4ScEd" with the aim of further improving it, based on their feedback. This paper is presented based on the findings of the pilot study.

The objectives of the study are as follows:

1. To find out perceptions of student teachers of the online learning environment "OER4ScEd".
2. To find out strengths and limitations in information design, instruction design, interaction design and interface design of the online learning environment
3. To identify areas for further improvements in the online learning environment

METHODOLOGY

The pilot study was conducted using multiple methods of data collection. Twenty participants were selected from 34 PGDE students registered in the Science subject stream for teaching methodology, in the Colombo Regional Centre. Descriptive data were collected through an online questionnaire incorporated in the Moodle LMS, including   5-point rating scales on their perceptions of the online learning environment and its different design aspects, together with open-ended questions. An evaluation checklist on the OER presented in the online learning environment under different competencies of the three subjects, was also administered among the participants. In addition, focus group interviews were held with three sub-groups according to the three subject areas- Biology, Chemistry and Physics.

RESULTS AND DISCUSSION

Table 1: Perceptions of student teachers on the online learning environment "OER4ScEd"

Question	Aspect	Average rating (on a Scale 5-1)
How valuable to you has been the Online Learning Environment "OER4ScEd", in the following aspects?	1. Raising awareness about Open Educational Resources(OER)	3.8
	2. Having access to a variety of teaching-learning resources	3.7
	3. Opportunity to search for Open Educational Resources	4.0
	4. Sharing resources with others	4.0
	5. Engage in discussions on use of resources	3.8
	6. Opportunity to develop resources collaboratively	3.9
How satisfied are you with the following attributes of the online learning environment "OER4ScEd"?	1. Relevance of the learning resources	3.9
	2. Quality of learning resources	3.8
	3. Clarity of the learning activities	3.8
	4. Interaction opportunities with peers	3.8
	5. Flexibility in learning options	3.8
	6. Taking control of your own learning	3.5
Scale used: 5-Extremely; 4-To a great extent; 3-Moderately; 2-Just a little; 1-Not at all		

A majority of the participants were females (17/20) and below 40 years of age (15/20). A majority (13/20) had more than five years' experience as teachers and all claimed to have either excellent or average proficiency in English language as well as in computer use.

Perceptions of participants of the online learning environment, based on their responses to the online questionnaire are presented in Table 1.

Results revealed that the participants considered "OER4ScEd" valuable to them to a great extent (all ratings above 3.7) in providing an opportunity to identify, search for and share OER. Further, they were satisfied to a great extent (all ratings above 3.5) with its relevance, quality, clarity, interactivity and flexibility. More attention was required on allowing learners to take control of their own learning.

Table 2 presents a summary of student perceptions of information design, instruction design, interaction design and interface design of the online learning environment.

Table 2 : Perceptions of participants on information design, instruction design, interaction design and interface design of the online learning environment

Question	Aspect	Average rating (on a Scale 5-1)
How satisfied are you with the Information Design of the online learning environment, in following aspects?	1. An informative title	3.4
	2. Home page information	3.8
	3. Introduction to the course	3.8
	4. Learning outcomes	4.0
	5. User guidelines	4.0
	6. Menu/Contents with links	3.8
	7. Organizing/Structuring information	3.8
	8. Categorizing information	4.0
	9. Labeling chunks of information	3.9
	10. Use of a variety of strategies in presenting information	4.1
How satisfied are you with the Instruction Design of the online learning environment, in following aspects?	1. Use of a learner-centered approach	3.8
	2. User has control over his/her learning	3.8
	3. Searching for information encouraged	3.8
	4. Flexibility in learning provided	3.8
	5. Enhancing participation in learning activities	3.8
	6. Facilitating knowledge construction	3.8
How satisfied are you with the Interaction Design of the online learning environment, in following aspects?	1. Learner-Content Interactions	3.6
	2. Learner-Teacher Interactions	3.8
	3. Learner-Learner Interactions	3.7
	4. Learner-Interface Interactions	3.4
	5. Meaningful navigation among sections	3.5
	6. Social Interactions	3.8
How satisfied are you with the Interface Design of the online learning environment, in following aspects?	1. Page layout – Consistency	3.7
	2. Page Layout - User friendly	3.8
	3. Font types/sizes/colours used	3.5
	4. Background/Text colour contrast	3.6
	5. Images used – Motivational	3.9
	6. Images used - Relevant & Appropriate	4.0
Scale used: 5-Extremely; 4-To a great extent; 3-Moderately; 2-Just a little; 1-Not at all		

As evident from these results, the participants were satisfied to a great extent (all ratings ranging between 3.4 to 4.1) with different aspects of information, instruction, interaction and interface design of the online learning environment. Areas for further improvements were identified in the learner-interface interactions, navigation, font and background types and colours.

The arrangement of a variety of OER under different competencies of Biology, Chemistry and Physics in the existing National curriculum of Science at GCE O/Level, were found to be "very useful", "effective" and "interesting". Further, it was claimed that most of the design aspects were "clear", "simple", "user-friendly", "flexible" and "motivating". Certain concerns on some OERs were stated as "too advanced", "too lengthy", "content not relevant to syllabus", and "cultural differences depicted in some examples". However, overall, a positive impact was revealed as evident by the following quotes: "It save time and money"; "It helps to have better knowledge in the subject matter, to find answers for questions which arise while teaching, to engage with new technology and communicate with peers"; "It enables to teach with confidence and enables to go with the world" and "I think it opens us a new path to teach". The main challenge faced by almost all participants was, coping with the technical problems. Suggestions of participants included making the environment more interactive, use of shorter video clips, including content directly tallying with the syllabi, addition of more multimedia materials, encouraging teachers to develop their own materials, to provide in Sinhala and Tamil media too and to expand to other subjects as well.

The evaluation checklist provided specific data on different OER presented under each competency in the three subject areas. It was identified that while a majority of the OER included were appropriate, there were some identified either as too advanced or too simple, which needed to be replaced. It was suggested to have a different link as "Additional Resources" to place in the advanced OER. It was evident through the focus group interviews that all participants were highly satisfied with the relevance, usefulness, organization and the effect of OER in the LMS. They further confirmed their confidence in making use of OER and effectively integrating it in the three Science subject areas in order to make the classroom teaching-learning process more conducive.

CONCLUSIONS/RECOMMENDATIONS

The online learning environment "OER4ScEd" has been a new experience for the Science teachers. It was identified as very useful and relevant for them, as it broadens their scope of learning, saves time in searching for resources and improves the quality of teaching and learning. The strengths revealed were structured organization of the learning environment, relevance of OER, simplicity in use, and catering to different learning styles through incorporation of a variety of media. The learning environment can be further improved by adding more relevant OER and making the environment more interactive.

REFERENCES

Butcher, N. (2011). *A basic guide to open educational resources (OER)*. [Online] Available URL: *<http://www.col.org/oerBasicGuide>* Accessed 23.10.11

Hatakka, M. (2009). Build it and they will come? – Inhibiting factors for reuse of open content in developing countries. EJISDC 37 (5), 1-16 [Online] Available
URL: *<http://www.ejisdc.org/ojs2/index.php/ejisdc/article/view/545/279>* Accessed 23.10.11

Karunanayaka, S., Fernando, C., De Silva, V. (2013). Designing an Online Learning Environment on Open Educational Resources for Science Education. *AAOU Journal,* Volume 8, No.1. pp 1-11

Karunanayaka, S. (2005). *Teachers as designers and developers of computer-assisted learning materials*. Paper presented at the 61st SLAAS Annual Sessions, 12-17 December, 2005, OUSL, Nawala.

Karunanayaka, S., (2006) *First Experiences in Collaborative Online Learning: A Case Study.* Paper presented at The Fourth Pan-Commonwealth Forum on Open Learning (PCF4), 30 October to 03 November, Ochos Rios, Jamaica.

Karunanayaka, S. & Thanaraj, T. (2011). Reflections on Design Features Adopted in the Online Courses of MATE-I Programme. Paper published in the *Special Journal on OUSL International Conference - Open & Distance Learning in the 21st Century-Challenges & Possibilities*

Wiley, D. (2006). *The current state of open educational resources.* [Online] Available *URL: <http://opencontent.org/blog/archives.247> Accessed 23.10.11*

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