Stiftung Internationales Informatik- und Begegnungszentrum Sachsen

IBS International Summer School

Wolfram Hardt
(Hrsg.)

This volume of IBS Scientific Workshop Proceedings collects research work from the international IBS workshop on Learner centered learning (LCL) topic. This workshop organized in frame of DrIVE-MATH – Development of Innovative Mathematical Teaching Strategies in European Engineering Degrees project where cooperating universities from Germany, Portugal, France and Slovakia. One of key goal of this project is to implement new teaching methods in engineering science and to apply different kind of active learning methods in universities. Therefore, main aim of this first workshop to call researchers, professors and educators from world to discuss highlight problems of modern higher education systems, especially active learning and new teaching methodologies in engineering sciences. Professors from Germany, Mongolia, Philippines, China, India, Sri Lanka and Egypt joined to workshop and three days actively discussed around LCL topic.

Editor:

Stiftung IBS

Prof. Dr. Wolfram Hardt
Hauptstraße 14
02991 Lauta

Workshop-proceedings online available

www.ibs-laubusch.de

9 783959 081580

IBS Workshop Learner Centered Learning

Wolfram Hardt
(Hrsg.)

Workshop-Proceedings

IBS Scientific Workshop Proceedings

6

IBS Learner Centered Learning

Wolfram Hardt
(Hrsg.)

TUD*press*

IBS Scientific Workshop Proceedings

Herausgegeben von Stiftung IBS, Wolfram Hardt

Band 6

IBS Workshop
Learner Centered Learning

Wolfram Hardt
(Hrsg.)

TUD*press*
2019

Bibliografische Information der Deutschen Nationalbibliothek
Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über http://dnb.d-nb.de abrufbar.

Bibliographic information published by the Deutsche Nationalbibliothek
The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at http://dnb.d-nb.de.

ISBN 978-3-95908-158-0

THELEM Universitätsverlag
GmbH und Co. KG
http://www.tudpress.de

Gesetzt von den Herausgebern.
Printed in Germany.

Preface to the scientific series
IBS Scientific Workshop Proceedings

This scientific series publishes contributions to IBS-workshops, -conferences and -events.

The foundation „Internationales Informatik- und Begegnungszentrum Sachsen (IBS)" supports the establishment, growth and preservation of scientific oriented interdisciplinary networks. National and international scientists and experts are brought together for research and technology transfer, where the foundation IBS provides the suitable environment for the conferences, workshops and seminars.

The series *IBS Scientific Workshop Proceedings* aims at the ensuring of permanent visibility and access to the research results presented during the events staged by IBS.

The rapid development of technology and completely new view to learning process of modern learners are requested to re-design learning environment and teaching methodologies of higher education systems. Therefore, universities of Germany, Portugal, France and Slovakia working on specific project so called "DrIVE-MATH – Development of Innovative Mathematical Teaching Strategies in European Engineering Degrees". One of key goal of this project is to use new teaching approaches in engineering sciences. The learner centered learning is challenging approach of active learning and teaching methodologies. Experts and educators from Germany, Mongolia, Philippines, China, India, Sri Lanka and Egypt joined to workshop and discussed actively around this topic. We included in this volume selected papers from LCL workshop.

Prof. Dr. Uranchimeg Tudevdagva

Chairman of LCL Workshop

January 2019

Table of contents

Learner Centered Learning Workshop

Learner Centered Teaching: Teaching Case Study with Student Collaboration

Erdenesuvd.A, Tsogzolmaa.D, Enkhtsetseg.M

School of Applied Science, Mongolian University of Science and Technology
Ulaanbaatar, Mongolia

Abstract

International trends in higher education show a shift away from the teacher-centered model that emphasizes what is presented, towards the student-centered model focusing on how students interact with each other well and what students know and can actually do. This paper addresses how to provide environment for students to promote effective self-learning and team work, to learn from classmates and to teach knowledge and competence for classmates. Classes, where teachers encourage students to teach and learn from each other help students effectively construct their knowledge. By emphasizing the collaborative and cooperative nature of academic work, students share responsibility for learning from each other, discuss different conceptual understandings, and shape the learning environment of the class. The author consider that, there might be relationship between academic performance, self-reflection and learning environment where students learn and teach each other by guidance of teachers. Furthermore, students improve their leadership skills, team work, time management and motivation by this activity.

Keywords: learner-centered teaching, collaborative learning, self-reflection.

Learner Centered Teaching: Teaching Case Study with Student Collaboration

Our Teaching Assistant Club /TAC/ was established in 2011 and has been working for seven years. The purpose of this club is to improve the skills and academic knowledge of the students at the Mongolian University of Science and Technology /MUST/. This club allows to establish environment, where future leaders of various fields shape themselves. Teaching assistants teach and help their colleagues and study together. The TAC experience can be an outstanding way to learn the art of teaching and to have a positive influence on many students. By working as a teaching assistant, students learn about themselves, improve their communication skills and take responsibilities. Our aims are shows in Figure 1:

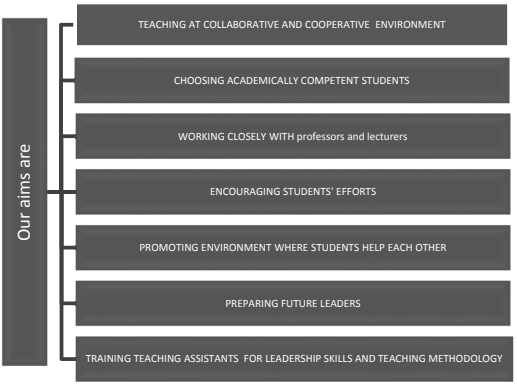

Figure 1. Aim of TAC

There are two types of courses for assistant teacher-student: Leadership training and Teaching methodology. Teaching assistant-student teach one of the following courses (Figure 2):

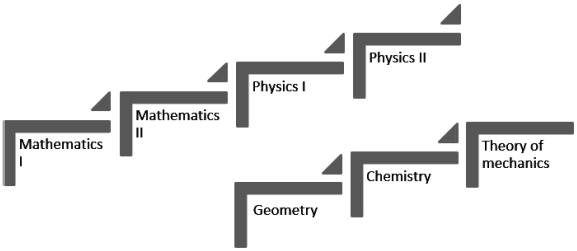

Figure 2. Courses for TAC

Our club activities are as follow (Figure 3):

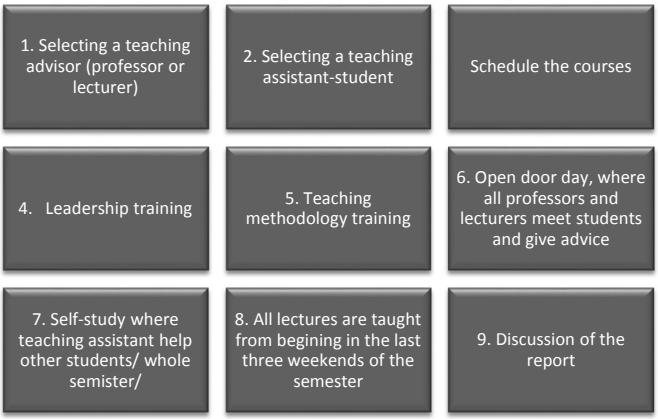

Figure 3. Activities of TAC

We structure our class in the following ways:

- Allow students to work in pairs and small groups and use multiple modes of communication e.g., discussions, making presentations, brainstorming, etc.);
- Encourage students to get comprehensive answers by cooperating together to an open-ended problem;
- Devote a significant proportion of class time to student interactions;
- Run in-depth conversations among students (and between students and instructor);
- Provide opportunity to explain their ideas to classmates.

We use some methods to improve student to student classroom interaction

- We want students to interact at different scales and engage in discussion in our classroom. For instance, we apply the following teaching methods and techniques:
    - In-class assignments, where students think individually about a question, talk with their classmates about an idea how can solve the problem, and then report their findings back to the class;
    - Conceptual multiple-choice questions (Concept Tests) about concepts of the subject, students discuss their conceptual understandings and strengthen their knowledge.;
    - In structured discussion exercises such as jigsaw activities, where students deepen their knowledge by getting help from teaching assistant, who has in-depth knowledge and ability about the topic;
    - In more cooperative learning techniques that encompasses a variety of methods to encourage student to student interactions within the classroom.

As a TAC member, teaching assistants are considered as a bridge between professor and students. This gives the opportunity to them to observe and influence higher-level decisions about course design and content, as well as to maintain a smooth daily close interactions with students.

What requirements do we consider of a student as an assistant teacher (Figure 4):

Figure 4. The requirements for students of TAC

Conclusion

From the observation of TAC activity, the author think there is a relationship between student's self-reflection, academic performance and motivation. Since 2011, over 60 students have worked as a teaching assistant, over 50 professors and lecturers have worked as an advisor, and 7000 students have joined the TAC. Teaching assistants teach 8 lesson/hours per week, which means 96 lesson/hours per semester. The first TA is Gerelmaa, who is an assistant lecturer in the mathematics department of the School of Applied Sciences. Many former TAC members are studying under various scholarships in abroad, such as USA, Germany, Austria, Japan, and Korea. Also, many other members have received domestic scholarships from leading companies, such as Oyu Tolgoi LLC, Khan bank, and Golomt bank. Moreover, many TAC members have participated in national and international competitions.

These participations and success show that TAC activity, where students cooperate and collaborate can facilitate learner centered teaching might have prepared a good professionals and inspired their motivation to further their career by applying skills and abilities they have possessed.

Mongolian University of Science and Technology have a policy to encourage teaching assistants to earn a certain percentage of their tuition fees from TAC activity. The average tuition fee for 1 course is around $80. During this time, a total of 50 students received scholarships, which equals $ 6,210.

References

1. Mongolia Human Development Report. (2016). Building a Better Tomorrow: Including Youth in the Development of Mongolia, United Nations Development Programme, Ulaanbaatar, pp.80-83.
2. Bathuyag.S. (2012). “How to study successfully”. Ulaanbaatar, Sod Press publishing, pp.24-28.
3. Amarjargalan.T, Buyandelger.Ts, Uyanga.S, Enkhjargal.Kh, and others, (2016). Conceive, Design, Implement and Operate (CDIO) framework for re-thinking engineering education, Manual for teachers series 4th book, Ulaanbaatar.
4. Annual Report of the Mongolian University of Science and Technology, (2018). MUST publishing, pp.136-139 .

Smart and Universal Education Environment for Life-Long Learning

Jiyou Jia

School of Education, Peking University. Beijing, 100871, China

Abstract

The popularity of smartphones, Internet and the Internet of things, artificial intelligence and other emerging technologies has created a smart and universal education environment for life-long learning, empowered the education without geographical border and schedule limitation, and improved the life-long learning for all and from all. The learning takes place not only in formal institutions like school and universities, but also at home, in workplace, on the way or anywhere at any time. This speech will address the opportunities and challenges for education in the era of artificial intelligence.

Keywords: Smart phone, Internet, Artificial intelligence, Life-long learning, Personalized Learning, Collaborative Learning

Smart and Universal Education Environment for Life-Long Learning

The concept smart and universal education environment for life-long learning (SAUEELLL) means that any person in the world located anywhere can learn any knowledge or skill he or she wants or needs to learn at any time, only if this person has a smart phone or other client equipment with access to Internet and very limited cost, and this learning can be both as personalized as taught by a tutor and as collaborative as learning in a traditional classroom so that the person can achieve the best learning performance regarding his or her own learning profile. In the time of life-long learning and artificial intelligence, this concept should be the target of the application of emerging technologies in education and is becoming the reality. The four conditions to realize the SAUEELLL include rich educational resource, ubiquitous equipment with lower cost, personalized or adaptive learning like accompanied by a human tutor, and collaborative learning as in traditional classrooms and schools.

Rich educational resource

Atkins, Brown, and Hammond (2007) defined OER (Open Educational Resource) as "teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge." MIT OpenCourseWare is a milestone in OER history. Chinese OER includes Chinese excellent courses for higher education, Chinese national public service platform for educational resource, provincial and other local educational resource, like Beijing Digital School.

The Internet's rapid advancement has enabled the establishment of giant common sense knowledge and professional knowledge through the selfless contribution from numerous

volunteers and institutes worldwide. Wikipedia is just such a database of common sense knowledge. Similar knowledge databases have also widely used in China like Baidu encyclopedia and knowledge, etc. Many professional databases have also been opened, like OLCDB (Oriental Language & Culture Database) from PKU.

Open video lectures are provided by many professional services like Khan Academy, Ted, and public portals like Chinese baidu, sina, sohu, etc. MOOC (Massive Open Online Course) provides not only lecture videos, but also discussion, quiz, exam, and other similar learning activities like traditional classrooms, and can be freely used by the learners worldwide. Typical MOOC platforms include Coursera, Edx, German MOOC Iversity, Chinese MOOC from Tsinghua University, from Higher Education Press and from Chinese University MOOC.

Free Educational Software can be found in open software repositories like Sourceforge, Google code, Github. A typical case is Geogebra.

Search engines play a critical role for the educators and learners to search the required teaching and learning materials in various languages and formats. Google, Yahoo, Bing, Baidu and other search engines can supply such service. The target can be websites, audios, videos, pictures, books, research papers, software, and so on.

Ubiquitous equipment with lower cost

Smart phones have been popularly used in the world. For example, the latest (42th) internet survey published on August 4th, 2018 by China Internet Network Information Centre shows that upon June 30, 2018, Internet users counted 802 Million (57.7% of Chinese population), Students count 25.4 of all internet users, Internet users using smarting phones counted 788 Million (98.3% of all users), Internet users for education counted 172 Million, weekly average online duration reached 27.7 hours.

Smart phones available in the hands of the leaners mean no need for the institution to provide learners with the special hardware to incorporate a technology enhanced learning into their teaching: High computing capability, instant voice and text communication, multimedia, Internet browsing, more affordable price compared with notebook and laptop computers.

Personalized or Adaptive Learning

An intelligent tutoring system (ITS) refers to a computer system that can function as a human tutor partially or fully to help a student learn and master content. The intelligence level of an ITS can be assessed by the extent to which it can function as a human tutor. The intelligence of an ITS is partly represented by its interaction with a learner, concretized by instant and appropriate feedback to a learner's request and input. An ITS not only stores, represents, and retrieves information, but also responds to learners' questions. An intelligent tutoring system is normally comprised of four components: domain model, learner model, pedagogical model, and interaction model (Jia, 2015). The data learning analytics have been adopted in the development of ITS to address the learners' features based on their online learning activities (Jia, 2017). OLAI (Online Learning Activity Index) is just such a model (Jia & Yu, 2017; Le & Jia, 2018).

Intelligent tutoring systems have cemented a place within both formal K-12 and higher education, and found homes in workplace training and lifelong learning. Application cases include school mathematics, science and language courses, STEM or MINT subjects, as well as technical and military training programs. Jia etc. (2004; 2009; 2012; 2015; 2016) conducted quasi-experiments to assess the effect of an English chatbot system CSIEC and the corresponding learning content management system on students' learning performance and found that those systems have better effect than traditional teaching approaches. Zhang & Jia (2017) conducted quasi-experiments to assess the effect of "Lexue 100" (Happy Learning for the Full Score)

(http://www.lexue100.com), a web-based interactive learning system for school mathematics on students' learning performance and found that that system had better effect than traditional teaching approaches.

Collaborative and blended learning

The learning can also be collaborative because the Internet connects the learners and teachers worldwide, wider than any current classroom. Blended learning links traditional classroom teaching to online learning that usually means the learning over the Internet or Intranet, and combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment (Bonk & Graham, 2006). University and school students can also use the blended learning to achieve best performance under the supervision of the teachers, because mobile devices can distract students and have negative influence on students' learning without teachers' supervision and deliberate design (Lepp, Barkley & Karpinski, 2014). Our previous studies about our CSIEC system (an intelligent web-based English instruction system) blended in English classes demonstrate its long-term effect on students' academic achievement represented by regular examination scores and vocabulary test is positive, and in most cases, the positive impact is statistically significant. The reliable positive effect on students' learning performance in ordinary examinations is caused by the learning content oriented design, the instant feedback feature of the web-based system, its regular integration into the English class, the time distribution principle for blended learning in classrooms, traditional instruction time: technology time is 3:1.

Conclusion

Educational resource is rich enough. Ubiquitous equipment with lower cost becomes affordable and popular. Personalized or adaptive learning can be accompanied by an ITS just like a learning

companion. Collaborative learning can take place anywhere anytime, and blended learning with ITS can be more effective than traditional instruction. SULELL is emerging and unavoidable!

References

Atkins, D. E., Brown, J. S. and Hammond, A. L. (2007). A Review of the Open Educational Resources (OER) Movement: Achievements, Challenges, and New Opportunities. Report to The William and Flora Hewlett Foundation.

Lepp, A., Barkley, J. E., & Karpinski, A. C. (2014). The relationship between cell phone use, academic performance, anxiety, and Satisfaction with Life in college students. Computers in Human Behavior 31: 343–350.

Jia, J. (2004). CSIEC (Computer Simulator in Educational Communication): A Virtual Context-Adaptive Chatting Partner for Foreign Language Learners. In Proceedings of ICALT04, P.690-692. New York: IEEE Press.

Jia, J. & Chen, W. (2009). The further development of CSIEC project driven by application and evaluation in English education. British Journal of Educational Technology. 40 (5):901–918.

Jia, J., etc. (2012). Effects of a vocabulary acquisition and assessment system on students' performance in a blended learning class for English subject. Computers & Education. 58 (1), pp. 63-76.

Jia, J., etc. (2013) The positive effect of an intelligent web-based English instruction system on students' academic performance: summarization of long-term quasi-experiments in four middle schools located in rural and urban areas. Journal of Computer Assisted Learning. 29(6):556-568.

Jia, J. (2014). Digital Classrooms Equipped with Tablet Computers as the Students' Learning Companions. Intelligent Web-Based English Instruction in Middle Schools, pp. 235-266. Hershey PA, USA: IGI Global.

Jia, J. (2015). Intelligent Tutoring Systems. In: Mike Spector (Ed.): Encyclopedia of Educational Technology. pp.411-413. Thousand Oaks, CA, USA: Sage.

Jia, J., Chen, Z. (2015). The Effect of Smart Phones' Application in Regular University English Class on Students' Learning Performance. In Proceedings of EITT 2015, pp. 131-136

Jia, J., Chen, Z. (2016). Blending Smart Phones into Regular Classroom Learning. In Proceedings of ICBL2016, Springer LNCS 9757, pp.337-347.

Jia, J. (2016). The learning behavior difference between supervised online learning and unsupervised online learning for K-12 education. Proceedings of 24th ICCE, pp. 128-135.

Jia, J., Yu, Y. (2017). Online Learning Activity Index (OLAI) and Its Application for Adaptive Learning. In Proceedings of ICBL 2017, Springer LNCS 10309. pp. 213-224.

Zhang, B., Jia, J. (2017). Evaluating an Intelligent Tutoring System for Personalized Math Teaching. Proceedings of ISET 2017, pp. 126-130.

Le, H., Jia, J. (2018). Analysis of Learner Timeout Behavior in Online Tests of a Big data Set Based on the OLAI Concept. In Proceedings of ICTE 2018, Springer CCIS 843. pp. 285-294.

The Self-Directed Learner: Understanding the Process of Learning in the 21st Century

Juvy Lizette M. Gervacio

University of the Philippines Open University

Abstract

Recent developments in the field of Information and Communication Technology (ICT) have led to the era of open and distance learning. With more learners going online, it is important to understand the mode of this innovative learning process, hence the need to understand at how the concept of Self-Directed Learning (SDL) is integrated in the design and development of courses. Self-directed learning is an old concept that refers to the ability of the learner on where, how and what to learn. Knowles (1975) generally defined self-directed learning as the ability to take responsibility for one's own learning without the need for the physical presence of an instructor to direct the learning experience. He added that self-directed learners (1) initiate their own learning, (2) diagnose their own needs, (3) create goals, (4) identify resources, (5) choose how to accomplish learning goals, and (6) can even evaluate their progress toward meeting their learning goals.

The presentation will focus on the concept of self-directed learning in in the context of designing and implementing online courses. The results will present how the idea that it is important to design and develop courses that would enhance self-directedness in learning in order to enhance the learning experiences of students in the 21st century.

Keywords: Learner-Centered Learning; Self-Directed Learning

The Self-Directed Leaner: Understanding the Process of Learning in the 21st Century

The increasing awareness and use of Information and Communication Technology (ICT) has brought remarkable changes in various sectors of society today, especially in the education sector. The use of technology ushered the birth of online courses or courses that can be accessed through the internet, as well as courses that have addressed traditional education barriers such as distance and age. However, despite breaking these barriers, there are some distance and online learning courses that remain restrictive by charging fees before a learner can start learning.

With the rise in the significance and utility of online learning in the recent decade, the concept of self-directed learning (SDL) has been highlighted, especially because learners are known to have more access to various learning resources.

Research Questions

Learning materials have become more available, hence, it has also become important to understand the process of learning and how learners utilize resources to enable the adoption of better designs in the implementation of online courses. This Study aims to answer the question: How does the concept of self-directed learning (SDL) promote new understanding of learning potentials in the context of online courses at the University of the Philippines Open University (UPOU)?

Specifically, it seeks also to answer the following compelling questions: a) What is self-directed learning? b) What are the dimensions/features of SDL that are important in Online Learning c) How is self-directed learning incorporated in the development of Online Modules? d) How do the participants assess the online courses on Inter-local Cooperation (ILC) ? e) What are the evidences that self-directed learning was present in the UPOU online courses on ILC?

Methodology

The Paper is based on a case study on the Online Course on ILC of the UPOU where self-directed learning is utilized during its design. The online courses on ILC were selected because they were developed and designed based on the concept of SDL wherein participants are able to learn from a variety of online activities and learning resources that would cater to various learning styles. Since the courses were initially offered to those working in government, there was a conscious effort to create different multimedia materials that would fit the busy schedules of the target participants. It was assumed that the participants will not be online all the time and may have considerably poor internet connections.

Results from an evaluation survey are presented and discussed to enable better understanding of how-to online courses were perceived. Course sites were analyzed to observe the interaction among the participants. The Study focused on two major sources of information, namely: a) results of the evaluation survey of the four courses of ILC; and b) analysis based on the observations on the activities in the online classroom. The evaluation survey included both quantitative and qualitative information while the analysis of content was derived from the discussion forum.

Theoretical Framework

Self-directed learning is an old concept that refers to the ability of the learner on where, how and what to learn. Knowles (1975) generally defined self-directed learning as the ability to take responsibility for one's own learning without the need for the physical presence of an instructor to direct the learning experience. He added that self-directed learners (1) initiate their own learning, (2) diagnose their own needs, (3) create goals, (4) identify resources, (5) choose how

to accomplish learning goals, and (6) can even evaluate their progress toward meeting their learning goals.

These characteristics were acknowledged by Guglielmino and Guglielmino (2003) who said that some characteristics of a self-directed learner include being independent, persevering through a learning experience, viewing issues as challenges and not obstacles, bringing curiosity and discipline to learning practices, embracing change, and enjoying learning.

Garrison's (1997) model of self-directed learning incorporates three dimensions of SDL, namely, self-management, self-monitoring, and motivation in joining as well as completing the tasks. Self-management gives emphasis on goal setting, use of resources within the learning context, and external support for learning. Self-monitoring pertains to the learners' ability to monitor their cognitive and meta-cognitive processes. In this dimension, learners make use of their own learning strategies, adjust to the learning task or goal, and engage in critical reflection. The motivation element in Garrison's model considers the initiation and maintenance of the effort exerted for learning and towards the attainment of goals.

Self-Directed Learning in the Context of Online Learning

Unlike traditional education where students are more dependent on the instructor for their learning needs, online courses, have allowed learners to learn independently on their own, either individually or collaboratively. Song and Hill (2007: 29; 34) claimed that "students need to have a high level of self-direction to succeed in online learning environment" and that "successful learning in every learning environment involves the use of effective learning strategies."

Song and Hill (2007) also introduced a conceptual framework that incorporates not only the dimensions of personal orientation and the learning process orientation generally accepted from previous SDL models but adds a third dimension, the learning context. This dimension takes

into account the impact of environmental factors on SDL. The online learning context provides opportunities and poses challenges on SDL personal attributes in terms of the learner's resource use, strategy and motivation.

Effective learning strategies are imperative to ensure favourable outcomes in every learning environment, especially in an online context. Song and Hill (2007) also noted that one of the challenges of online learning mentioned above relates to written communication as an integral part of online learning. In this mode of communication marked by the absence of facial expressions and body language, misinterpretation may arise. Furthermore, delayed response from peers and instructors as mentioned earlier is another concern. Song and Hill (2007) further added that such issues however can be overcome through the use of communication strategies that are more applicable to the text-based online environment, as well as time management strategies that could improve online communication with others.

One of the important aspects of self-direction is the concept of the "selfhood." Boucouvalas (2009) noted that research on self-directed learning had focused mostly on autonomy and very rarely on the concept of self as the core aspect of self-direction. According to Boucouvalas, although autonomy is a vital concept in self-directed learning, it is an incomplete interpretation of "selfhood." "Self-directed learning has even greater potentials to contribute to the development of the human species when guided by a concept of "self" that includes both autonomous (separate, individual) and homonomous (connected, collective) dimensions" (2009:1).

For Boucouvalas, individuals "have the ability, as demonstrated over the years, to develop an autonomous aspect of selfhood that enables us to: (a) take initiative and responsibility for learning, (b) understand ourselves as learners, and (c) maintain our self-direction, even when in other-directed environments; however, as individuals we are also embedded in relationships,

groups, communities and cultures, nations, and society-at-large" (2009:3-4). This has implications on the importance of the learning environment, its context, as well as the interactions and collaboration with other learners in the individual's journey of self-directed learning.

Building on the discussion of SDL, Bouchard (2009) also inquired more closely into learner autonomy as a central aspect of SDL, referring to this as autonomous learning strategies. He identified and classified factors affecting autonomous learning strategies into four categories; namely: conative (psychological factors), algorithmic (pedagogical factors), semiotics, and economy (environmental factors).

The conative dimension is associated with psychological issues, for instance drive, motivation, initiative and confidence. Emphasized in this dimension are aspects of context and transitions, how these shape individuals' inclination to take up learning, and the social networks that individuals are engaged in and which serve as emotional support and resources. Previous learning experiences, according to Bouchard, may also have an impact on autonomous learning strategies (Kop and Fournier, 2010).

The algorithmic dimension refers to pedagogical concerns, such as sequencing, pacing and goal setting in learning, the evaluation of progress, and final evaluation and preparation for validation. These tasks are traditionally performed by a teacher, but in an autonomous learning environment where the learners engage themselves in such activities (Kop and Fournier, 2010).

The semiotics of learning and aspects of economy are groups of environmental factors affecting learning strategies. The former involves the delivery model of resources. In recent decades, the delivery model has evolved from hard copies of books and papers to electronic copies made available through the internet. It includes the use of blogs, wikis, synchronous and asynchronous communication with information done through social networks. The economy

dimension is the fourth factor that refers to "the perceived and actual value of the learning, the choice to learn for personal gain such as for future employment, and the possible cost of other study options" (Kop and Fournier, 2010: 2).

This Paper explores into the relationship between SDL and MOOCs based on Bouchard's four dimensions of autonomous learning strategies in the context of MOOCs as offered by the University of the Philippines Open University. This is important in order to determine how MOOCs can be designed and developed to facilitate self-directed learning in MOOCs to lead to higher completions rates.

The Case

UPOU Online Modules on Inter-local Cooperation

The University of the Philippines Open University was established on February 23, 1995 and has been declared by the Commission of Higher Education (CHED) of the Republic of the Philippines as the National Center of Excellence in Open Learning and Distance Education for being in the forefront of providing lifelong learning for the Filipino people.

Its mission is to provide wider access to quality higher education and shall adhere to the highest standards of academic excellence, guarantee academic freedom, and encourage social responsibility and nationalistic commitment among its faculty, staff and students. (Vision and Mission, n.d.)

The UPOU offers various higher education courses that students can choose from which include formal and non-formal courses. The Inter-local Cooperation (ILC) are just some of the online courses offered by the UPOU. These courses were developed in partnership with the Decentralization Program of the GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) in 2013.

The ILC modules were formally launched as MOOCs on March 2015, with the support of the Department of Interior and Local Government (DILG). The DILG issued a Memorandum Circular inviting all "Provincial Governors, City and Municipal Mayors, DILG Regional Directors and others concerned" to avail of the online and open course on ILC.

The courses were designed and developed based on the concept of self-directed learning following the prescriptions advocated by Garrison's model (1997) of self-directed learning and reinforced by the studies of Boucouvalas (2009) and of Bouchard (2009). Hence, unlike typical MOOCs which are mostly based on videos, the courses utilized several multimedia learning resources such as podcasts, screencasts, pdf files, online games, diagnostic tests and online quizzes. The learning resources were presented in a non-linear format. The idea of the design is for learners to simply go over any of the materials with no particular order as long as they will finish the course in a given time period. The discussion forum was created for the participants to utilize and discuss among themselves.

The courses were first offered as a regular online three-unit course for the Master of Public Management Program under the field of Local Government and Regional Administration (LGRA). The original course content was later transformed into four different MOOCs.

The four courses on ILC include: a) Introduction to Inter-local Cooperation; b) Legal components of Inter-local Cooperation; c) Institutional Ingredients of Inter-local Cooperation; and d) Financial Ingredients of Inter-local Cooperation. Each course runs for four weeks, which is equivalent to a total of 12 hours or 3 hours each week.

Results of the MOOCs

Generally, the MOOCs on ILC were perceived by UPOU as a success given the number of participants who attended the first course and the number of participants who applied for

certification. Figure 1 shows the number of participants for each MOOC and the number of those who applied and were given certification. The first MOOC had a total of 362 participants. There were more participants in the first course because it served as an introductory course on ILC. The 2nd course which focused on a specific area of the ILC had fewer participants with only 91. It went down further to 56 on the 3rd course and 44 on the last course on ILC. It is important to note that most of the participants who enrolled in the four courses are the same set of participants.

The same figure shows the number of participants who applied for certification is almost consistent across the four courses. They ranged from 23 in the first course, 31 in the second course and 24 for the 3rd and 4th courses. It is also important to note that there is a certain cohort which finished all the courses with nine (9) participants who consistently applied for certification. There were 11 participants who completed at least three modules and eight (8) participants who applied certification for two modules. There were 17 participants who applied for certification for only one course.

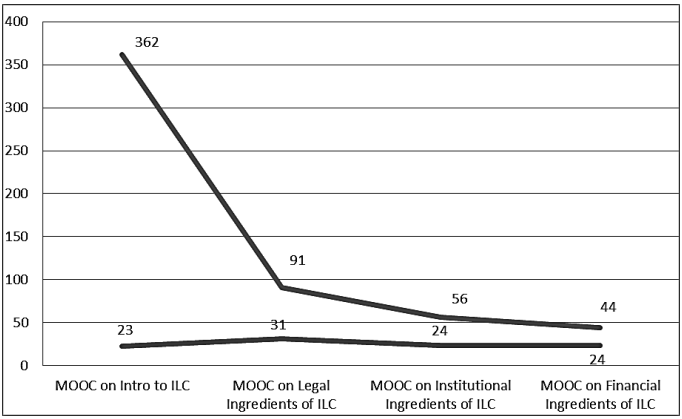

Fig. 1. Number of Participants (Blue) and Number of Participants Who Received Certification (Red)

Evaluation of the Online Modules

An evaluation survey was conducted for each course. The survey aimed to elicit feedback from the participants regarding their perceptions on the following topics: a) Content of Module; b) Working and Learning Methods; c) Participants; d) Achievement of Objectives, and e) Organization of the Course. The first course got the most number of respondents for the survey with 25 of them who participated in the survey. The following are the general results of the evaluation survey.

On Content of the Module – The survey reveals that most of those who responded claimed that the contents of the modules were able to meet their expectations with a range of 82 to 94 per cent approval rate. Most of them agreed with the statements that they can apply what they have learned from the courses and are willing to share what they have learned with their colleagues. Some of them answered positively when asked if they now have a concrete idea on how to use what they have learned from the course. This more or less affirms somehow the conative factors expressed by Bouchard (2009) on autonomous learning strategies, and to some extent that of the algorithmic and semiotics of learning.

Working and Learning Methods – More than 90 percent of the respondents agreed that the contents and outcomes were specific, clear and consistent. More than 82 percent of the respondents were certain that the working and learning methods were appropriate to their tasks, were suitably varied, and the materials in the course site supported the learning process. The participants also noted that they were able to share their experiences and examples about the inter-local cooperation that exists in their area and were able to learn from others. The positive answers given ranged from 64% to 88%. More than 90 percent claimed that the length of the courses was just right. Again,

this somehow confirms the findings of Bouchard (2009) on the learning environment and the specifics of the conative dimensions.

Participants – More than 75% of the survey respondents agreed that the atmosphere among the participants was always cooperative. However, the figures were higher for the last two courses with more than 90 percent of them agreeing to this. The survey revealed that most of the participants agreed that they were able to benefit from the experiences of other participants and committed to continuing to exchange views on this subject with other participants.

Achievement of Objectives – For each of the course, there were some objectives that needed to be met. More than 90% of the respondents mentioned that generally, they have a clearer understanding of the subject matter. For example, the respondents claimed that they can now develop their own roadmap on Inter-local Cooperation and can now write their own manual of operation. Some of them noted that they now understand the relevance of matching "resources with plans and programs."

Organization of the Course – Most of the respondents (80% – 95%) claimed that generally, they were satisfied with the way the course was handled and the courses were easy to navigate. Some of the recommendations from the respondents include more reference books and audio case studies and more sharing of innovative ideas.

To sum up, there are several aspects in the evaluation of the participants which showed elements that are important in autonomous learning. On the motivation and confidence aspect, the evaluation results show that the participants agreed that the atmosphere among the learners fosters cooperation and they learn from each other's contribution.

Another aspect is the positive feedback of the learners on the working and learning methods, specifically on the various types of materials and the course site, which they claimed to

be easy to navigate. This means that it is important to design various learning materials that would engage the learners to participate. The usability of the course in the working environment of the learners was also identified as a motivating factor for the participation.

Adapting Bouchard's New Dimension Framework in Learning to MOOCS: Inter-local Cooperation

Summing up the discussion based on the observations on what transpired inside the "online classroom" of the MOOCs, it can be gleaned that there are some elements that closely relate to Bouchard's four dimensions of learning. It can be said that those who finished the four courses are highly motivated self-directed learners. Although not everyone participated actively in the online discussion, those who have interacted with their peers have exhibited high level of motivation. Moreover, the completion of the MOOCs is perceived by learners as a chance for them to enhance their current job in particular, and their respective career, in general.

The various types of learning materials were also valued by the learners. This was confirmed by the enthusiastic discussions about the podcasts; the results of the online games, the diagnostic exam, the pdf materials, etc. Some of the participants even uploaded their own learning materials and shared them with the group. Indeed, these are manifestations of self-directed learning.

It is however important to determine if the four dimensions of Bouchard were evident in the MOOCs of UPOU. Hence, a review of the online discussion was important to come up with the following observations.

Conative Dimensions. Motivation and confidence were identified as some of the factors that are present among self-directed learners. The active participants were able to introduce themselves, the nature of their jobs and their location. It was interesting to know that some of them

already knew each other since they were either colleagues working for the same office; or enrolled in other courses offered by the University. This makes the online interaction among the participants more active because of the trust and familiarity with the system. Some of the learners shared that the course will be able to help them in their own jobs. Some participants praised the contribution of other participants in the forum.

Algorithmic Dimensions. In terms of pedagogical factors, this dimension refers to sequencing, pacing and goal setting as very important for the learners. Since the MOOCs were not tutored, the learners themselves were given the autonomy of introducing themselves since there was no prescribed format for them to follow. The learners were free to pace themselves and go over various course formats without any sequence as to which material should be read or viewed or read first. Based on the activities, some learners opted to upload different file formats like word document, pdf files or screenshots of the results of the online games and other activities that they did online. The online "dialogues" enabled them to reflect, sympathize and agree with the online characters in the storyboard.

Semiotic Dimensions. This dimension focuses on how the course is delivered online and how interaction is done. Based on this, the MOOCs were able to provide suitable environment in terms of utilizing various resources. The content of the courses were designed to cater to various learning styles. The different formats of the online materials enabled the participants to listen, read, watch, play and discuss with other participants. A diagnostic test was designed which gives them feedback. The diagnostic test was present in the first course and enables the learner to tick off a series of questions. The results of the diagnostic test serve as a checklist on what the province/city or town still needs to accomplish based on the results of the diagnostic test. It also provides a guide for the participants on which of the succeeding courses would still be beneficial for their work.

There was one participant however who downloaded the online course materials and converted them to an offline format. By doing this, the other participants who cannot be online all the time were able to read the contents of the documents. The other participants praised the effort because they were able to access the contents offline. This observation reveals that learners have been empowered to create new formats of learning and also share new documents relevant to the course.

Economic Dimensions. Bouchard refers to this dimension as the "perceived and actual value of learning" (cf. above) and this can be confirmed readily from the course discussion. There are learners who mentioned in the course site that the completion of the course is an advantage to their probable career in government. Learners that are consistently active in participating agree most of the time when participants reflect on a certain topic based on their experiences. The learners are able to raise relevant issues such as protocols and processes from their respective jobs. There are learners who expect that the course gives them an advantage for a government post. It was also mentioned by a participant that the main drive to complete all the four courses is for the advancement of his/her potential career.

Based on the above discussion, the MOOCs on ILC that were offered by the UPOU had the elements of self-directed learning.

Conclusion

The Study has showed the significance of the relationship between SDL and online courses. SDL influenced the level of participation and types of activities that the learners engaged in. The results of the investigation reveal that based on the evaluation survey, majority of the respondents were satisfied with the working and learning methods of UPOU's online courses on ILC. The

respondents generally agreed that the materials and tasks were varied and are supportive of their careers in their learning. The length of the courses was just right, according to the respondents.

The observations and content analysis of the learner's using Bouchard's framework on SDL showed that there are learners who have exhibited characteristics of self-directed learning. This is evident on their active participation discussing the contents of the different types of materials available to them. Moreover, they share the results of the games that they did, including uploading their own resources. It was also cited in the forum that the course will help them in their work and in their career in the future.

Self-directed learners determine where, how and what to learn, hence it is important that they are provided more choices and alternative sources of knowledge generation. However, there are also other factors that matter such as level of connectivity and applicability of the course to one's work. It is in this regard that the design of online courses should be able to address such challenges in order to meet the demands of the learners.

References

Bouchard, P. (2009). Pedagogy Without a Teacher: What are the Limits? *International Journal of Self-Directed Learning 6*(2), 1-12.

Boucouvalas, M. (2009). Revisiting the Concept of *Self* in Self-Directed Learning: Toward a More Robust Construct for Research and Practice in a Global Context. *International Journal of Self-Directed Learning 6*(1), 1-10. http://www.sdlglobal.com/IJSDL/IJSDL6.1-2009.pdf

Czierniewicz, L., Deacon, A., Fife, M., Small, J. & Walji, S. (2015). *CILT Position Paper: MOOCs*. Centre for Innovation in Learning and Teaching (CILT), University of Cape Town. http://www.cilt.uct.ac.za/sites/default/files/image_tool/images/83/FA_MOOCs_final%20July2015.pdf

de Waard, I., Kukulska-Hulme, A. & Sharples, M. (2015). Investigating Self-Directed Learning Dimensions: Adapting the Bouchard Framework. In G. Conole, T. Klobucar, C. Rensing, J. Konert & E. Lavoué (Eds.), *Design for Teaching and Learning in a Networked World,* pp. 395-400, Springer. http://oro.open.ac.uk/44494/1/ECtel%202015%20paper%2093%20Inge%20de%20Waard%20SDL%20MOOC%20final%202.pdf.

Fournier, H., Kop, R., & Durand, G. (2014). Challenges to Research in MOOCS. *MERLOT Journal of Online Learning and Teaching, 10*(1). http://jolt.merlot.org/vol10no1/fournier_0314.pdf

Garrison, R. (1997). Self-Directed Learning: Toward a Comprehensive Model. *Adult Education Quarterly, 48*(1), 18-33. https://www.researchgate.net/publication/249698827_Self-Directed_Learning_Toward_a_Comprehensive_Model

Guglielmino, L., & Guglielmino, P. J. (2003). Becoming a more self-directed learner. In G. Piskurich (Ed.), *Getting the most from online learning: A learner's guide,* (pp. 25-38). West Sussex: John Wiley & Sons.

Knowles, M. S. (1975). *Self-directed learning*. New York: Association Press.

Kop, R. & Fournier, H. (2010). New Dimensions to Self-Directed Learning in an Open Networked Learning Environment. *International Journal of Self-Directed Learning, 7*(2), 1-20. https://www.researchgate.net/publication/285750999_New_dimensions_to_self-directed_learning_in_an_open_networked_learning_environment

Luaran, J. (2013). *Massive Open Online Course (MOOC)*. i-Learn Center, Universiti Teknologi Mara. http://i-learn.uitm.edu.my/v2/wp-content/uploads/2015/03/Full-MOOCs-book.pdf

Natad, J. (2011). Alliances of Local Governments in the Philippines. *Johny Natad Official Site.* https://johnysnatad.wordpress.com/2011/12/14/alliances-of-local-governments-in-the-philippines/

Patru, M. & Balaji, V. (Eds.) (2016). *Making Sense of MOOCS: A guide for Policy-Makers in developing countries*. UNESCO and Commonwealth of Learning. http://unesdoc.unesco.org/images/0024/002451/245122E.pdf

Song, L., & Hill, J. (2007). A Conceptual Model for Understanding Self-Directed Learning in Online Environments. *Journal of Interactive Online Learning, 6*(1), 27-42. http://www.ncolr.org/jiol/issues/pdf/6.1.3.pdf

University of the Philippines Open University Vision and Mission, n.d.

E-Learning system personalization service based on the analysis of user behavior

Khulan Khalzaa

Mongolian University of Science and Technology, Mongolia

School of Computer Science and Technology, Tianjin University, China

E-LEARNING SYSTEM PERSONALIZATION SERVICE BASED ON THE ANALYSIS OF USER BEHAVIOR

Abstract

With the development internet technology, the E-Learning model has been rapidly developed. However, due to the low completion rate for E-Learning platform, it is very necessary to analyze the behavior characteristics of online learners to intelligently adjust online education strategy and enhance the quality of learning. Learners aren't the only ones who benefit from e-learning and learning management systems. For course instructors, an effective learning system offers easy course authoring tools for quickly creating and updating content. If the model predicts the visitor's intentions and delivers exactly the information that is necessary for him, the likelihood of the user returning to the site increases. One of the ways to achieve this result is the personalization of the site. The personalization of the site refers to a set of technical measures to adapt the appearance and content of the site to different categories of visitors. If each segment of users of the site will be provided with personalized content, it is possible to significantly improve the effectiveness of the site. In this article introduced method personalization of E-Learning system interface through learner behavior.

Keywords: e-learning, learner behavior, content, website personalization.

E-Learning system personalization service based on the analysis of user behavior

Nowadays e-learning systems have become widely used in the educational process, and have begun to better understand the format of "e-learning" is as tools and the different full-time forms of education, which includes courses, tests, video and audio content, info graphics, charts, various visualizations, simulators, interactive and gamified courses, micro courses, webinars, forums, blogs and so on. All these tools have their own purpose and can be part of a mixed training program consisting of full-time and distance formats.

People will be comfortable enough to perceive the format of learning, when lectures can be independently viewed at any convenient time, and then come and work out everything in practice at the training or if necessary, ask questions in the forum/webinar. But do not forget that learners will make higher demands on the quality of e-learning.

User behavior influence of system personalization

Often, specialists from training departments meet with complaints such as “we already know this”, “this is superfluous information”, “this is incomprehensible and there is nobody to ask a question”. Many of these problems can be solved with the help of personalization of learning, coupled with an adaptive approach. In this case, there will not be a single course or a single program for all employees, students or trainers**,** there will be a training scenario prescribed in the Learning management system (LMS), which adapts to each individual student, adapts to learner level of knowledge and pace of training. To prescribe recommendations, based on the previously studied material should manage the electronic content in the LMS quickly and

efficiently, one of the most important moments is to monitor the relevance of the training scenario and all incoming elements to be able to create so-called “puzzles” from which the training program is easily assembled.

Personalization of new system

Website Personalization is the process of creating customized experiences for visitors to a website. Rather than providing a single, broad experience, website personalization allows to present visitors with unique experiences tailored to their needs and desires. Website personalization attempts to use data to take that same level of one-on-one attentiveness and translate it into the digital world. Personalization of the site refers to a set of technical measures to adapt the appearance and content of an E-learning system to different categories of visitors. If each segment of users of the site will be provided with personalized content, it is possible to significantly improve the effectiveness of the training site.

The principle of execution of the script changes the site depending on the recognized in real time the type of visitor or his behavior on the page. For each type of visitor, you must use personal algorithms to change the appearance or content of the site. As soon as the visitor is segmented, the personalization algorithm will change the site. To predict which version of the page will be of interest to the user, depending on his behavior, the methods of predictive analytics are used.

Personalization of new platform consists of several stages: data collection, visitor classification and application of page alteration algorithms.

- Personalized site analyzes the visitor data: where they come from, what keywords have found a resource, geographic data, what they did on the site, when and on which page they left, what interested most of all, etc.

- The next step is to define audience segments. It is necessary to determine who the majority of visitors are, what interests what kind of learning methods or sources looking for, what resources they come from.

The algorithm for using the service is as follows. The first step is integration with the service. The site owner determines the purpose of personalization and analyzes the data about the visits that the service provides. Based on the results of the analysis, the user creates several versions of the page display. The service tests these versions of the page and determines the most effective depending on the purpose. This version will be displayed to visitors of a personalized site. To start working with the service, need to add an integration script to the page code.

First, it is the collection of data from a personalized site about visits. The following data is determined: from which page the visit to the site started, from which it ended, the duration of viewing each page, whether the user is a new visitor or a repeated visit to the site, which pages were visited, which links were clicked, etc.

Second, for each visitor a personalized site creates an identifier that allows you to distinguish between visits to a site by different people. The data obtained from the site is stored in the database on the service side in the tables “events” and “visitors”. The second function of the script is to change the appearance of the page.

Page alteration algorithm through A/B testing

Algorithm used to determine personalization of E-learning system strategy is A/B testing. A/B testing (sometimes called split testing) is comparing two versions of a web page to see which one performs better.

The method consists, as the name implies, in comparing the two (A and B) versions of the page under study in order to determine which of the changes increases the target indicator.

Figure 1. A version of page (unmodified).

Figure 2. B version of page (modified

Users are shown randomly one of the versions of the page, including the original unmodified. The important point is that the same page visitor is always shown to the same visitor. When performing a target action, and in this case clicking on a link, the conversion for the current page variant increases.

$$\text{conversion} = \frac{\text{action}}{\text{number of visit}} \text{x}100$$

The number means that the target action will be performed with probability x%. The change in conversions shows how many times the conversion will change when using this version compared to the original one.

Experiments

Users are shown randomly one of the page versions, including the original unmodified. The variations are completely identical except for a specific element on the page, which has changed the appearance and / or content. For example, after testing two variants of the "Academics" button on the this page, where in one variation the brown color of the background fill was used, and in the other - blue, you can determine that the first option had a higher percentage of clicks. When performing a target action, and in this case clicking on a link, the conversion for the current page variant increases.

As a result of testing, get a report for each version of the page. When conducting A / B testing, it is possible to specify a segment of visitors on which an experiment will be conducted. In this case, it was determined that the experiment involved only visitors who came to the site from 14:00 to 16:00, i.e. in the afternoon. Segmentation is also possible by location, by search query, by page from which the transition occurred, etc.

As a result of the personalization, we received a more efficient way to display the page than the original one, aimed at clicking on the “Academics” link, which will be shown to visitors from 14:00 to 16:00.

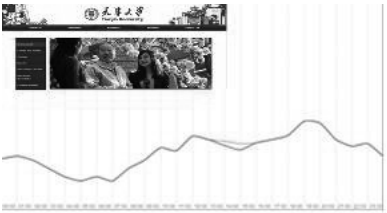

Figure 3. B version is more efficient

After analysis, the site will offer the visitor something which falls within the scope of learner interests. For example, based on the analysis of searching materials, downloaded books, lectures or video lessons, user will immediately receive the recommendation of the book, the lessons of its sphere or series.

Conclusion

The results of this analysis become a plan for design and what trainer hope to get their learners to achieve because of know what they actually need, versus just guessing or assuming. E-learning is perfect for addressing gaps in skill or knowledge but is typically not an effective

cure for lack of customer satisfaction or a job design problem. By analyzing first, can rule out these other issues and get to the heart of the problem faster than if have gone on assumption.

References

Dan Siroker, Pete Koomen "A / B Testing: The Most Powerful Way to Turn Clicks Into Customers"

Brian P. Hogan, Chris Warren, Mike Weber, Chris Jonhson, Aaron Godin (2012). Web Development Recipes, ISBN: 978-1-93435-683-8

Hampton Catlin, Michael Lintorn Catlin (2011). Pragmatic Guide to Sass, ISBN: 978-1-93435-684-5

https://cyberleninka.ru/article/v/metodologiya-postroeniya-e-learning-sistemy-personalizatsii-obucheniya

http://trends.builtwith.com/analytics/personalization

http://hr-portal.ru/blog/15-trendov-v-e-learning-kotorye-mozhno-vnedrit-uzhe-seychas

https://www.optimizely.com/optimization-glossary/website-personalization/

https://vwo.com/ab-testing/

http://techcrunch.com/2010/07/15/optimizely-ab-test

Design and evaluation based on simulated enterprise learning environment - a case study on logistics management

Shuang Wang[1], Ling Zhai[2]

[1]Graduate school of Education, Peking University; Lean International SCM GmbH

[2]Tianjin Coastal Polytechnic, China

Abstract

The high standards of integrated process operation and comprehensive coordination in business require students in applied science discipline to develop practical skills and integrated view of business. The rapid pace of development of Education Technology are enabling a high-tech course environment and highly efficient instructions. In order to meet the dynamic changing requirement of enterprises, a systematical designed simulated enterprise learning environment do help schools achieve a better teaching and learning effects. This article reports based on a study investigation in the group who applied simulated enterprise, attempts to evaluate this teaching and learning on effectiveness, skills development and deep practical study. The result reveals that simulated enterprise learning environment contributes to integrated practical skills development, and shorten the gap between classroom learning and enterprise engagement. The study also recommends further improvements to instructional design and curriculum innovation.

Keywords: simulated enterprise learning environment, education technology, logistics management, instructional design and evaluation.

Design and evaluation based on simulated enterprise learning environment - a case study on logistics management

1. Introduction

1.1 features of logistics management education

Different from discipline of theoretical or philosophy, the subject of logistics management as an applied discipline more concentrate on the capability of process management, resource integration, cost accounting, team work and how to survive in high pressure competition. Therefore, the education of logistics management is of the following features:

- Practice-oriented. The main target of teaching or learning logistics management is to grasp the practical skills which is useful in particular practical field, such as transport management, warehouse management, forwarding services are all based on enterprises practices. How to make reasonable solutions for customers to meet their particular requirement would be the crucial skills for student in subject logistics management.
- Continuous interactive. On instructional point of view, teacher and learners need more interaction on both sides than other discipline, so as to discuss and create new ideas or new solutions onto concrete project. On practical point of view, the skills learned in applied discipline need more interactive activities to improve and enhance those skills
- Project task-based. When graduated students engaged in Logistics Enterprises, they have to have the ability to join and fulfill project one and another. Therefore, it is necessary to create an environment of task and project-thinking for learners. Some instructional designers in applied discipline trends to construct a systematic gameplay to simulate such environment in practical enterprise.

- Systematic and process management. With IT system and intelligent devices, Logistics companies enable to improve efficiency and benefits. They optimize their management by adjust their Systematic and process management. Then, with better skills in Systematic and process management, graduates can play a bigger role in their practical works.
- Theoretical applied. Most of the applied discipline ought to apply formal science such as mathematics, statistics, even physical or biological methods. The subject Logistics management is without exception as well, it is theoretical-based and practical-oriented.

1.2 simulated enterprise learning environment

Herewith referring to the simulated enterprise learning environment, it is first of all a software supported education environment, which is engaged learners in realistic activities designed to increase knowledge, improve skills, and enable positive learning outcomes (Prensky, 2001).

Under simulated enterprise, it emulates the structure, business and procedures operation like a real company. Learner execute the works and business with virtual capital, tasks, and competitive market, but the system uses documents identical with the real ones, complying with the national and international commercial laws, international trade terms, traffic rules, information flux and documents issued regulations (Artene, 2012).

By creating real working tasks under a systematic enterprise environment, it helps lecturers and learner logically connect the theoretical methods with practical projects as the means to make the education more efficient. Comparing to traditional computer supported collaborative learning (Koschmann, 2006), it is involved in real enterprises tasks, data, management process and team work coordination. Rather than realistic practice in enterprise, it creates far more various possibilities for learners to try their ideas and solution, without bring enterprises any lost and

troubles. That is important for learners to improve their deep thinking combined with theories and practices. By systematical designed integrated tasks practice, and free competition in virtual dynamics business market, it offers an exciting and stimulated learning environment. It would be provided a comprehensive solution for education of logistics management.

1.3 target of this paper

This paper reports on the effectiveness of that pedagogical application and discusses the challenges and opportunities involved in instructional design and curriculum innovation. Firstly, it will present a review of literature on simulated enterprises learning environment and education technology development in logistics management. then It will describe the software designation and logic that used for this investigation. Hence, the data analysis and evaluation will be conducted in this study. Finally, it will present the findings and implications of this study, as well as discuss improvement and challenges.

2. Literature review

2.1 Simulated enterprises learning environment

Situated cognition theory states that activities, tasks, and understanding do not exist in isolation, but rather are part of broader relationship systems. Learning thus implies addressing the possibilities enabled by these relationship systems (Léger, 2006). As an effective instructional method, simulated enterprises learning environment was experimented by many education institutes. Simulated enterprise exposes students to an authentic learning experience in a virtual but sophisticated business environment and offers an exciting and stimulated learning environment (Lave, 1988). Researchers in education suggest that situational cognition and problem-based learning might provide instructional strategies that are better aligned with the challenges underlying IT competency development (Cheaburu, Munteanu, 2014). By exposing students who

typically specialize in one virtual enterprise and engaged with real cases would be helpful to enhance their cognitive ability and problem based executive ability (Seethamraju, 2011). And meanwhile push learn be used to the dynamic and sophisticated working environment (Kincaid, 2009). Simulation can be used to show the eventual real effects of alternative conditions and courses of action. Simulations are taken place in controlled environments that provide the learner with experiences in understanding how a set of conditions interact with each other in risk-free conditions. While all above experiences of leaner won't lead to any consequences to real enterprises. Therefore, from the angle of employer, teacher and learner as a whole, there is nearly no trial and error cost.

2.2 Educational technology development in logistics management

The education in subject of logistics management has been benefit a lot from updated technology. And mean while the technology applied in logistics industry has been developing obviously. From the barcode applied in warehousing management to systematic warehousing management, from GPS applied in transportation management to TPMS (Transport Plan and Management System) commonly be used, from the application of logistics management system to integrated Supply Chain Management based on SAAS or cloud dada technology, logistics industry, as a foundational services industry of other industries, experienced a revolution of technology development in recent 20 years. Adapted to it, like many other applied science discipline, educational technology in subject of logistics management has been developed and combined with instructional innovation and industrial technologyi. Therefore, we can see Many industry technologies are integrated into instructional practice, such as barcode technology, WMS, GPS, RFID, etc.

In order to achieve the educational goal of developing more logistics professionals who have more executive capability and problem-solving thinking, using problem-based learning and simulation-based approaches to teaching Logistics Management requires new instructional strategies to fully leverage their pedagogical benefits. How to design the instructional system, how to organize the courses, how to assess the affection and efficiency to the education would be very important, so as to evaluate the adaptability between teaching objectives and corporate technology needs (Bloechl, Schneider, 2016). Based on the teaching objectives, the evaluation of multi-dimensional teaching effects is a common method of teaching evaluation.

3. Study Object and methodology

3.1 learning objectives

As a discipline of applied science, the curriculum of logistics management should involve the main technical skills in the field of logistics management and provide training in applied technology. In order to meet the requirement of the industrial technology, the learning objectives should integrate the following contents:

First, logistics functional recognition, such as transport, warehousing, inventory control, supply chain management, outsourcing services as well as international trade and finance.

Second, process management capability. For an international door to door services, it usually asks for logistics engineer to organize a cross border services, even including more than dozens of small processes.

Third, outsources integration and coordination capability. It is not only a business management, but also the comprehensive administration. It needs team work, sense of cost accounting, as well as strategy plan.

Last but not least, the ability of dynamic planning and decision making in sophisticated situations. That's potential developing capability decisively pushing practitioner to a higher career level.

Therefore, the above-mentioned core abilities in educational object of logistics management can be concluded as conceptual skills, management skills, comprehensive coordination skills, as well as deep thinking and strategic capabilities.

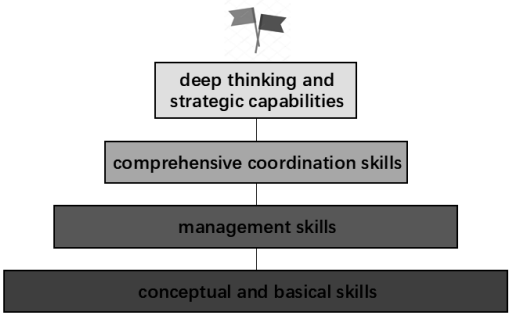

Figure 1. Study object and core professional abilities in education of logistics management

3.2 description of the designation and logic of the software used for this investigation

The simulated-enterprise teaching software that is meet the technical requirements of enterprises and industries, and meanwhile can also satisfy the teaching objectives is the crucial basis to carry out the applied technology education in the subject of logistics management, and of course also is the key factor to this research.

The software platform which is adapted in this research is a co-developed software designed by our research group and developed by an IT company who is in charge of realize our designed idea. Principles of software designation are as follows:

a. Software technology is based on internet, cloud data and computer system collaborative learning.

b. Main teaching contents and main business line in system practice is to create, operate and develop a logistics company from single function to comprehensive business group.

c. Based on create a Game scenes and social backgrounds, learners can execute the real operation like working in the real company. By organize team work and market competition, learners would experience the corporate realities and competing visions.

d. designation of the modules in the educational system is involved in market competition, performance assessment and community relationships.

e. The settings of difficulty levels is progressive and in line with the rules of teaching and learning.

f. The design of the teaching platform takes into account the combination of teaching objectives in two aspects, e.g. integration of teaching, learning, doing, and training; as well as combination of examination, evaluation, competition, and implication.

3.3 instructional design and process of this curriculum

The main modules of enterprises simulation are started from Writing a business plan to create and configure a single-function, small-scale logistics company. There are necessary data, tools, theoretical guidance, sufficient references as well as virtual finance support to assist students make a good start. Then, if followed by creating transportation services for clients, expanding warehousing business, develop international freight forwarding business, and operate full-service supply chain services. It is generally following the rule of the development of a logistics company and the logistics industry.

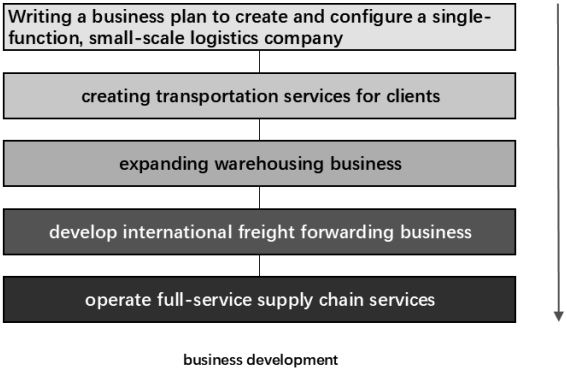

Figure 2. The main modules of enterprises simulation

Team composition is the main part of execution during the study course. All the tasks are fulfilled by teams which are comprised of various roles, like CEO, marketing, business operator, technical executive and accounting. All the teams are competing in this virtual market under this systematical designed business ecology. Members fulfill their task by their own character and they also can change their roles in different tasks.

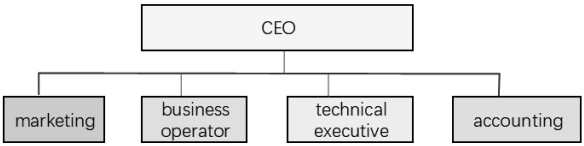

Figure 3. Team composition

The logical business process of each tasks in each module is as such:

First, each team group will receive a bidding task, which is created randomly by system. But the tasks are pre-set according to enterprises reality and Finely designed according to the virtual market. Necessary market information and operational data of enterprises is provided to each group as well.

Then, it follows by analyzing the market and enterprise data, call material resources, make bidding strategy, market bidding and carry out the winning bidding business.

Business in each module will be operated in 1-2 years. During the simulated operation, teachers should control the time rhythm, and business cycle. Other relevant business data which is provided to team group for reference are randomly happened by different teams and their differentiated operational decisions.

The design of operation process is based on enterprises standard process referring to ERP system which is effective in real enterprises.

Business Review and group discussion after each operation cycle would be necessary for better teaching and learning effectiveness.

3.4 design of investigation and data collection

Data in this investigation was collected twice – before and after the experiences by answering the questionnaire designed for this study. The questionnaire consisted of some basic demographic details such as gender, course they are currently enrolled in, whether they have any previous experience or knowledge in logistics management. In the second chapter of the questionnaire, students were asked to make a self-assessment of their knowledge on specific dimensions/concepts and the competence gained before and after this learning using a 5- point Likert scale (1 = very low, 5 = very high). This questionnaire was feedback by the students who have pass the basic theoretical courses and have a general concept of logistics management, before they participate to the course of logistics management under simulated enterprises learning environment. And again, feedback will be collected after they had successfully completed their course under such software.

The questionnaire included questions that measure "the grasp of professional concepts and knowledge", 'process orientation of logistics business', 'integrated view of logistics management', "basic sense of enterprises practice" as well as "difficulties of study logistics management and defect of instructional design". It involves the skills dimensions indicated in the following table:

Table 1. table of skills dimension and investigation aspects

skills dimension	items	definition
the grasp of professional concepts and knowledge	5	Refers to remember the expression of most concepts and theories; describe the meaning and logic of those concepts and theories
process orientation of logistics business	3	Refers to the understanding of the significance of process, information flows; and consequences of sub-optimization of tasks in process.
integrated view of logistics management	3	Refers to the understanding of inner-dependencies, integration of out sourcing management, and sense of strategy planning.
basic sense of enterprises practice	4	Refers to grasp most of the know-how and can apply them in practice with those know-how
difficulties of study logistics management and defect of instructional design	5	the difficulties in professional study, comments of current disadvantages
additional investigation: about instructional design	5	referring to the comments and suggestion to instructional design and the role of lecturer
In total	25	

4. Analysis, discussion and implication

4.1 Basic data statistics

The demographics of the participants in this study are shown in Table 2

Table 2. Basic data statistics

pos.	details	percentage (%)/ quantity
1	Total number of valid responses	101
2	male feedback	47.52
3	sophomore	48.51
4	junior	51.49
5	participate more than 8 professional courses in subject of logistics management	73.26

In between the 101 valid responses, 47.52% are male students. The percentages of sophomore and junior are 48.51% and 51.49%. Participates who have attended more than 8 professional courses in subject of logistics management is 73.26%. It means the most responders have the basic concept of logistics management.

4.2 comparation of two investigation feedback

From the statistical data of two investigations (shown in Table 3 and Table 4), it illustrates the vivid increasing in every skills dimension, including the grasp of professional concepts and knowledge, process orientation of logistics business, integrated view of logistics management, and basic sense of enterprises practice, particularly the basic sense of enterprises practice was increased by 40.7%.

Table 3. Feedback before the course

skills dimension	mean	Std dev.
the grasp of professional concepts and knowledge	3.356436	1.15
process orientation of logistics business	2.653465	0.97
integrated view of logistics management	1.90099	1.02
basic sense of enterprises practice	2.821782	1.06

Table 4. Feedback after the course

skills dimension	mean	Std dev.
the grasp of professional concepts and knowledge	4.186275	1.09
process orientation of logistics business	4.088235	1.02
integrated view of logistics management	3.852941	0.98
basic sense of enterprises practice	3.970588	0.97

4.3 challenges and improvement

a. about challenges and bottleneck in traditional professional education

In order to analyze the necessity of application of simulated enterprise system, we also got the statistical data from the investigation about the challenges and difficulties in professional study. It reflects the bottle neck of traditional professional education. Lack of chances to engage in realistic enterprises, lack of chances to try various ideas in practice, and difficult to Establish connections between theories and applications are the main factors that students are facing.

75.49% respondents thought their weakness of competence is “Lack of experience and solutions”

80.2% Respondents selected “they would prefer to practice in simulated enterprise-learning environment if possible”.

Above data improved the necessity, also raised the general needs in professional learning.

b. About instructional design.

However, simulated enterprise teaching system is not a panacea. There are many important factors that affect the effectiveness of teaching. Instructional design is the crucial one.

Comparing to other combination, 58.41% respondents prefer to practical oriented, practice/contest in simulated enterprise environment, efficiency evaluation, theoretical references study assistance. As indicated in table 5.

Table 5. About instructional method

Items	number	percentage
Focus more on theoretical logic, references analysis	3	2.94%
classroom oriented, good organization of study, discussion, analysis and feedback	14	13.73%
application oriented, question/task driven, case study, solution discussion, efficiency evaluation, case review	25	25.49%
practical oriented, practice/contest in virtual enterprise environment, efficiency evaluation, theoretical references study assistance	48	47.06%
blended target oriented, combination of application oriented and practical oriented.	11	10.78%

Valid responders	**101**	

In selected study loops, more than 84% Respondents prefer to practical learning model, in between 62.74% recognized it is more effective under simulated enterprises learning environment.

Table 6. About study loops of logistics management

Items	number	percentage
Question/task-discussion-references study- solution- evaluation-feedback	16	15.69%
Study target-textbook study- case study/practice- evaluation	22	21.57%
Simulated enterprises operation - strategy contest in operational tasks- references study to find solutions- evaluation review and feedback	63	62.74%
Valid responders	**101**	

When asking which are the points, do you think, the lecturers didn't pay enough attention in their instructional design, 53.47% respondents choose "applicational practice".

Moreover, In the question that study with simulated enterprise-learning system, most of the responders think lecturers should be the role of guider of practical tasks, organizer of brain storm discussion, guider of market activities and arbitrator in business transactions.

5. Conclusion

In conclusion from the case study based on investigation statistics, the obvious contribution from simulated enterprises learning system provide teachers and learner a better systematic tool to grasp professional skill in an efficient way. It is a good combination of conceptual skills, knowledge skills and practical skills in the teaching of logistics management. Through the operation of the simulated enterprises system, it effectively enhances students' practical business operation ability, team cooperation ability, and professional skills understanding ability. At the same time, students can continue to try any solution even errors in the virtual environment but without any trial-error costs, which is not possible for traditional teaching and corporate practice.

Like everything has double sides, it meanwhile raises higher requirement to instructional design and curriculum innovation. Practice-oriented and leaner-centered instructions should be finely designed for the course. The study loops in such courses should be logical organized. In the application of simulated enterprise systems for teaching, teachers need to improve their ability in practical skills of enterprises technology and capability to solve practical problems. At the same time, teachers need to have the ability to control mission progress and business processes, as well as to act as an arbitrator in the virtual market to guide and supervise legitimate business practices. Those capabilities can help lecturers who applied such system achieve professional teaching goals more effectively.

Limited by the scope of investigation, and the study was done by author and her assistance, the findings therefore may potentially have researchers' bias.

This study doesn't prove simulated enterprises learning system can take place of all traditional education in applied science, but a good compensation to that.

References

Marc Prensky, (2001) "Digital Natives, Digital Immigrants Part 1", On the Horizon, Vol. 9 Issue: 5, pp.1-6.

Patic, P. C., Duta, L., Popa, I. F., 2013, Collaborative Platform for Virtual Practice Enterprise Learning, 4th IFIP WG 5.5 Working Conference on Virtual Enterprises, PRO-VE 2013, Dresden, Germany, Volume: Collaborative Systems for Reindustrialization, Springer

Kokodei, T. O., 2009, Development of Personnel Education System with Application of Computer Simulator "Virtual Enterprise", Actual Problems of Economics, National Acad Management, no. 99/2009, Pag. 227-234

Medinschi, S., Artene, A. S., 2012, Simulated Enterprises, A Modality to Learn Students to Be Good Managers, Annals. Economic Science Series, University “Tibiscus” Timişoara, Vol. XVIII - supplement/2012

Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. In R. K. Sawyer (Ed.), Cambridge handbook of the learning sciences. Cambridge, UK: Cambridge University Press,409-426.

Andrei VASILĂȚEANU, Maria-Iuliana DASCĂLU, Ionel-Bujorel PĂVĂLOIU, George DRĂGOI, INTERACTIVE LEARNING METHODS USING A SIMULATED ENTERPRISE,The 11th International Scientific Conference eLearning and Software for Education Bucharest, April 23-24, 2015

Lave, J., & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge, UK: Cambridge University Press.

Léger, P.-M. (2006). Using a simulation game approach to teach enterprise resource planning concepts. Journal of Information Systems Education, 17(4), 441-447.

Lave, J. (1988). Cognition in practice. Cambridge, UK: Cambridge University Press.

Cheaburu, C., Munteanu, R., 2014. Learning through “Simulated Enterprise”, International Journal of Social and Educational Innovation (IJSEI) No.1/ 2014

Ravi Seethamraju, Enhancing Student Learning of Enterprise Integration and Business Process Orientation through an ERP Business Simulation Game, Journal of Information Systems Education, Vol. 22(1), pp19-29, Spr2011.

Kincaid, J. P., 2009, Simulation in Education and Training, Proceedings of the 2009 Winter Simulation Conference, IEEE

Summarized from https://www.logisticstechoutlook.com/news/

Timothy Green, Jennifer Ponder, and Loretta Donovan. Educational Technology in Social Studies Education. handbook of research of education communication and technology[M], Springer Press, Edition 4th: 573-582.

Niine, Tarvo; Koppel, Ott. Logistics Systems Engineer - Interdisciplinary Competence Model for Modern Education[J]. International Journal of Engineering Pedagogy: 5(54-63).2015.

Pierre-Majorique Léger,Patrick Charland,Harvey D. Feldstein,Jacques Robert, Gilbert Babin,Derick Lyle,Business Simulation Training in Information Technology Education: Guidelines for New Approaches in IT Training, Journal of Information Technology Education Volume 10, 2011

Bloechl, Stefan J.; Schneider, Markus. Simulation Game for Intelligent Production Logistics-The Pull (R) Learning Factory[C].6th CIRP Conference on Learning Factories (CLF), vol 54:130-135.2016,06.

Supplementing Classroom Teaching with Learning Resources: Challenges and Strategies - A Librarian's Perspective

Vijay Srinath Kanchi

Moolji Jaitha College, Jalgaon, Maharashtra, India

Abstract

The rapid rise in the Information and Communication Technologies (ICT) in the past two to three decades impacted the classrooms across the globe as never before. With the deployment of interactive boards, LCD projectors and laptops, the classrooms are transforming into digital learning centers offering never before learning experiences to the students. However, the libraries, particularly in rural environment, are not galloping adequately as the chief support systems for the learning process and are falling short in inspiring the students to use e-contents. This paper describes an attempt by the Moolji Jaitha College located in a semi urban area of India, to develop a model information retrieval and delivery interface with an aim to solve many of the challenges faced by the students in locating the reference material and receiving the content translated into their native language.

Keywords: Information retrieval, translating, higher education, e resources.

Supplementing Classroom Teaching with Learning Resources: Challenges and Strategies - A Librarian's Perspective

Introduction

India is a country that is distinct in many ways. The geographical conditions are varied – from mountainous terrains to plateaus, thick jungles to deserts and myriad other landforms. With 29 states and 7 Union Territories, each having their distinct cultural practices, languages and diverse religious practices, India is a home to 1.33 billion people and is rightly called a subcontinent. The country displays a multi-colored canvass of different mother tongues. Apart from the 22 official languages recognized by the eight schedule of the Constitution of India1, the country has 122 major languages and 1599 other spoken languages2. If dialects and variations in language are also taken into account, the figures would be much higher. The 2001 Census records reveal that there are 30 Indian languages that are spoken by more than a million native speakers and 122 languages are spoken by more than 10,000 people. English is not a native language of India and due to the colonization of Britishers in 19th and first half of 20th century, it has been in a way, imposed on the people of India. English is a second language in most part of the country and is the preferred choice only of the educated and the elite. However, owing to the dominance of English as the lingua franca connecting divergent world regions, English has become the predominant language of knowledge communication in the modern era. Thus most of the learning resources produced in the electronic format are in English language, a language a great majority of the rural populace of India is not very familiar with.

Added to this, a dichotomy exists between its developed regions popularly identified with the term India and less developed and developing regions signified by its traditional nomenclature Bharat. The English educated urban Indians have good technical competencies to handle

computers and other electronic gadgets but the rural populace has very meager technical skills. Thus the language barrier that discourages the students from making use of the e-resources produced predominantly in the English language is compounded with the inadequate technical competencies in handling computers and other gadgetry.

With such a diversity on the platter, the librarians of India, particularly working in semi-urban regions, face a challenging task in providing e resources to the students in a way that is simple to access and easy to comprehend in their preferred language choice.

THE PLIGHT OF RURAL STUDENT COMMUNITY

The Indian society is witnessing a distinct digital divide in the past twenty years or so, resulting in 'information haves' and 'information haves-not'. Though the government is ever increasing the budget outlay to educational sector in every five-year plan, the ability of the students to identify their information needs, locate and use the information available online, particularly in semi-urban and rural areas, is very concerning. The Indian metros like Mumbai, New Delhi, Bengaluru, Hyderabad and Pune are major contributors to world's software development, on par with their global counterparts, contrasted by semi-urban and rural regions of the country which still battle with the issue of providing quality education to its rural populace. India finds itself in a queer situation where the educated upper elite residing in urban areas are adopting and galloping to the changing currents, while a great majority of country’s populace, still remaining firmly anchored to agrarian economic resources, seems isolated and lost, in the cacophony of emerging technologies.

The student community of the rural India is grappling with the challenge of being part of information revolution taking place in their surrounding environment. This inability to acclimatize to the technological environment is starkly evident in case of rural students of higher education.

The World Wide Web and other electronic resources including CDs and DVDs contain such a huge wealth of information that, if they are provided to the rural mass in a palatable way, could completely transform the academic scenario and bring the underdeveloped and the developing world on par with the developed parts of the globe.

Lack of Adequate Technical Skills: A formidable Challenge

The information and communication technology revolution that engulfed the whole globe in 1990 has radically transformed the very approach towards information storage and retrieval resulting in rapid expansion of the purview of the term 'information sources'. Today the information sources no longer refer merely to printed books available in libraries and book stores but also refer to those electronic sources that provide access to information beyond the limitations of time and space. However encouraging the students to turn to the new sources of information and ensuring that such resources in new formats are positively adopted by the student community hailing from Bharat is not an easy task. The new e-resource formats demand a certain degree of technical competency on the part of the user and unfortunately there is whole lot of student community in rural India that has less than mediocre computer skills. The transition to e-learning resources is a big challenge to the academic institutions located in semi-urban and rural areas of India, as a sizable number of students, except those who are pursuing a course in computer applications are not comfortable with handling computer systems.

Retrieving the desired information from the vast expanse of information available on the web demands some degree of competencies on part of the user. The natural language expressions need to be parsed into search engine keywords and the search results are to be properly filtered so as to improve the precision in the output. Presently there are no readymade solutions available to the students and each student has to entirely rely upon his computer handling skills

and maneuver through the maze of information. Correlating the syllabus content and reference resources suggested by the affiliating university/institution with the vast plethora of information in various formats (ebooks, ejournals, audios, video lectures, computer simulations etc.,) available on the web is a challenge very few students are capable of handling on their own.

What's more, there is no single engine developed and deployed that effectively addresses the needs of rural and semi urban students in respect of information retrieval, segregation and delivery across the platforms such as windows based computer systems and android based pocket gadgets. Such an interface, if developed and deployed in every institute of higher learning would greatly improve the usage of e-resources, provide latest developments in various fields.

The new algorithms developed in the recent times in computational science are revolutionizing the behavioral and social sciences and the advances made in social technology have the capacity to integrate users with the information they need as never before. This calls for the development of Intelligent Information Retrieval and Delivery Interface and adaptive eLearning strategies that are customized solutions specific to the needs of rural and semi-urban regions. Student performance improves when online educational content is personalized. With the emphasis now being focused on Massive Online Open Content (MOOC), it is time the university and college libraries develop suitable interfaces supported by intelligent engines that identify the specific needs of the students and offer customized information resources.

The Challenge of Communication Medium

Added to this issue of migrating and adopting to the new technology based accessing methods is the challenge of the language barrier. India is a land of multiple languages. Though the national language of the country is Hindi, more than 60% the country's population has many other vernacular languages as its mother tongue. A great number of youth in the rural and semi-

urban areas still pursue their education - even at higher education levels - in their mother tongues. Owing to this their comprehension levels of English language are as rudimentary as their computer handling skills. A substantial number of e-resources are produced in English language; a language the students of rural India are not comfortable with. This compels them to bank on books published by local publishers in the language of land, which in turn are way below the international standard in terms of quality and concurrence. Even the technology and tools that enable them access the learning resources are heavily dependent on English. This severely discourages the learners from adapting to the technological environment. Thus language barrier is one of the most fundamental issues that stops the learners of higher education from favoring the e-resources to conventional books. A great deal of world class literature in every field of knowledge is produced and made available in English, a language the rural populace in India are not comfortable with. Since the learners want the accessing technologies as well as the learning material in their native languages, this leaves them out of bounds.

There have been some efforts by the premier technology universities of India like Indian Institute of Technology, Kanpur, CDAC, Pune and Bangalore who produced translation software such as Anglabharati, Matra and Mantra3. But it is very unlikely that a student would access, search for and then access an e-resource in English on his own from a maze of internet resources and then deploy a translation tool available on some other website and get the e-book translated into his native language. This is a tedious and impractical task which an average student is very unlikely to adopt. The students require a one stop solution that is easy to adopt and highly useful in its outcome. Thus the onus of providing such facility shifts on to the shoulders of libraries of higher education institutions.

THE MOOLJI JAITHA COLLEGE INITIATVE

SUPPLEMENTING CLASSROOM TEACHING

The North Maharashtra region is relatively underdeveloped semi-urban region of India where a large number of students with high aspirations are pursuing higher education programs under Kavayitri Bahinabai Chaudhari North Maharashtra University and its affiliate colleges. Moolji Jaitha College run by the Khandesh College Education Society is a premier college of higher education in North Maharashtra region catering to the educational needs of the students of rural and semi-urban regions comprising student strength of over six thousand students in Arts, Science and Commerce faculties5. The college also has a junior college attached to it within the campus where about 3000 students pursue their education. Moolji Jaitha College, popularly known as M.J. College is affiliated to Kavayitri Bahinabai Chaudhari North Mahrarashtra University, Jalgaon and is all set to become an autonomous institution from the next academic year 2019-20.

The college is a recipient of College with Potential for Excellence for two terms (2003-08 and 2009-14) and College of Excellence for 2014-19 by the University Grants Commission of India and is an ISO 9001:2015 certified college. It has undergone three cycles of assessment and accreditation by the National Assessment and Accreditation Council, and received 'A' grade. It is a traditional college established in 1945, offering undergraduate and postgraduate programs in Arts, Commerce and Science faculties apart from professional programs in Management and Computer Science. Undoubtedly it is one of the oldest and most sought after colleges in Khandesh region since1945.

The college library is the largest academic library in this part of the globe with over 155,000 books and received the coveted status of Manuscript Conservation Center by the National Manuscript Mission. The college library is an automated library using SOUL 2.0 ILMS and offers online WEB OPAC facility to its users. A Moodle based Learning Management System (LMS) integrating teaching with the library resources was also introduced in the college by the college

library. The college is a subscriber to the Nlist program and provides access to e-resource to the students free of cost. This subscription enables the college library to provide access to 6,000+ ejournals and 31,35,000+ ebooks to the students.

Digital Learning Resource Access Centre for e-Learning

With the prevalence of the technological environment in the educational scenario across the globe in mind, the college library developed a Digital Learning Resource Access Centre with 30 computer nodes with internet access thus offering the students not only the traditional reading room facility for studying printed books, but also a digital learning room to access the online internet resources.

Figure 1. Digital Learning Resource Access Centre (DLRAC) in M. J. College

This Digital Learning Resource Access Centre facility not only provides free access to internet resources but also to the vast collection of electronic library resources that the library has been building over the years. These educational resources include videos, e-books, simulations, etc. Through Resource Space, an open source software these e-contents are hosted on a local server. Thus access to these resources is restricted only within the college campus. The intranet server also hosts the scanned images of the question papers of the previous years, dictionaries, encyclopedia, thesaurus, language learning tools, etc.

Figure 2. Provision of access to locally hosted e resources through Intranet

However the moot question of providing the syllabus related appropriate e-content without the need to search for various resources in the vast ocean of internet to students who have little technical skills that too in a language they will be most comfortable with remained unanswered. Hence it was conceived that a library portal may also be developed that offers a one stop solution to all the academic requirements of the students. This resulted in planning for a solution in the form of an intelligent information retrieval and delivery interface that runs at the background of the library portal and delivers the students with appropriate e-content.

College Library Portal – A One Stop Solution

An innovative library portal as a one stop solution for all the educational needs of the students is conceived and initiated since 2017[6]. It provides federated searching of resources from an array of pre identified web resources through a single click and also provides translation in the local vernacular language. The college library believed that an Intelligent Information Retrieval and Delivery Interface, which works on various platforms and which provides various educational resources to the students with one click and that too in the language of their choice will go a long way in upgrading academic standards of the students. This model delivery system developed by the college library proved to be of immense significance to the students of higher education hailing from the rural and semi-urban regions, whose skills and competencies in locating,

collecting and using information resources online are very rudimentary. It would be one of its kind and helps in designing adaptive learning systems for the students that takes into consideration varying needs of students with different linguistic, intellectual and technical abilities. The idea was to develop an intelligent information retrieval and delivery system based on the specific information needs of the students in the modem technological age through a single technological framework for digital reading rooms. The project envisages a cross platform delivery systems that offers state of the art digital environment for the students pursuing higher education.

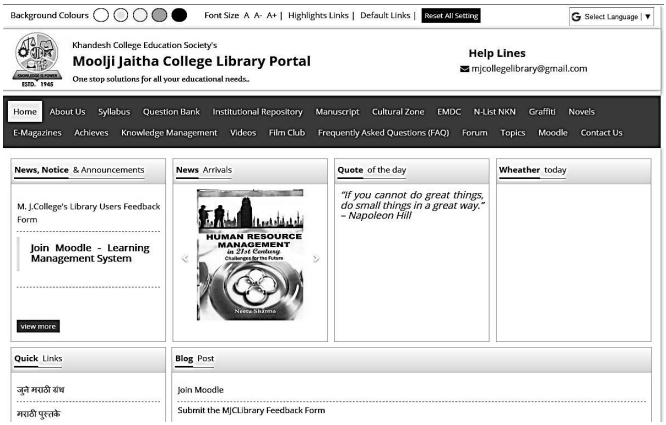

Figure 3. The College Library Portal – A One Stop Solution for all the Academic Needs of the Students

The library portal has several features that address the basic academic requirements of students not only in terms of providing e-resources suiting the prescribed syllabus but also all such information an educated person would like to know. Some of the salient features of the portal include Quote of the Day, Weather Today, News, Notices & Announcements, New Arrivals, Cultural zone displaying jokes, information on festivals, celebrations, motivational stories, messages,etc., Graffiti where authenticated logged in users can express their ideas, views on any

topic, a Forum to discuss current and trending topics with sticky and updated threads, Maps of world, India, Maharashtra and Jalgaon, provision for writing blogs on various topics of interest, previous year Question papers, Institutional Repository consisting of M.Phil & Ph.D. theses and dissertations, previous issues of the college's cultural magazine titled Ajintha, Compendia of Budding Researcher Scheme research papers, Scanned images of rare Manuscripts digitized under a university funded project, audio and video lectures recorded by the Educational Media Development Centre of the college, access to N-List site, inspirational novels, motivational videos and a plethora of other useful material. The college library also launched a learning management system (LMS) with a view to integrating classroom teaching with the library as well as internet resources. For this an open source software named Moodle was put to use. The library portal also provides direct access to this Moodle based Learning Management where each registered teacher monitors a group of students, provides them with suitable notes, solves their queries, and evaluates their progress through online internal tests[7].

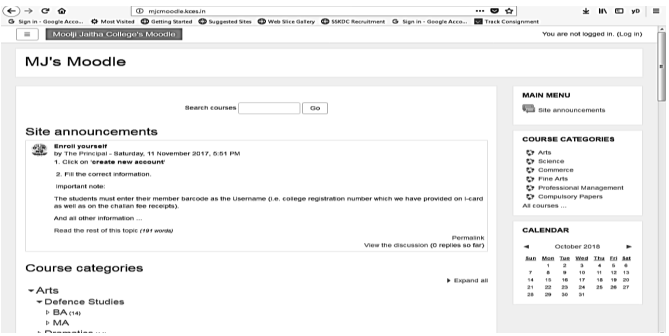

Figure 4. Moodle based Learning Management System

The library on the other hand enriches the learning management system by providing appropriate learning resources and also through constant monitoring of the activities on the LMS.

Developing and Deploying an Intelligent Information Retrieval and Delivery Interface (IIRDI)

The college library has also developed and deployed an intelligent information retrieval and delivery interface that works at the background of the library portal and provides the students with the suitable learning resources in various formats that are appropriate to the syllabus of their study. The IIRDI functions in the following way:

As the student enters the Digital Learning Resource Access Centre (DLRAC) facility the default webpage that gets loaded onto his computer screen is the college library portal. The student doesn't have to click on any software or visit any website. The library portal offers the student with a provision to select the course of his study through an array of drop down menus. Once that is done, the IIRDI fetches the syllabus prescribed for the course from the affiliating university website and displays the same through a flash player in front of him. Since the displayed content fetched from the university invariably is in non-editable pdf format, the engine parses the file into an editable format from which it generates searchable keywords and displays them as clickable web links. As the students clicks the keyword of his syllabus content thus displayed, the in-built customized search engine crawls across the pre-identified websites for possible matches and retrieves the e-resources hosted on those websites. The results are displayed as another set of segregated links under four categories: Videos, Audios, E-books, Simulations, each representing a resource in that particular format that conforms to the keyword searched based on the prescribed syllabus. If the student wishes to watch a video concerning the topic of his interest, he/she can click the video link displayed which in turn displays the video file in an in-built flash player. Similarly by clicking an audio link an in built audio gets activated which plays the particular audio resource. If the file chosen is an e-book a text window gets displayed in place of the flash player

wherein the e-book is displayed. The whole process starting from the display of syllabus to eventual display of e-resource in the format of the student's choice takes place within a single webpage and the students is not bothered to go to any other website or activate any application.

Thus the library portal relieves the student of the burden of acquiring adequate web browsing skills before he or she embarks on using the e-resources that are helpful to study the prescribed syllabus.

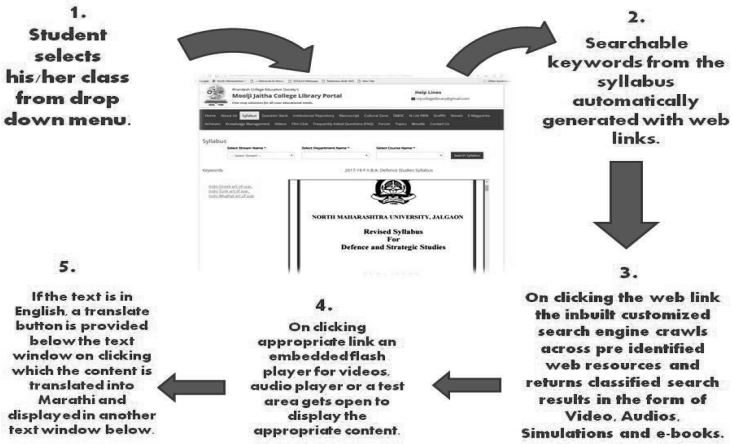

Figure 5. Flow chart of IIRDI engine

To mitigate the challenge posed by the language barrier, the library portal with its built-in IIRDI engine offers another feature. If the text of the e-book displayed is in English language, a translate button is provided right below the text displaying window on clicking which, the content is translated into the local vernacular language Marathi and displayed in another text window right below. For translating the content into Marathi the IIRDI avails the services of the Google translate engine and displays the content. Though the translation provided may not be 100% accurate, it however certainly provides the user with the content that is comprehensible, and usable.

Thus the envisaged library portal with built-in IIRDI engine addresses the two vital issues that hamper to students of rural background to utilize the e-resources, namely: the technical competency and the language barrier. The identification of specific learning resources spread across the globe and from pre-identified web resources, would ensure developing a solution with multi- perspectivity, disciplinary diversity and mutual sensitivity.

Future Applications of the Intelligent Information Retrieval and Delivery Interface (IIRDI)

The Intelligent Information Retrieval and Delivery Interface, coupled with robotic pedagogical agents and facilities to interaction between and among students, could be used on large scale in Massive Online Open Content systems, radically transforming even distance learning and online courses, let alone the contact based teaching-learning environment. The objective as stated in the mission document 'National Mission on Education through Information and Communication Technology' (NMEICT) and Inclusive and Qualitative Expansion of Higher Education in the 12 Five-Year Plan, 2012-17', could be realized by the development and deployment of such Intelligent Information Retrieval and Delivery Interfaces coupled with digital learning resource access centers that could usher in new areas of adaptive learning solutions for personal learning and open learning of the students.

Conclusion

The Intelligent Information Retrieval and Delivery Interface is designed and developed by the MJ College library as part of its library portal, keeping the local conditions and needs into consideration. This library portal supported at the background with an Intelligent Information Retrieval and Delivery system retrieves information from an array of pre-identified web resources and delivers it in a customized and segregated fashion to the students of higher education. It

incorporates the principles of library and information science with that of the computer technology and provides e-resources in an easy to access and simple way. It also addresses the issue of poor usage of e-resources by average students owing to the language barrier, thanks to the provision of translation tool in the library portal. This solution is developed as a meaningful and effective solution to the information needs of the present day student community that hails from a rural background and which is vary of utilizing the vast swathes of e-resources spread on the internet owing to their technical and linguistic limitations.

References

Department of Official Langauge, Languages Included in the Eighth Schedule of the Indian Constitution Available at: http://rajbhasha.nic.in/en/languages-included-eighth-schedule-indian-constution (Accessed on 23 Oct 2018).

Office of the Registrar General & Census Commissioner, India, General Note. Available at: http://www.censusindia.gov.in/Census_Data_2001/Census_Data_Online/Language/gen_note.html (Accessed on 23 Oct 2018).

Kanchi VS, Towards an Information Society: What Can Be Done To Face The Challenges?. *In Proceedings of IADIS E Society 2012*. Berlin, Germany, 10-12 March 2012, P.505-510.

Moolji Jaitha College, Available at: https://www.kcesmjcollege.in/ (Accessed on 23 Oct 2018).

Moolji Jaitha College Library Portal, Available at: http://mjcollegelibrary.kces.in (Accessed on 23 Oct 2018).

Mj's Moodle Available at: http://mjcmoodle.kces.in/(Accessed on 23 Oct 2018).

Active Learning Methods in Math Courses for Engineering Students and Its Evaluation

U. Tudevdagva and A. Heller

Chemnitz University of Technology, TUC, Chemnitz, Germany

Abstract

Math courses are most important courses of all directions of engineering students. Study of some researchers showed that many students leaving university early not finishing degree because of math courses. One of the main goal of Europe 2020 strategy of Education and Culture European Commission is to reduce drop out of students from universities. To contribute on this issue four European universities working together to support students with math courses during their study. Main idea of DrIVE-MATH - Development of Innovative Mathematical Teaching Strategies in European Engineering Degrees, is to apply new teaching methodologies and active learning methods in math courses. By our opinion, it will help to students stay motivated and learn math with success. This paper presents formative report of the DrIVE-MATH project. We reflect on our on-going report activities and expect valuable hints from researchers who are dealing with same problems.

Keywords: project, drive math, math course, active learning.

Active Learning Methods in Math Courses for Engineering Students and Its Evaluation

Introduction

One of the key goal of Europe 2020 strategy of Education and Culture European Commission is to reduce drop out and to increase finish their tertiary degree at least 40% in age of 30-34 years old. Numerous students in Europe drop out before obtaining a higher education diploma or degree (Hans Vossensteyn, Bjørn Stensaker and others, 2015). Reasons for drop out is different: a desire to work instead (reported by about 25%), or finding their studies uninteresting or not meeting their needs (given by 22%). Almost 18% cited the degree of difficulty of their studies, whereas about 10% reported that they dropped out because of family reasons. Finally, around 7% struggled with studies because of financial reasons and 5% reported health problems.

The DrIVE-MATH project came out from idea to support learning of mathematic courses in four European universities: The Polytechnic of Porto, Portugal, Chemnitz University of Technology, Germany, University Claude Bernard Lyon 1, France and Slovak University of Technology in Bratislava, Slovakia works together for establish new teaching materials and methodologies in mathematic courses. As educators, we recognize that an engineering education is acquired over a long period and in a variety of institutions, and that educators in all parts of this spectrum can learn from practice elsewhere. All partners involved in the current project have experience in previous projects, which provide background, knowledge, and experience for the current one. Some already accomplished assets will be delivered in this work (Mendonça and others, 2018).

Rapid development of technology enables to educators to apply different active learning methodologies in combination of technologies. In frame of DrIVE-MATH project, we selected

several teaching methodologies like: EduScrum, Jigsaw, problem based learning and programmed tools for mathematic senses. Next focus of our project is to update curricula of mathematic courses. Modernization and adaptation of actual curricula is important issue of universities. Nowadays science development requires interdisciplinary research and ideas. Therefore, some of the traditional curricula should be update with opportunities to use technologies and to improve learning objectives and transferring skills for students. Other key point of our project is cooperation and collaboration of educators of four universities from different countries.

Design of project activities

To reach main targets of project we planned to organize serial training workshops that will hold partner universities in systematic order (See Figure 1).

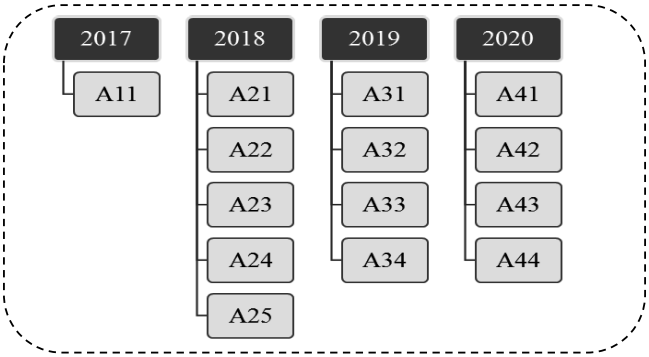

Figure 1. Scheme of planned activities

Figure 1 describes basic design of serial activities. Here, A11 standing for first activity of first year. From here we can read A44 as fourth activity of fourth year. Each activity has own title and main purposes. Table 1 shows information about serial workshops. Here, GN is general number of activities; GNA is given number of single activity.

Table 1. Activity plan

GN	GNA	Title of activity	Purpose of activity	Location
1.	A11	Training and teaching methodologies for teaching staff I	Exchange of the best teaching practices and experiences between the partner universities	Porto, Portugal
2.	A21	Curricula modernization and adaptation	Reflection and discussion around new strategies and new paradigms for instructional leadership	Bratislava, Slovakia
3.	A22	Pedagogical materials for updated curricula	Selection of corresponding teaching materials and adapt to the rapid changes that occur in students	Lyon, France
4.	A23	Innovative pedagogical evaluation	Challenge in implementation of new teaching methodologies in partner universities	Chemnitz, Germany
5.	A24	Case studies evaluation	Presentation and feedback around implementation examples of ISEP and at the partners' universities	Porto, Portugal
6.	A25	Training and teaching methodologies for teaching staff II	Second around discussion on new curricula and corresponding teaching material selection	Bratislava, Slovakia
7.	A31	Experiences in mathematic curricula for engineers	Exchange the best active learning teaching practices along the pilot implementation	Lyon, France
8.	A32	Application of EduScrum methodology in mathematics for engineers	Learn how to apply EduScrum model at high school mathematic classes	Porto, Portugal
9.	A33	Evaluation methodology training	Discuss tangible results of application of pedagogical methodologies in pervious activities	Chemnitz, Germany
10.	A34	SWOT analysis on the evaluation of active-learning methodologies	Perform a SWOT analysis of the implementation of the active-learning methods	Lyon, France

11.	A41	Role of active learning in mathematic curricula for unmotivated students	Reflection and discussion on three main aspects of motivation: relatedness, competence and autonomy	Chemnitz, Germany
12.	A42	Mid-term curricular and evaluation methodology activity	Review of ongoing results, comparison analysis between past and future activities and support improvements on the ongoing project	Chemnitz, Germany
13.	A43	Final curricular and evaluation methodology activity	Reflection and discussion on focus movement of teaching from teacher to student should be d	Bratislava, Slovakia
14.	A44	Sum-up of active learning methodologies for mathematics on engineering education	Summary of all serial activities and reflect on outcomes of project	Porto, Portugal

Best experience exchange and learned lessons from activities

During workshop days, participants presented their best case studies in class and later continued reflection and discussion on day topic.

- School of Engineering, Polytechnic of Porto. The development of student supportive learning environment is very important. The Polytechnic of Porto University uses various type of active learning methods for teaching in math classes. The EduScrum is method where students can collaborate under general task. By this method, students have to divide into groups up to five members. Advantage of this method is improvement of teamwork skill and to share own knowledge with others. Some personal characteristic of students can be limitation of this method. Next new teaching methodology which applying for math classes in School of Engineering, Polytechnic of Porto was Jigsaw method. Highlight of Jigsaw learning in classroom is opportunity to discuss topics with group members and later can teach topic to others. Some not motivated student can stay out of activity during this

kind of class. This can be side effect of Jigsaw method. CDIO is the one of active learning method which using in this university. Main advantage of this teaching is professors of different courses can cooperate. Students will receive general task for solution have to apply knowledge and learned skill from courses like: mathematic, physics and programming.

- Chemnitz University of Technology. To support students in math classes professors in TU Chemnitz offers several e-math courses for students. Dr. Wenzel from Faculty of Mathematics developed OPAL course "e-Learning based Teaching Examples" (Wenzel, 2018). Moreover improving communication channel between learning platform and students. To use learning management system OPAL should be easy for students and students have to feel compatible with feedback from system. Some researchers working in this sense to test polite feedback to students (Mikheeva, 2018). There are running project ESF Project Presentation "Digitalization of Teaching in Mathematic" where work researchers from Psychology of learning with digital media of Institute for Media Research in Faculty of Humanities. Main goal of this study is to keep motivation of students to learn math. In the summer semester of 2018 Faculty of Computer Science applied EduScrum teaching methodology for master student in main research seminar.
- University Claude Bernard Lyon 1. Many different tools uses in classroom for teaching math. OpArt and MathCityMap are some example of technology-supported tools for math teachers. The MathCityMap application is free and open course learning platform. This apps support students to use mathematical theoretical knowledge in real world problems. Most important impact of this tool is student not only can solve formulated tasks in the platform, moreover any student if like can create own task which linked to real world.

- Slovak University of Technology. Professors of STU use some of free tools to teach math courses. For example, GeoGebra is tool for dynamic mathematical software, which is free to download. Next one is Mathenmatica - Wolfram sogtware package, which is commercial. To teach math courses with fun is complicated task. Dr. Velichova is one of the main organizer of annually international conference where calls contribution of math professors (Velichova, 2017). The APLIMAT is 17 successful conferences on applied mathematics originated by the former Department of Mathematics at the Faculty of Mechanical Engineering STU in 2002. Main goal of this conference to share experiences and new activities in applied mathematics. It helps a lot to math professors to keep their motivation on teaching and research. Proceedings of APLIMAT conference is included into to SCOPUS that confirms effort of STU math professors reached own targets. This year all partner universities contributed to this conference and had fruitful and interesting discussion with many excellent math professors from Italy, France and others.

Self-Evaluation based on structure-oriented evaluation

An evaluation is the important part of our project. The partner universities using different methods to evaluate progress and result of project. TU Chemnitz applies structure oriented evaluation method for final evaluation of project.

The structure oriented evaluation model originally developed for evaluation of e-learning (Tudevdagva, 2014). To use logical structure for design of evaluation goal is basic new idea of this method. There are eight steps to use structure oriented evaluation model. In this paper, we describes first two steps of method.

Key issue of any evaluation process is definition of evaluation goal. As usually this part is not so clear, designing and discussion with groups, which can be, interest and involve evaluation

process. Structure oriented evaluation model uses logical structure, which shows transparent way evaluation goal to all interested group.

Figure 2 shows main goal of DrIVE-MATH evaluation.

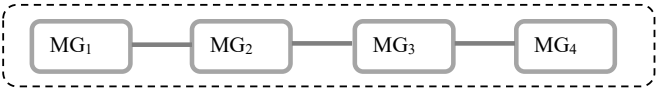

Figure 2. Logical structure for main goal of project evaluation

y structure oriented evaluation model calculation rule data collected by structure (Figure 2) will processed by formula:

$$C = \bigcap_{i=1}^{r} MG_i$$

Where, MG = {MG_1, MG_2, MG_3, MG_4} standing for main goals. Evaluation is positive if C>1. C>1 can be only if MG_i>1.

The main goals of evaluation can consist of several sub goals. Figure 3 shows sub goals of project evaluation.

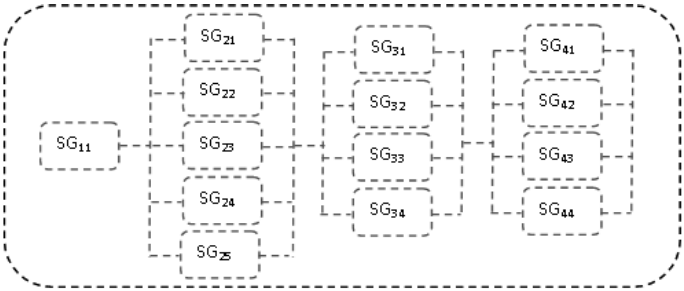

Figure 3. Logical structure for main goal of project evaluation

By structure oriented evaluation model calculation rule data collected by structure (Figure 3) will processed by formula:

$$C = \bigcap_{i=1}^{r} MG_i = \bigcap_{i=1}^{r} \bigcup_{j=1}^{s_i} SG_{ij}$$

If any sub goal reached, own target then corresponding main goal will evaluate successful.

The structure oriented evaluation request to design questionnaire to collect data for evaluation. The questionnaire has to adapt to goal structure of evaluation.

Table 1. The questionnaire for single activity

No	Criteria	Very low 1	Low 2	Middle 3	High 4	Very high 5
1	Information (about travel, accommodation etc.) received before the meeting from host university responding in time					
2	General organization during the meeting					
3	Duration and timing of the meeting					
4	The subjects discussed were relevant					
5	The activities were relevant					
6	The meeting fulfilled the established objectives					
7	The meeting fulfilled my personal expectations					
8	Effective communication amongst partners					
9	The commitment to the project by each partner (fulfilling the responsibilities set out for this project meeting, quality of the presentations and products, sharing responsibility for the meeting)					
10	The information (on tasks, materials for the meeting etc.) received before the meeting from the coordinator					
11	The coordinator facilitate understanding of the objectives and work plan for the next period					

12	The coordinator facilitates communication and collaboration between partners. Everyone was encourages to contribute to discussion					

Table 1 shows questionnaire for single activity. We will consider logical structure of this questionnaire as parallel structure and will use calculation rule for parallel structure.

Conclusion

One of the solution to reduce dropout of students from universities is to support students with learning environment and keep motivation to successful finish of study. Main target of DrIVE-MATH project is to produce new teaching materials for math courses, which can enhance teaching methodologies of teachers in classroom.

References

Hans, V.& Bjørn, S. and others. (2015). Dropout and Completion in Higher Education in Europe. Luxembourg: Publications Office of the European Union. Online available: https://supporthere.org/sites/default/files/dropout-completion-he_en.pdf

Data from Eurostat. (2016). European Labour Force Survey ad hoc module on young people on the labour market. Online available: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfso_16ymgnednc&lang=en

Mendonça, Jorge & Pinto, Carla & Nicola, Susana. (2018). Collaborative networking for educational innovation in math courses – project drive-math. 4548-4553. 10.21125/edulearn.2018.1134

Uranchimeg Tudevdagva, (2014). Structure Oriented Evaluation Model for E-Learning. Wissenschaftliche Schriftenreihe Eingebettete Selbstorganisierende Systeme, Universitätsverlag Chemnitz, Chemnitz, Germany, July 2014. 123 p., ISBN: 978-3-944640-20-4, ISSN: 2196-3932.

Norbert Englisch et al, (2018). AUTOMATED GENERATION OF TESTS FOR EDUCATION IN SOFTWARE ENGINEERING IN Proceedings of the 10th annual International Conference on Education and New Learning Technologies (EDULEARN)

Norbert Englisch et al, (2018). LEARNING SYSTEM FOR AUTOMOTIVE SPECIFIC SYSTEM ARCHITECTURE BASED ON A KNOWLEDGE BASE IN Proceedings of the 12th International Technology, Education and Development Conference (INTED), page 8996 - 9002, ISBN: 978-84-697-9480-7

Norbert Englisch et al, (2015). CROSS-SYSTEM KNOWLEDGE REPRESENTATION OF LEARNING CONTENT IN SYSTEMS FOR EDUCATION IN Proceedings of the 8th

International Conference of Education, Research and Innovation (ICERI), page 2269 - 2276, ISBN: 978-84-608-2657-6, ISSN: 2340-1095

Norbert Englisch et al (2014). GENERIC TEMPLATES FOR COURSES WITH MULTILINGUAL CONTENT IN LEARNING MANAGEMENT SYSTEMS IN Proceedings of the 7th International Conference of Education, Research and Innovation (ICERI), page 6279 - 6285. ISBN: 978-84-617-2484-0

IBS Scientific Workshop Proceedings

This scientific series publishes contributions to IBS-workshops, -conferences and -events.

The foundation „Internationales Informatik- und Begegnungszentrum Sachsen (IBS)" supports the establishment, growth and preservation of scientific oriented interdisciplinary networks. National and international scientists and experts are brought together for research and technology transfer, where the foundation IBS provides the suitable environment for the conferences, workshops and seminars.

The series *IBS Scientific Workshop Proceedings* aims at the ensuring of permanent visibility and access to the research results presented during the events staged by IBS.

The rapid development of technology and completely new view to learning process of modern learners are requested to re-design the learning environment and teaching methodologies of higher education systems. Therefore, universities of Germany, Portugal, France and Slovakia working on a specific project so called "DrIVE-MATH – Development of Innovative Mathematical Teaching Strategies in European Engineering Degrees". One key goal of this project is to use new teaching approaches in engineering sciences. The learner centered learning is a challenging approach of active learning and teaching methodologies. Experts and educators from Germany, Mongolia, Philippines, China, India, Sri Lanka and Egypt joined the workshop and discussed actively around this topic. We included in this volume selected papers from the LCL workshop.

Prof. Dr. Uranchimeg Tudevdagva

Chairman of LCL Workshop

January 2019

Table of contents

Learner Centered Learning Workshop

Learner Centered Teaching: Teaching Case Study with Student Collaboration

Erdenesuvd, A., Tsogzolmaa, D., Enkhtestesg, M.

School of Applied Science, Mongolian University of Science and Technology

Ulaanbaatar, Mongolia

Abstract

International trends in higher education show a shift away from the teacher-centered model that emphasizes what is presented, towards the student-centered model focusing on how students interact with each other well and what students know and can actually do. This paper addresses how to provide environment for students to promote effective self-learning and team work, to learn from classmates and to teach knowledge and competence for classmates. Classes, where teachers encourage students to teach and learn from each other help students effectively construct their knowledge. By emphasizing the collaborative and cooperative nature of academic work, students share responsibility for learning from each other, discuss different conceptual understandings, and shape the learning environment of the class. The author consider that, there might be relationship between academic performance, self-reflection and learning environment where students learn and teach each other by guidance of teachers. Furthermore, students improve their leadership skills, team work, time management and motivation by this activity.

Keywords: learner-centered teaching, collaborative learning, self-reflection

Learner Centered Teaching: Teaching Case Study with Student Collaboration

Our Teaching Assistant Club /TAC/ was established in 2011 and has been working for seven years. The purpose of this club is to improve the skills and academic knowledge of the students at the Mongolian University of Science and Technology /MUST/. This club allows to establish environment, where future leaders of various fields shape themselves. Teaching assistants teach and help their colleagues and study together. The TAC experience can be an outstanding way to learn the art of teaching and to have a positive influence on many students. By working as a teaching assistant, students learn about themselves, improve their communication skills and take responsibilities. Our aims are shows in Figure 1:

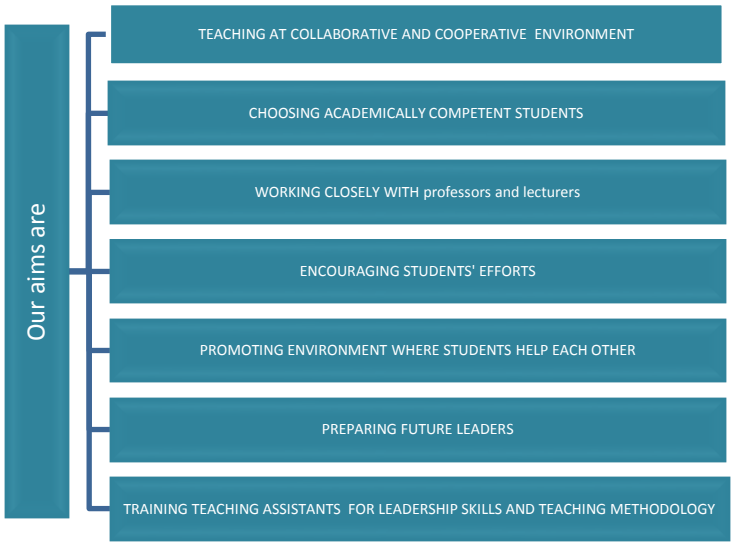

Figure 1. Aim of TAC

There are two types of courses for assistant teacher-student: Leadership training and Teaching methodology. Teaching assistant-student teach one of the following courses (Figure 2):

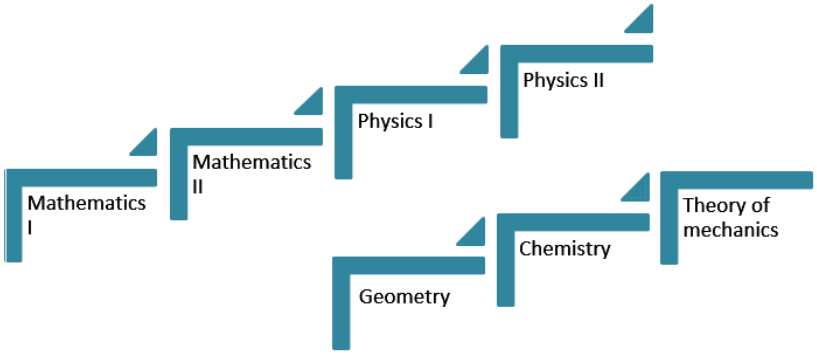

Figure 2. Courses for TAC

Our club activities are as follow (Figure 3):

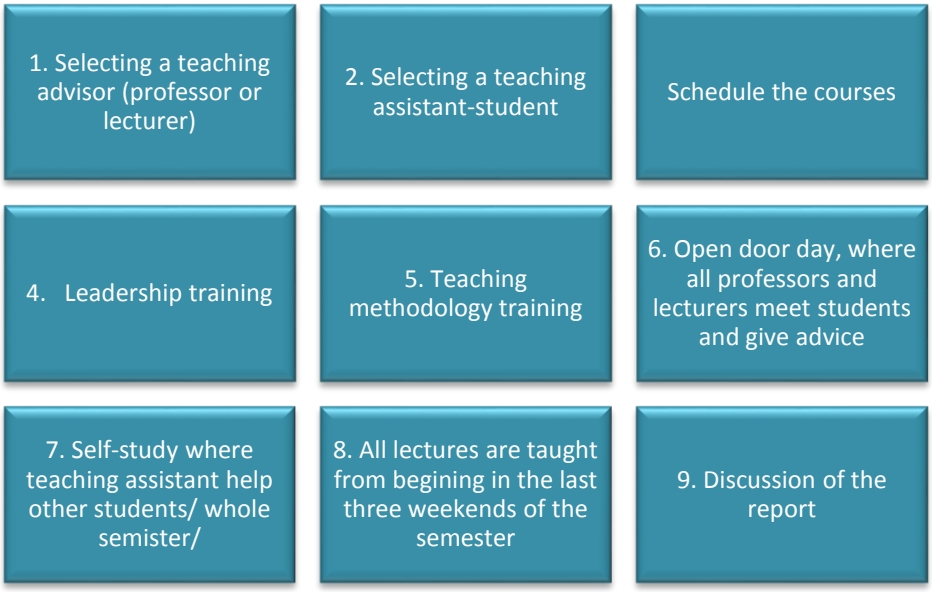

Figure 3. Activities of TAC

We structure our class in the following ways:

- Allow students to work in pairs and small groups and use multiple modes of communication e.g., discussions, making presentations, brainstorming, etc.);
- Encourage students to get comprehensive answers by cooperating together to an open-ended problem;

- Devote a significant proportion of class time to student interactions;
- Run in-depth conversations among students (and between students and instructor);
- Provide opportunity to explain their ideas to classmates.

We use some methods to improve student to student classroom interaction

- We want students to interact at different scales and engage in discussion in our classroom. For instance, we apply the following teaching methods and techniques:
    - In-class assignments, where students think individually about a question, talk with their classmates about an idea how can solve the problem, and then report their findings back to the class;
    - Conceptual multiple-choice questions (Concept Tests) about concepts of the subject, students discuss their conceptual understandings and strengthen their knowledge.;
    - In structured discussion exercises such as jigsaw activities, where students deepen their knowledge by getting help from teaching assistant, who has in-depth knowledge and ability about the topic;
    - In more cooperative learning techniques that encompasses a variety of methods to encourage student to student interactions within the classroom.

As a TAC member, teaching assistants are considered as a bridge between professor and students. This gives the opportunity to them to observe and influence higher-level decisions about course design and content, as well as to maintain a smooth daily close interactions with students.

What requirements do we consider of a student as an assistant teacher (**Fehler! Verweisquelle konnte nicht gefunden werden.**):

Figure 4. The requirements for students of TAC

Conclusion

From the observation of TAC activity, the author think there is a relationship between student's self-reflection, academic performance and motivation. Since 2011, over 60 students have worked as a teaching assistant, over 50 professors and lecturers have worked as an advisor, and 7000 students have joined the TAC. Teaching assistants teach 8 lesson/hours per week, which means 96 lesson/hours per semester. The first TA is Gerelmaa, who is an assistant lecturer in the mathematics department of the School of Applied Sciences. Many former TAC members are studying under various scholarships in abroad, such as USA, Germany, Austria, Japan, and Korea. Also, many other members have received domestic scholarships from leading companies, such as Oyu Tolgoi LLC, Khan bank, and Golomt bank. Moreover, many TAC members have participated in national and international competitions.

These participations and success show that TAC activity, where students cooperate and collaborate can facilitate learner centered teaching might have prepared a good professionals and inspired their motivation to further their career by applying skills and abilities they have possessed.

Mongolian University of Science and Technology have a policy to encourage teaching assistants to earn a certain percentage of their tuition fees from TAC activity. The average tuition fee for 1 course is around $80. During this time, a total of 50 students received scholarships, which equals $ 6,210.

References

Mongolia Human Development Report. (2016). Building a Better Tomorrow: Including Youth in the Development of Mongolia, United Nations Development Programme, Ulaanbaatar, pp.80-83.

Bathuyag.S. (2012). “How to study successfully”. Ulaanbaatar, Sod Press publishing, pp.24-28.

Amarjargalan.T, Buyandelger.Ts, Uyanga.S, Enkhjargal.Kh, and others, (2016). Conceive, Design, Implement and Operate (CDIO) framework for re-thinking engineering education, Manual for teachers’ series 4th book, Ulaanbaatar.

Annual Report of the Mongolian University of Science and Technology, (2018). MUST publishing, pp.136-139.

Smart and Universal Education Environment for Life-Long Learning

Jiyou Jia

School of Education, Peking University. Beijing, 100871, China

Abstract

The popularity of smartphones, Internet and the Internet of things, artificial intelligence and other emerging technologies has created a smart and universal education environment for life-long learning, empowered the education without geographical border and schedule limitation, and improved the life-long learning for all and from all. The learning takes place not only in formal institutions like school and universities, but also at home, in workplace, on the way or anywhere at any time. This speech will address the opportunities and challenges for education in the era of artificial intelligence.

Keywords: Smart phone, Internet, Artificial intelligence, Life-long learning, Personalized Learning, Collaborative Learning

Smart and Universal Education Environment for Life-Long Learning

The concept smart and universal education environment for life-long learning (SAUEELLL) means that any person in the world located anywhere can learn any knowledge or skill he or she wants or needs to learn at any time, only if this person has a smart phone or other client equipment with access to Internet and very limited cost, and this learning can be both as personalized as taught by a tutor and as collaborative as learning in a traditional classroom so that the person can achieve the best learning performance regarding his or her own learning profile. In the time of life-long learning and artificial intelligence, this concept should be the target of the application of emerging technologies in education and is becoming the reality. The four conditions to realize the SAUEELLL include rich educational resource, ubiquitous equipment with lower cost, personalized or adaptive learning like accompanied by a human tutor, and collaborative learning as in traditional classrooms and schools.

Rich educational resource

Atkins, Brown, and Hammond (2007) defined OER (Open Educational Resource) as "teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge." MIT OpenCourseWare is a milestone in OER history. Chinese OER includes Chinese excellent courses for higher education, Chinese national public service platform for educational resource, provincial and other local educational resource, like Beijing Digital School.

The Internet's rapid advancement has enabled the establishment of giant common sense knowledge and professional knowledge through the selfless contribution from numerous

volunteers and institutes worldwide. Wikipedia is just such a database of common sense knowledge. Similar knowledge databases have also widely used in China like Baidu encyclopedia and knowledge, etc. Many professional databases have also been opened, like OLCDB (Oriental Language & Culture Database) from PKU.

Open video lectures are provided by many professional services like Khan Academy, Ted, and public portals like Chinese baidu, sina, sohu, etc. MOOC (Massive Open Online Course) provides not only lecture videos, but also discussion, quiz, exam, and other similar learning activities like traditional classrooms, and can be freely used by the learners worldwide. Typical MOOC platforms include Coursera, Edx, German MOOC Iversity, Chinese MOOC from Tsinghua University, from Higher Education Press and from Chinese University MOOC.

Free Educational Software can be found in open software repositories like Sourceforge, Google code, Github. A typical case is Geogebra.

Search engines play a critical role for the educators and learners to search the required teaching and learning materials in various languages and formats. Google, Yahoo, Bing, Baidu and other search engines can supply such service. The target can be websites, audios, videos, pictures, books, research papers, software, and so on.

Ubiquitous equipment with lower cost

Smart phones have been popularly used in the world. For example, the latest (42th) internet survey published on August 4th, 2018 by China Internet Network Information Centre shows that upon June 30, 2018, Internet users counted 802 Million (57.7% of Chinese population), Students count 25.4 of all internet users, Internet users using smarting phones counted 788 Million (98.3% of all users), Internet users for education counted 172 Million, weekly average online duration reached 27.7 hours.

Smart phones available in the hands of the leaners mean no need for the institution to provide learners with the special hardware to incorporate a technology enhanced learning into their teaching: High computing capability, instant voice and text communication, multimedia, Internet browsing, more affordable price compared with notebook and laptop computers.

Personalized or Adaptive Learning

An intelligent tutoring system (ITS) refers to a computer system that can function as a human tutor partially or fully to help a student learn and master content. The intelligence level of an ITS can be assessed by the extent to which it can function as a human tutor. The intelligence of an ITS is partly represented by its interaction with a learner, concretized by instant and appropriate feedback to a learner's request and input. An ITS not only stores, represents, and retrieves information, but also responds to learners' questions. An intelligent tutoring system is normally comprised of four components: domain model, learner model, pedagogical model, and interaction model (Jia, 2015). The data learning analytics have been adopted in the development of ITS to address the learners' features based on their online learning activities (Jia, 2017). OLAI (Online Learning Activity Index) is just such a model (Jia & Yu, 2017; Le & Jia, 2018).

Intelligent tutoring systems have cemented a place within both formal K-12 and higher education, and found homes in workplace training and lifelong learning. Application cases include school mathematics, science and language courses, STEM or MINT subjects, as well as technical and military training programs. Jia etc. (2004; 2009; 2012; 2015; 2016) conducted quasi-experiments to assess the effect of an English chatbot system CSIEC and the corresponding learning content management system on students' learning performance and found that those systems have better effect than traditional teaching approaches. Zhang & Jia (2017) conducted quasi-experiments to assess the effect of "Lexue 100" (Happy Learning for the Full Score)

(http://www.lexue100.com), a web-based interactive learning system for school mathematics on students' learning performance and found that that system had better effect than traditional teaching approaches.

Collaborative and blended learning

The learning can also be collaborative because the Internet connects the learners and teachers worldwide, wider than any current classroom. Blended learning links traditional classroom teaching to online learning that usually means the learning over the Internet or Intranet, and combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment (Bonk & Graham, 2006). University and school students can also use the blended learning to achieve best performance under the supervision of the teachers, because mobile devices can distract students and have negative influence on students' learning without teachers' supervision and deliberate design (Lepp, Barkley & Karpinski, 2014). Our previous studies about our CSIEC system (an intelligent web-based English instruction system) blended in English classes demonstrate its long-term effect on students' academic achievement represented by regular examination scores and vocabulary test is positive, and in most cases, the positive impact is statistically significant. The reliable positive effect on students' learning performance in ordinary examinations is caused by the learning content oriented design, the instant feedback feature of the web-based system, its regular integration into the English class, the time distribution principle for blended learning in classrooms, traditional instruction time: technology time is 3:1.

Conclusion

Educational resource is rich enough. Ubiquitous equipment with lower cost becomes affordable and popular. Personalized or adaptive learning can be accompanied by an ITS just like a learning

companion. Collaborative learning can take place anywhere anytime, and blended learning with ITS can be more effective than traditional instruction. SULELL is emerging and unavoidable!

References

Atkins, D. E., Brown, J. S. and Hammond, A. L. (2007). A Review of the Open Educational Resources (OER) Movement: Achievements, Challenges, and New Opportunities. Report to The William and Flora Hewlett Foundation.

Lepp, A., Barkley, J. E., & Karpinski, A. C. (2014). The relationship between cell phone use, academic performance, anxiety, and Satisfaction with Life in college students. Computers in Human Behavior 31: 343–350.

Jia, J. (2004). CSIEC (Computer Simulator in Educational Communication): A Virtual Context-Adaptive Chatting Partner for Foreign Language Learners. In Proceedings of ICALT04, P.690-692. New York: IEEE Press.

Jia, J. & Chen, W. (2009). The further development of CSIEC project driven by application and evaluation in English education. British Journal of Educational Technology. 40 (5):901–918.

Jia, J., etc. (2012). Effects of a vocabulary acquisition and assessment system on students' performance in a blended learning class for English subject. Computers & Education. 58 (1), pp. 63-76.

Jia, J., etc. (2013) The positive effect of an intelligent web-based English instruction system on students' academic performance: summarization of long-term quasi-experiments in four middle schools located in rural and urban areas. Journal of Computer Assisted Learning. 29(6):556-568.

Jia, J. (2014). Digital Classrooms Equipped with Tablet Computers as the Students' Learning Companions. Intelligent Web-Based English Instruction in Middle Schools, pp. 235-266. Hershey PA, USA: IGI Global.

Jia, J. (2015). Intelligent Tutoring Systems. In: Mike Spector (Ed.): Encyclopedia of Educational Technology. pp.411-413. Thousand Oaks, CA, USA: Sage.

Jia, J., Chen, Z. (2015). The Effect of Smart Phones' Application in Regular University English Class on Students' Learning Performance. In Proceedings of EITT 2015, pp. 131-136

Jia, J., Chen, Z. (2016). Blending Smart Phones into Regular Classroom Learning. In Proceedings of ICBL2016, Springer LNCS 9757, pp.337-347.

Jia, J. (2016). The learning behavior difference between supervised online learning and unsupervised online learning for K-12 education. Proceedings of 24th ICCE, pp. 128-135.

Jia, J., Yu, Y. (2017). Online Learning Activity Index (OLAI) and Its Application for Adaptive Learning. In Proceedings of ICBL 2017, Springer LNCS 10309. pp. 213-224.

Zhang, B., Jia, J. (2017). Evaluating an Intelligent Tutoring System for Personalized Math Teaching. Proceedings of ISET 2017, pp. 126-130.

Le, H., Jia, J. (2018). Analysis of Learner Timeout Behavior in Online Tests of a Big data Set Based on the OLAI Concept. In Proceedings of ICTE 2018, Springer CCIS 843. pp. 285-294.

The Self-Directed Learner:

Understanding the Process of Learning in the 21st Century

Juvy Lizette M. Gervacio

University of the Philippines Open University

Abstract

Recent developments in the field of Information and Communication Technology (ICT) have led to the era of open and distance learning. With more learners going online, it is important to understand the mode of this innovative learning process, hence the need to understand at how the concept of Self-Directed Learning (SDL) is integrated in the design and development of courses.

Self-directed learning is an old concept that refers to the ability of the learner on where, how and what to learn. Knowles (1975) generally defined self-directed learning as the ability to take responsibility for one's own learning without the need for the physical presence of an instructor to direct the learning experience. He added that self-directed learners (1) initiate their own learning, (2) diagnose their own needs, (3) create goals, (4) identify resources, (5) choose how to accomplish learning goals, and (6) can even evaluate their progress toward meeting their learning goals.

The presentation will focus on the concept of self-directed learning in in the context of designing and implementing online courses. The results will present how the idea that it is important to design and develop courses that would enhance self-directedness in learning in order to enhance the learning experiences of students in the 21st century.

Keywords: Learner-Centered Learning; Self-Directed Learning

The Self-Directed Leaner: Understanding the Process of Learning in the 21st Century

The increasing awareness and use of Information and Communication Technology (ICT) has brought remarkable changes in various sectors of society today, especially in the education sector. The use of technology ushered the birth of online courses or courses that can be accessed through the internet, as well as courses that have addressed traditional education barriers such as distance and age. However, despite breaking these barriers, there are some distance and online learning courses that remain restrictive by charging fees before a learner can start learning.

With the rise in the significance and utility of online learning in the recent decade, the concept of self-directed learning (SDL) has been highlighted, especially because learners are known to have more access to various learning resources.

Research Questions

Learning materials have become more available, hence, it has also become important to understand the process of learning and how learners utilize resources to enable the adoption of better designs in the implementation of online courses. This Study aims to answer the question: How does the concept of self-directed learning (SDL) promote new understanding of learning potentials in the context of online courses at the University of the Philippines Open University (UPOU)?

Specifically, it seeks also to answer the following compelling questions: a) What is self-directed learning? b) What are the dimensions/features of SDL that are important in Online Learning c) How is self-directed learning incorporated in the development of Online Modules? d) How do the participants assess the online courses on Inter-local Cooperation (ILC) ? e) What are the evidences that self-directed learning was present in the UPOU online courses on ILC?

Methodology

The Paper is based on a case study on the Online Course on ILC of the UPOU where self-directed learning is utilized during its design. The online courses on ILC were selected because they were developed and designed based on the concept of SDL wherein participants are able to learn from a variety of online activities and learning resources that would cater to various learning styles. Since the courses were initially offered to those working in government, there was a conscious effort to create different multimedia materials that would fit the busy schedules of the target participants. It was assumed that the participants will not be online all the time and may have considerably poor internet connections.

Results from an evaluation survey are presented and discussed to enable better understanding of how-to online courses were perceived. Course sites were analyzed to observe the interaction among the participants. The Study focused on two major sources of information, namely: a) results of the evaluation survey of the four courses of ILC; and b) analysis based on the observations on the activities in the online classroom. The evaluation survey included both quantitative and qualitative information while the analysis of content was derived from the discussion forum.

Theoretical Framework

Self-directed learning is an old concept that refers to the ability of the learner on where, how and what to learn. Knowles (1975) generally defined self-directed learning as the ability to take responsibility for one's own learning without the need for the physical presence of an instructor to direct the learning experience. He added that self-directed learners (1) initiate their own learning, (2) diagnose their own needs, (3) create goals, (4) identify resources, (5) choose how

to accomplish learning goals, and (6) can even evaluate their progress toward meeting their learning goals.

These characteristics were acknowledged by Guglielmino and Guglielmino (2003) who said that some characteristics of a self-directed learner include being independent, persevering through a learning experience, viewing issues as challenges and not obstacles, bringing curiosity and discipline to learning practices, embracing change, and enjoying learning.

Garrison's (1997) model of self-directed learning incorporates three dimensions of SDL, namely, self-management, self-monitoring, and motivation in joining as well as completing the tasks. Self-management gives emphasis on goal setting, use of resources within the learning context, and external support for learning. Self-monitoring pertains to the learners' ability to monitor their cognitive and meta-cognitive processes. In this dimension, learners make use of their own learning strategies, adjust to the learning task or goal, and engage in critical reflection. The motivation element in Garrison's model considers the initiation and maintenance of the effort exerted for learning and towards the attainment of goals.

Self-Directed Learning in the Context of Online Learning

Unlike traditional education where students are more dependent on the instructor for their learning needs, online courses, have allowed learners to learn independently on their own, either individually or collaboratively. Song and Hill (2007: 29; 34) claimed that "students need to have a high level of self-direction to succeed in online learning environment" and that "successful learning in every learning environment involves the use of effective learning strategies."

Song and Hill (2007) also introduced a conceptual framework that incorporates not only the dimensions of personal orientation and the learning process orientation generally accepted from previous SDL models but adds a third dimension, the learning context. This dimension takes

into account the impact of environmental factors on SDL. The online learning context provides opportunities and poses challenges on SDL personal attributes in terms of the learner's resource use, strategy and motivation.

Effective learning strategies are imperative to ensure favourable outcomes in every learning environment, especially in an online context. Song and Hill (2007) also noted that one of the challenges of online learning mentioned above relates to written communication as an integral part of online learning. In this mode of communication marked by the absence of facial expressions and body language, misinterpretation may arise. Furthermore, delayed response from peers and instructors as mentioned earlier is another concern. Song and Hill (2007) further added that such issues however can be overcome through the use of communication strategies that are more applicable to the text-based online environment, as well as time management strategies that could improve online communication with others.

One of the important aspects of self-direction is the concept of the "selfhood." Boucouvalas (2009) noted that research on self-directed learning had focused mostly on autonomy and very rarely on the concept of self as the core aspect of self-direction. According to Boucouvalas, although autonomy is a vital concept in self-directed learning, it is an incomplete interpretation of "selfhood." "Self-directed learning has even greater potentials to contribute to the development of the human species when guided by a concept of "self" that includes both autonomous (separate, individual) and homonomous (connected, collective) dimensions" (2009:1).

For Boucouvalas, individuals "have the ability, as demonstrated over the years, to develop an autonomous aspect of selfhood that enables us to: (a) take initiative and responsibility for learning, (b) understand ourselves as learners, and (c) maintain our self-direction, even when in other-directed environments; however, as individuals we are also embedded in relationships,

groups, communities and cultures, nations, and society-at-large" (2009:3-4). This has implications on the importance of the learning environment, its context, as well as the interactions and collaboration with other learners in the individual's journey of self-directed learning.

Building on the discussion of SDL, Bouchard (2009) also inquired more closely into learner autonomy as a central aspect of SDL, referring to this as autonomous learning strategies. He identified and classified factors affecting autonomous learning strategies into four categories; namely: conative (psychological factors), algorithmic (pedagogical factors), semiotics, and economy (environmental factors).

The conative dimension is associated with psychological issues, for instance drive, motivation, initiative and confidence. Emphasized in this dimension are aspects of context and transitions, how these shape individuals' inclination to take up learning, and the social networks that individuals are engaged in and which serve as emotional support and resources. Previous learning experiences, according to Bouchard, may also have an impact on autonomous learning strategies (Kop and Fournier, 2010).

The algorithmic dimension refers to pedagogical concerns, such as sequencing, pacing and goal setting in learning, the evaluation of progress, and final evaluation and preparation for validation. These tasks are traditionally performed by a teacher, but in an autonomous learning environment where the learners engage themselves in such activities (Kop and Fournier, 2010).

The semiotics of learning and aspects of economy are groups of environmental factors affecting learning strategies. The former involves the delivery model of resources. In recent decades, the delivery model has evolved from hard copies of books and papers to electronic copies made available through the internet. It includes the use of blogs, wikis, synchronous and asynchronous communication with information done through social networks. The economy

dimension is the fourth factor that refers to "the perceived and actual value of the learning, the choice to learn for personal gain such as for future employment, and the possible cost of other study options" (Kop and Fournier, 2010: 2).

This Paper explores into the relationship between SDL and MOOCs based on Bouchard's four dimensions of autonomous learning strategies in the context of MOOCs as offered by the University of the Philippines Open University. This is important in order to determine how MOOCs can be designed and developed to facilitate self-directed learning in MOOCs to lead to higher completions rates.

The Case

UPOU Online Modules on Inter-local Cooperation

The University of the Philippines Open University was established on February 23, 1995 and has been declared by the Commission of Higher Education (CHED) of the Republic of the Philippines as the National Center of Excellence in Open Learning and Distance Education for being in the forefront of providing lifelong learning for the Filipino people.

Its mission is to provide wider access to quality higher education and shall adhere to the highest standards of academic excellence, guarantee academic freedom, and encourage social responsibility and nationalistic commitment among its faculty, staff and students. (Vision and Mission, n.d.)

The UPOU offers various higher education courses that students can choose from which include formal and non-formal courses. The Inter-local Cooperation (ILC) are just some of the online courses offered by the UPOU. These courses were developed in partnership with the Decentralization Program of the GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) in 2013.

The ILC modules were formally launched as MOOCs on March 2015, with the support of the Department of Interior and Local Government (DILG). The DILG issued a Memorandum Circular inviting all "Provincial Governors, City and Municipal Mayors, DILG Regional Directors and others concerned" to avail of the online and open course on ILC.

The courses were designed and developed based on the concept of self-directed learning following the prescriptions advocated by Garrison's model (1997) of self-directed learning and reinforced by the studies of Boucouvalas (2009) and of Bouchard (2009). Hence, unlike typical MOOCs which are mostly based on videos, the courses utilized several multimedia learning resources such as podcasts, screencasts, pdf files, online games, diagnostic tests and online quizzes. The learning resources were presented in a non-linear format. The idea of the design is for learners to simply go over any of the materials with no particular order as long as they will finish the course in a given time period. The discussion forum was created for the participants to utilize and discuss among themselves.

The courses were first offered as a regular online three-unit course for the Master of Public Management Program under the field of Local Government and Regional Administration (LGRA). The original course content was later transformed into four different MOOCs.

The four courses on ILC include: a) Introduction to Inter-local Cooperation; b) Legal components of Inter-local Cooperation; c) Institutional Ingredients of Inter-local Cooperation; and d) Financial Ingredients of Inter-local Cooperation. Each course runs for four weeks, which is equivalent to a total of 12 hours or 3 hours each week.

Results of the MOOCs

Generally, the MOOCs on ILC were perceived by UPOU as a success given the number of participants who attended the first course and the number of participants who applied for

certification. Figure 1 shows the number of participants for each MOOC and the number of those who applied and were given certification. The first MOOC had a total of 362 participants. There were more participants in the first course because it served as an introductory course on ILC. The 2nd course which focused on a specific area of the ILC had fewer participants with only 91. It went down further to 56 on the 3rd course and 44 on the last course on ILC. It is important to note that most of the participants who enrolled in the four courses are the same set of participants.

The same figure shows the number of participants who applied for certification is almost consistent across the four courses. They ranged from 23 in the first course, 31 in the second course and 24 for the 3rd and 4th courses. It is also important to note that there is a certain cohort which finished all the courses with nine (9) participants who consistently applied for certification. There were 11 participants who completed at least three modules and eight (8) participants who applied certification for two modules. There were 17 participants who applied for certification for only one course.

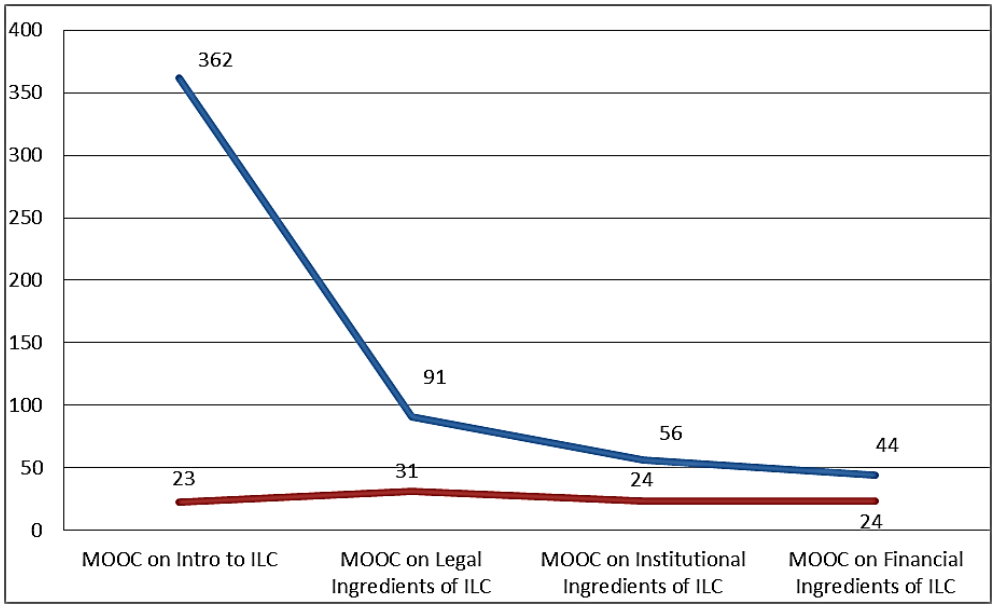

Fig. 1. Number of Participants (Blue) and Number of Participants Who Received Certification (Red)

Evaluation of the Online Modules

An evaluation survey was conducted for each course. The survey aimed to elicit feedback from the participants regarding their perceptions on the following topics: a) Content of Module; b) Working and Learning Methods; c) Participants; d) Achievement of Objectives, and e) Organization of the Course. The first course got the most number of respondents for the survey with 25 of them who participated in the survey. The following are the general results of the evaluation survey.

On Content of the Module – The survey reveals that most of those who responded claimed that the contents of the modules were able to meet their expectations with a range of 82 to 94 per cent approval rate. Most of them agreed with the statements that they can apply what they have learned from the courses and are willing to share what they have learned with their colleagues. Some of them answered positively when asked if they now have a concrete idea on how to use what they have learned from the course. This more or less affirms somehow the conative factors expressed by Bouchard (2009) on autonomous learning strategies, and to some extent that of the algorithmic and semiotics of learning.

Working and Learning Methods – More than 90 percent of the respondents agreed that the contents and outcomes were specific, clear and consistent. More than 82 percent of the respondents were certain that the working and learning methods were appropriate to their tasks, were suitably varied, and the materials in the course site supported the learning process. The participants also noted that they were able to share their experiences and examples about the inter-local cooperation that exists in their area and were able to learn from others. The positive answers given ranged from 64% to 88%. More than 90 percent claimed that the length of the courses was just right. Again,

this somehow confirms the findings of Bouchard (2009) on the learning environment and the specifics of the conative dimensions.

Participants – More than 75% of the survey respondents agreed that the atmosphere among the participants was always cooperative. However, the figures were higher for the last two courses with more than 90 percent of them agreeing to this. The survey revealed that most of the participants agreed that they were able to benefit from the experiences of other participants and committed to continuing to exchange views on this subject with other participants.

Achievement of Objectives – For each of the course, there were some objectives that needed to be met. More than 90% of the respondents mentioned that generally, they have a clearer understanding of the subject matter. For example, the respondents claimed that they can now develop their own roadmap on Inter-local Cooperation and can now write their own manual of operation. Some of them noted that they now understand the relevance of matching "resources with plans and programs."

Organization of the Course – Most of the respondents (80% – 95%) claimed that generally, they were satisfied with the way the course was handled and the courses were easy to navigate. Some of the recommendations from the respondents include more reference books and audio case studies and more sharing of innovative ideas.

To sum up, there are several aspects in the evaluation of the participants which showed elements that are important in autonomous learning. On the motivation and confidence aspect, the evaluation results show that the participants agreed that the atmosphere among the learners fosters cooperation and they learn from each other's contribution.

Another aspect is the positive feedback of the learners on the working and learning methods, specifically on the various types of materials and the course site, which they claimed to

be easy to navigate. This means that it is important to design various learning materials that would engage the learners to participate. The usability of the course in the working environment of the learners was also identified as a motivating factor for the participation.

Adapting Bouchard's New Dimension Framework in Learning to MOOCS: Inter-local Cooperation

Summing up the discussion based on the observations on what transpired inside the "online classroom" of the MOOCs, it can be gleaned that there are some elements that closely relate to Bouchard's four dimensions of learning. It can be said that those who finished the four courses are highly motivated self-directed learners. Although not everyone participated actively in the online discussion, those who have interacted with their peers have exhibited high level of motivation. Moreover, the completion of the MOOCs is perceived by learners as a chance for them to enhance their current job in particular, and their respective career, in general.

The various types of learning materials were also valued by the learners. This was confirmed by the enthusiastic discussions about the podcasts; the results of the online games, the diagnostic exam, the pdf materials, etc. Some of the participants even uploaded their own learning materials and shared them with the group. Indeed, these are manifestations of self-directed learning.

It is however important to determine if the four dimensions of Bouchard were evident in the MOOCs of UPOU. Hence, a review of the online discussion was important to come up with the following observations.

Conative Dimensions. Motivation and confidence were identified as some of the factors that are present among self-directed learners. The active participants were able to introduce themselves, the nature of their jobs and their location. It was interesting to know that some of them

already knew each other since they were either colleagues working for the same office; or enrolled in other courses offered by the University. This makes the online interaction among the participants more active because of the trust and familiarity with the system. Some of the learners shared that the course will be able to help them in their own jobs. Some participants praised the contribution of other participants in the forum.

Algorithmic Dimensions. In terms of pedagogical factors, this dimension refers to sequencing, pacing and goal setting as very important for the learners. Since the MOOCs were not tutored, the learners themselves were given the autonomy of introducing themselves since there was no prescribed format for them to follow. The learners were free to pace themselves and go over various course formats without any sequence as to which material should be read or viewed or read first. Based on the activities, some learners opted to upload different file formats like word document, pdf files or screenshots of the results of the online games and other activities that they did online. The online "dialogues" enabled them to reflect, sympathize and agree with the online characters in the storyboard.

Semiotic Dimensions. This dimension focuses on how the course is delivered online and how interaction is done. Based on this, the MOOCs were able to provide suitable environment in terms of utilizing various resources. The content of the courses were designed to cater to various learning styles. The different formats of the online materials enabled the participants to listen, read, watch, play and discuss with other participants. A diagnostic test was designed which gives them feedback. The diagnostic test was present in the first course and enables the learner to tick off a series of questions. The results of the diagnostic test serve as a checklist on what the province/city or town still needs to accomplish based on the results of the diagnostic test. It also provides a guide for the participants on which of the succeeding courses would still be beneficial for their work.

There was one participant however who downloaded the online course materials and converted them to an offline format. By doing this, the other participants who cannot be online all the time were able to read the contents of the documents. The other participants praised the effort because they were able to access the contents offline. This observation reveals that learners have been empowered to create new formats of learning and also share new documents relevant to the course.

Economic Dimensions. Bouchard refers to this dimension as the "perceived and actual value of learning" (cf. above) and this can be confirmed readily from the course discussion. There are learners who mentioned in the course site that the completion of the course is an advantage to their probable career in government. Learners that are consistently active in participating agree most of the time when participants reflect on a certain topic based on their experiences. The learners are able to raise relevant issues such as protocols and processes from their respective jobs. There are learners who expect that the course gives them an advantage for a government post. It was also mentioned by a participant that the main drive to complete all the four courses is for the advancement of his/her potential career.

Based on the above discussion, the MOOCs on ILC that were offered by the UPOU had the elements of self-directed learning.

Conclusion

The Study has showed the significance of the relationship between SDL and online courses. SDL influenced the level of participation and types of activities that the learners engaged in. The results of the investigation reveal that based on the evaluation survey, majority of the respondents were satisfied with the working and learning methods of UPOU's online courses on ILC. The

respondents generally agreed that the materials and tasks were varied and are supportive of their careers in their learning. The length of the courses was just right, according to the respondents.

The observations and content analysis of the learner's using Bouchard's framework on SDL showed that there are learners who have exhibited characteristics of self-directed learning. This is evident on their active participation discussing the contents of the different types of materials available to them. Moreover, they share the results of the games that they did, including uploading their own resources. It was also cited in the forum that the course will help them in their work and in their career in the future.

Self-directed learners determine where, how and what to learn, hence it is important that they are provided more choices and alternative sources of knowledge generation. However, there are also other factors that matter such as level of connectivity and applicability of the course to one's work. It is in this regard that the design of online courses should be able to address such challenges in order to meet the demands of the learners.

References

Bouchard, P. (2009). Pedagogy Without a Teacher: What are the Limits? *International Journal of Self-Directed Learning 6*(2), 1-12.

Boucouvalas, M. (2009). Revisiting the Concept of *Self* in Self-Directed Learning: Toward a More Robust Construct for Research and Practice in a Global Context. *International Journal of Self-Directed Learning 6*(1), 1-10. http://www.sdlglobal.com/IJSDL/IJSDL6.1-2009.pdf

Czierniewicz, L., Deacon, A., Fife, M., Small, J. & Walji, S. (2015). *CILT Position Paper: MOOCs*. Centre for Innovation in Learning and Teaching (CILT), University of Cape Town. http://www.cilt.uct.ac.za/sites/default/files/image_tool/images/83/FA_MOOCs_final%20July2015.pdf

de Waard, I., Kukulska-Hulme, A. & Sharples, M. (2015). Investigating Self-Directed Learning Dimensions: Adapting the Bouchard Framework. In G. Conole, T. Klobucar, C. Rensing, J. Konert & E. Lavoué (Eds.), *Design for Teaching and Learning in a Networked World*, pp. 395-400, Springer. http://oro.open.ac.uk/44494/1/ECtel%202015%20paper%2093%20Inge%20de%20Waard%20SDL%20MOOC%20final%202.pdf.

Fournier, H., Kop, R., & Durand, G. (2014). Challenges to Research in MOOCS. *MERLOT Journal of Online Learning and Teaching, 10*(1). http://jolt.merlot.org/vol10no1/fournier_0314.pdf

Garrison, R. (1997). Self-Directed Learning: Toward a Comprehensive Model. *Adult Education Quarterly, 48*(1), 18-33. https://www.researchgate.net/publication/249698827_Self-Directed_Learning_Toward_a_Comprehensive_Model

Guglielmino, L., & Guglielmino, P. J. (2003). Becoming a more self-directed learner. In G. Piskurich (Ed.), *Getting the most from online learning: A learner's guide*, (pp. 25-38). West Sussex: John Wiley & Sons.

Knowles, M. S. (1975). *Self-directed learning*. New York: Association Press.

Kop, R. & Fournier, H. (2010). New Dimensions to Self-Directed Learning in an Open Networked Learning Environment. *International Journal of Self-Directed Learning*, *7*(2), 1-20. https://www.researchgate.net/publication/285750999_New_dimensions_to_self-directed_learning_in_an_open_networked_learning_environment

Luaran, J. (2013). *Massive Open Online Course (MOOC)*. i-Learn Center, Universiti Teknologi Mara. http://i-learn.uitm.edu.my/v2/wp-content/uploads/2015/03/Full-MOOCs-book.pdf

Natad, J. (2011). Alliances of Local Governments in the Philippines. *Johny Natad Official Site.* https://johnysnatad.wordpress.com/2011/12/14/alliances-of-local-governments-in-the-philippines/

Patru, M. & Balaji, V. (Eds.) (2016). *Making Sense of MOOCS: A guide for Policy-Makers in developing countries*. UNESCO and Commonwealth of Learning. http://unesdoc.unesco.org/images/0024/002451/245122E.pdf

Song, L., & Hill, J. (2007). A Conceptual Model for Understanding Self-Directed Learning in Online Environments. *Journal of Interactive Online Learning*, *6*(1), 27-42. http://www.ncolr.org/jiol/issues/pdf/6.1.3.pdf

University of the Philippines Open University Vision and Mission, n.d.

E-Learning system personalization service based on the analysis of user behavior

Khulan Khalzaa

Mongolian University of Science and Technology, Mongolia

School of Computer Science and Technology, Tianjin University, China

Abstract

With the development internet technology, the E-Learning model has been rapidly developed. However, due to the low completion rate for E-Learning platform, it is very necessary to analyze the behavior characteristics of online learners to intelligently adjust online education strategy and enhance the quality of learning. Learners aren't the only ones who benefit from e-learning and learning management systems. For course instructors, an effective learning system offers easy course authoring tools for quickly creating and updating content. If the model predicts the visitor's intentions and delivers exactly the information that is necessary for him, the likelihood of the user returning to the site increases. One of the ways to achieve this result is the personalization of the site. The personalization of the site refers to a set of technical measures to adapt the appearance and content of the site to different categories of visitors. If each segment of users of the site will be provided with personalized content, it is possible to significantly improve the effectiveness of the site. In this article introduced method personalization of E-Learning system interface through learner behavior.

Keywords: e-learning, learner behavior, content, website personalization.

E-Learning system personalization service based on the analysis of user behavior

Nowadays e-learning systems have become widely used in the educational process, and have begun to better understand the format of "e-learning" is as tools and the different full-time forms of education, which includes courses, tests, video and audio content, info graphics, charts, various visualizations, simulators, interactive and gamified courses, micro courses, webinars, forums, blogs and so on. All these tools have their own purpose and can be part of a mixed training program consisting of full-time and distance formats.

People will be comfortable enough to perceive the format of learning, when lectures can be independently viewed at any convenient time, and then come and work out everything in practice at the training or if necessary, ask questions in the forum/webinar. But do not forget that learners will make higher demands on the quality of e-learning.

User behavior influence of system personalization

Often, specialists from training departments meet with complaints such as “we already know this”, “this is superfluous information”, “this is incomprehensible and there is nobody to ask a question”. Many of these problems can be solved with the help of personalization of learning, coupled with an adaptive approach. In this case, there will not be a single course or a single program for all employees, students or trainers**,** there will be a training scenario prescribed in the Learning management system (LMS), which adapts to each individual student, adapts to learner level of knowledge and pace of training. To prescribe recommendations, based on the previously studied material should manage the electronic content in the LMS quickly and

efficiently, one of the most important moments is to monitor the relevance of the training scenario and all incoming elements to be able to create so-called “puzzles” from which the training program is easily assembled.

Personalization of new system

Website Personalization is the process of creating customized experiences for visitors to a website. Rather than providing a single, broad experience, website personalization allows to present visitors with unique experiences tailored to their needs and desires. Website personalization attempts to use data to take that same level of one-on-one attentiveness and translate it into the digital world. Personalization of the site refers to a set of technical measures to adapt the appearance and content of an E-learning system to different categories of visitors. If each segment of users of the site will be provided with personalized content, it is possible to significantly improve the effectiveness of the training site.

The principle of execution of the script changes the site depending on the recognized in real time the type of visitor or his behavior on the page. For each type of visitor, you must use personal algorithms to change the appearance or content of the site. As soon as the visitor is segmented, the personalization algorithm will change the site. To predict which version of the page will be of interest to the user, depending on his behavior, the methods of predictive analytics are used.

Personalization of new platform consists of several stages: data collection, visitor classification and application of page alteration algorithms.

- Personalized site analyzes the visitor data: where they come from, what keywords have found a resource, geographic data, what they did on the site, when and on which page they left, what interested most of all, etc.

- The next step is to define audience segments. It is necessary to determine who the majority of visitors are, what interests what kind of learning methods or sources looking for, what resources they come from.

The algorithm for using the service is as follows. The first step is integration with the service. The site owner determines the purpose of personalization and analyzes the data about the visits that the service provides. Based on the results of the analysis, the user creates several versions of the page display. The service tests these versions of the page and determines the most effective depending on the purpose. This version will be displayed to visitors of a personalized site. To start working with the service, need to add an integration script to the page code.

First, it is the collection of data from a personalized site about visits. The following data is determined: from which page the visit to the site started, from which it ended, the duration of viewing each page, whether the user is a new visitor or a repeated visit to the site, which pages were visited, which links were clicked, etc.

Second, for each visitor a personalized site creates an identifier that allows you to distinguish between visits to a site by different people. The data obtained from the site is stored in the database on the service side in the tables “events” and “visitors”. The second function of the script is to change the appearance of the page.

Page alteration algorithm through A/B testing

Algorithm used to determine personalization of E-learning system strategy is A/B testing. A/B testing (sometimes called split testing) is comparing two versions of a web page to see which one performs better.

The method consists, as the name implies, in comparing the two (A and B) versions of the page under study in order to determine which of the changes increases the target indicator.

Figure 1. A version of page (unmodified).

Figure 2. B version of page (modified

Users are shown randomly one of the versions of the page, including the original unmodified. The important point is that the same page visitor is always shown to the same visitor. When performing a target action, and in this case clicking on a link, the conversion for the current page variant increases.

$$\text{conversion} = \frac{\text{action}}{\text{number of visit}} \text{x}100$$

The number means that the target action will be performed with probability x%. The change in conversions shows how many times the conversion will change when using this version compared to the original one.

Experiments

Users are shown randomly one of the page versions, including the original unmodified. The variations are completely identical except for a specific element on the page, which has changed the appearance and / or content. For example, after testing two variants of the “Academics” button on the this page, where in one variation the brown color of the background fill was used, and in the other - blue, you can determine that the first option had a higher percentage of clicks. When performing a target action, and in this case clicking on a link, the conversion for the current page variant increases.

As a result of testing, get a report for each version of the page. When conducting A / B testing, it is possible to specify a segment of visitors on which an experiment will be conducted. In this case, it was determined that the experiment involved only visitors who came to the site from 14:00 to 16:00, i.e. in the afternoon. Segmentation is also possible by location, by search query, by page from which the transition occurred, etc.

As a result of the personalization, we received a more efficient way to display the page than the original one, aimed at clicking on the “Academics” link, which will be shown to visitors from 14:00 to 16:00.

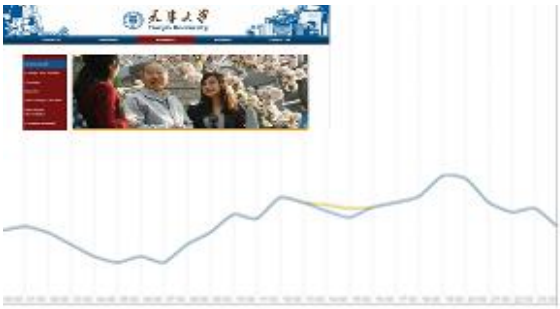

Figure 3. B version is more efficient

After analysis, the site will offer the visitor something which falls within the scope of learner interests. For example, based on the analysis of searching materials, downloaded books, lectures or video lessons, user will immediately receive the recommendation of the book, the lessons of its sphere or series.

Conclusion

The results of this analysis become a plan for design and what trainer hope to get their learners to achieve because of know what they actually need, versus just guessing or assuming. E-learning is perfect for addressing gaps in skill or knowledge but is typically not an effective

cure for lack of customer satisfaction or a job design problem. By analyzing first, can rule out these other issues and get to the heart of the problem faster than if have gone on assumption.

References

Dan Siroker, Pete Koomen "A / B Testing: The Most Powerful Way to Turn Clicks Into Customers"

Brian P. Hogan, Chris Warren, Mike Weber, Chris Jonhson, Aaron Godin (2012). Web Development Recipes, ISBN: 978-1-93435-683-8

Hampton Catlin, Michael Lintorn Catlin (2011). Pragmatic Guide to Sass, ISBN: 978-1-93435-684-5

https://cyberleninka.ru/article/v/metodologiya-postroeniya-e-learning-sistemy-personalizatsii-obucheniya

http://trends.builtwith.com/analytics/personalization

http://hr-portal.ru/blog/15-trendov-v-e-learning-kotorye-mozhno-vnedrit-uzhe-seychas

https://www.optimizely.com/optimization-glossary/website-personalization/

https://vwo.com/ab-testing/

http://techcrunch.com/2010/07/15/optimizely-ab-test

Design and evaluation based on simulated enterprise learning environment - a case study on logistics management

Shuang Wang[1], Ling Zhai[2]

[1]Graduate school of Education, Peking University; Lean International SCM GmbH

[2]Tianjin Coastal Polytechnic, China

Abstract

The high standards of integrated process operation and comprehensive coordination in business require students in applied science discipline to develop practical skills and integrated view of business. The rapid pace of development of Education Technology are enabling a high-tech course environment and highly efficient instructions. In order to meet the dynamic changing requirement of enterprises, a systematical designed simulated enterprise learning environment do help schools achieve a better teaching and learning effects. This article reports based on a study investigation in the group who applied simulated enterprise, attempts to evaluate this teaching and learning on effectiveness, skills development and deep practical study. The result reveals that simulated enterprise learning environment contributes to integrated practical skills development, and shorten the gap between classroom learning and enterprise engagement. The study also recommends further improvements to instructional design and curriculum innovation.

Keywords: simulated enterprise learning environment, education technology, logistics management, instructional design and evaluation.

Design and evaluation based on simulated enterprise learning environment - a case study on logistics management

1. Introduction

1.1 features of logistics management education

Different from discipline of theoretical or philosophy, the subject of logistics management as an applied discipline more concentrate on the capability of process management, resource integration, cost accounting, team work and how to survive in high pressure competition. Therefore, the education of logistics management is of the following features:

- Practice-oriented. The main target of teaching or learning logistics management is to grasp the practical skills which is useful in particular practical field, such as transport management, warehouse management, forwarding services are all based on enterprises practices. How to make reasonable solutions for customers to meet their particular requirement would be the crucial skills for student in subject logistics management.
- Continuous interactive. On instructional point of view, teacher and learners need more interaction on both sides than other discipline, so as to discuss and create new ideas or new solutions onto concrete project. On practical point of view, the skills learned in applied discipline need more interactive activities to improve and enhance those skills
- Project task-based. When graduated students engaged in Logistics Enterprises, they have to have the ability to join and fulfill project one and another. Therefore, it is necessary to create an environment of task and project-thinking for learners. Some instructional designers in applied discipline trends to construct a systematic gameplay to simulate such environment in practical enterprise.

- Systematic and process management. With IT system and intelligent devices, Logistics companies enable to improve efficiency and benefits. They optimize their management by adjust their Systematic and process management. Then, with better skills in Systematic and process management, graduates can play a bigger role in their practical works.
- Theoretical applied. Most of the applied discipline ought to apply formal science such as mathematics, statistics, even physical or biological methods. The subject Logistics management is without exception as well, it is theoretical-based and practical-oriented.

1.2 simulated enterprise learning environment

Herewith referring to the simulated enterprise learning environment, it is first of all a software supported education environment, which is engaged learners in realistic activities designed to increase knowledge, improve skills, and enable positive learning outcomes (Prensky, 2001).

Under simulated enterprise, it emulates the structure, business and procedures operation like a real company. Learner execute the works and business with virtual capital, tasks, and competitive market, but the system uses documents identical with the real ones, complying with the national and international commercial laws, international trade terms, traffic rules, information flux and documents issued regulations (Artene, 2012).

By creating real working tasks under a systematic enterprise environment, it helps lecturers and learner logically connect the theoretical methods with practical projects as the means to make the education more efficient. Comparing to traditional computer supported collaborative learning (Koschmann, 2006), it is involved in real enterprises tasks, data, management process and team work coordination. Rather than realistic practice in enterprise, it creates far more various possibilities for learners to try their ideas and solution, without bring enterprises any lost and

troubles. That is important for learners to improve their deep thinking combined with theories and practices. By systematical designed integrated tasks practice, and free competition in virtual dynamics business market, it offers an exciting and stimulated learning environment. It would be provided a comprehensive solution for education of logistics management.

1.3 target of this paper

This paper reports on the effectiveness of that pedagogical application and discusses the challenges and opportunities involved in instructional design and curriculum innovation. Firstly, it will present a review of literature on simulated enterprises learning environment and education technology development in logistics management. then It will describe the software designation and logic that used for this investigation. Hence, the data analysis and evaluation will be conducted in this study. Finally, it will present the findings and implications of this study, as well as discuss improvement and challenges.

2. Literature review

2.1 Simulated enterprises learning environment

Situated cognition theory states that activities, tasks, and understanding do not exist in isolation, but rather are part of broader relationship systems. Learning thus implies addressing the possibilities enabled by these relationship systems (Léger, 2006). As an effective instructional method, simulated enterprises learning environment was experimented by many education institutes. Simulated enterprise exposes students to an authentic learning experience in a virtual but sophisticated business environment and offers an exciting and stimulated learning environment (Lave, 1988). Researchers in education suggest that situational cognition and problem-based learning might provide instructional strategies that are better aligned with the challenges underlying IT competency development (Cheaburu, Munteanu, 2014). By exposing students who

typically specialize in one virtual enterprise and engaged with real cases would be helpful to enhance their cognitive ability and problem based executive ability (Seethamraju, 2011). And meanwhile push learn be used to the dynamic and sophisticated working environment (Kincaid, 2009). Simulation can be used to show the eventual real effects of alternative conditions and courses of action. Simulations are taken place in controlled environments that provide the learner with experiences in understanding how a set of conditions interact with each other in risk-free conditions. While all above experiences of leaner won't lead to any consequences to real enterprises. Therefore, from the angle of employer, teacher and learner as a whole, there is nearly no trial and error cost.

2.2 Educational technology development in logistics management

The education in subject of logistics management has been benefit a lot from updated technology. And mean while the technology applied in logistics industry has been developing obviously. From the barcode applied in warehousing management to systematic warehousing management, from GPS applied in transportation management to TPMS (Transport Plan and Management System) commonly be used, from the application of logistics management system to integrated Supply Chain Management based on SAAS or cloud dada technology, logistics industry, as a foundational services industry of other industries, experienced a revolution of technology development in recent 20 years. Adapted to it, like many other applied science discipline, educational technology in subject of logistics management has been developed and combined with instructional innovation and industrial technologyi. Therefore, we can see Many industry technologies are integrated into instructional practice, such as barcode technology, WMS, GPS, RFID, etc.

In order to achieve the educational goal of developing more logistics professionals who have more executive capability and problem-solving thinking, using problem-based learning and simulation-based approaches to teaching Logistics Management requires new instructional strategies to fully leverage their pedagogical benefits. How to design the instructional system, how to organize the courses, how to assess the affection and efficiency to the education would be very important, so as to evaluate the adaptability between teaching objectives and corporate technology needs (Bloechl, Schneider, 2016). Based on the teaching objectives, the evaluation of multi-dimensional teaching effects is a common method of teaching evaluation.

3. Study Object and methodology

3.1 learning objectives

As a discipline of applied science, the curriculum of logistics management should involve the main technical skills in the field of logistics management and provide training in applied technology. In order to meet the requirement of the industrial technology, the learning objectives should integrate the following contents:

First, logistics functional recognition, such as transport, warehousing, inventory control, supply chain management, outsourcing services as well as international trade and finance.

Second, process management capability. For an international door to door services, it usually asks for logistics engineer to organize a cross border services, even including more than dozens of small processes.

Third, outsources integration and coordination capability. It is not only a business management, but also the comprehensive administration. It needs team work, sense of cost accounting, as well as strategy plan.

Last but not least, the ability of dynamic planning and decision making in sophisticated situations. That's potential developing capability decisively pushing practitioner to a higher career level.

Therefore, the above-mentioned core abilities in educational object of logistics management can be concluded as conceptual skills, management skills, comprehensive coordination skills, as well as deep thinking and strategic capabilities.

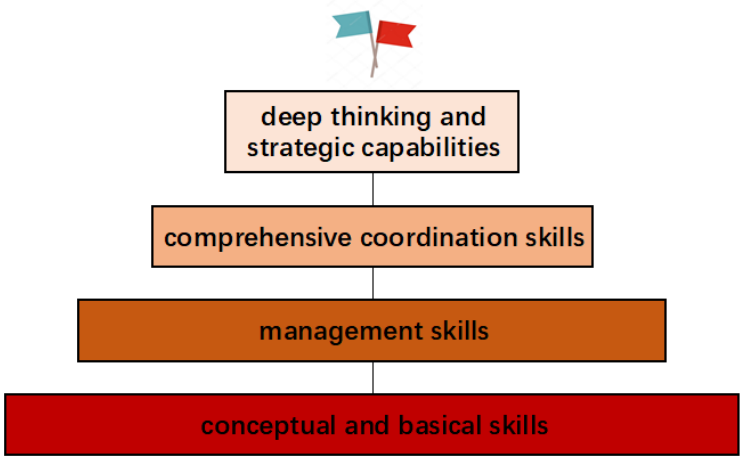

Figure 1. Study object and core professional abilities in education of logistics management

3.2 description of the designation and logic of the software used for this investigation

The simulated-enterprise teaching software that is meet the technical requirements of enterprises and industries, and meanwhile can also satisfy the teaching objectives is the crucial basis to carry out the applied technology education in the subject of logistics management, and of course also is the key factor to this research.

The software platform which is adapted in this research is a co-developed software designed by our research group and developed by an IT company who is in charge of realize our designed idea. Principles of software designation are as follows:

a. Software technology is based on internet, cloud data and computer system collaborative learning.

b. Main teaching contents and main business line in system practice is to create, operate and develop a logistics company from single function to comprehensive business group.

c. Based on create a Game scenes and social backgrounds, learners can execute the real operation like working in the real company. By organize team work and market competition, learners would experience the corporate realities and competing visions.

d. designation of the modules in the educational system is involved in market competition, performance assessment and community relationships.

e. The settings of difficulty levels is progressive and in line with the rules of teaching and learning.

f. The design of the teaching platform takes into account the combination of teaching objectives in two aspects, e.g. integration of teaching, learning, doing, and training; as well as combination of examination, evaluation, competition, and implication.

3.3 instructional design and process of this curriculum

The main modules of enterprises simulation are started from Writing a business plan to create and configure a single-function, small-scale logistics company. There are necessary data, tools, theoretical guidance, sufficient references as well as virtual finance support to assist students make a good start. Then, if followed by creating transportation services for clients, expanding warehousing business, develop international freight forwarding business, and operate full-service supply chain services. It is generally following the rule of the development of a logistics company and the logistics industry.

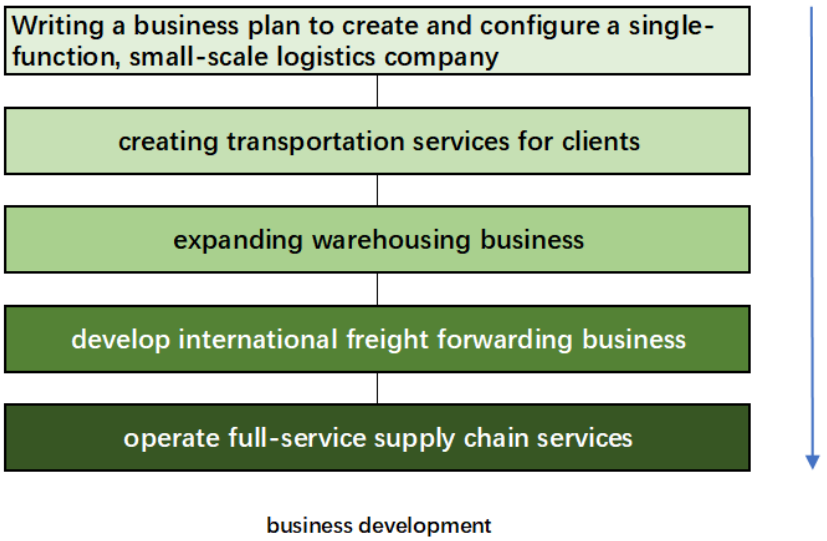

Figure 2. The main modules of enterprises simulation

Team composition is the main part of execution during the study course. All the tasks are fulfilled by teams which are comprised of various roles, like CEO, marketing, business operator, technical executive and accounting. All the teams are competing in this virtual market under this systematical designed business ecology. Members fulfill their task by their own character and they also can change their roles in different tasks.

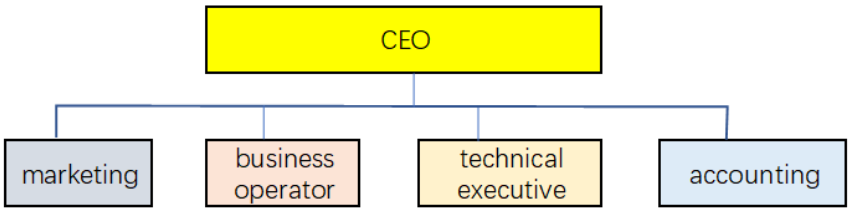

Figure 3. Team composition

The logical business process of each tasks in each module is as such:

First, each team group will receive a bidding task, which is created randomly by system. But the tasks are pre-set according to enterprises reality and Finely designed according to the virtual market. Necessary market information and operational data of enterprises is provided to each group as well.

Then, it follows by analyzing the market and enterprise data, call material resources, make bidding strategy, market bidding and carry out the winning bidding business.

Business in each module will be operated in 1-2 years. During the simulated operation, teachers should control the time rhythm, and business cycle. Other relevant business data which is provided to team group for reference are randomly happened by different teams and their differentiated operational decisions.

The design of operation process is based on enterprises standard process referring to ERP system which is effective in real enterprises.

Business Review and group discussion after each operation cycle would be necessary for better teaching and learning effectiveness.

3.4 design of investigation and data collection

Data in this investigation was collected twice – before and after the experiences by answering the questionnaire designed for this study. The questionnaire consisted of some basic demographic details such as gender, course they are currently enrolled in, whether they have any previous experience or knowledge in logistics management. In the second chapter of the questionnaire, students were asked to make a self-assessment of their knowledge on specific dimensions/concepts and the competence gained before and after this learning using a 5- point Likert scale (1 = very low, 5 = very high). This questionnaire was feedback by the students who have pass the basic theoretical courses and have a general concept of logistics management, before they participate to the course of logistics management under simulated enterprises learning environment. And again, feedback will be collected after they had successfully completed their course under such software.

The questionnaire included questions that measure "the grasp of professional concepts and knowledge", 'process orientation of logistics business', 'integrated view of logistics management', "basic sense of enterprises practice" as well as "difficulties of study logistics management and defect of instructional design". It involves the skills dimensions indicated in the following table:

Table 1. table of skills dimension and investigation aspects

skills dimension	items	definition
the grasp of professional concepts and knowledge	5	Refers to remember the expression of most concepts and theories; describe the meaning and logic of those concepts and theories
process orientation of logistics business	3	Refers to the understanding of the significance of process, information flows; and consequences of sub-optimization of tasks in process.
integrated view of logistics management	3	Refers to the understanding of inner-dependencies, integration of out sourcing management, and sense of strategy planning.
basic sense of enterprises practice	4	Refers to grasp most of the know-how and can apply them in practice with those know-how
difficulties of study logistics management and defect of instructional design	5	the difficulties in professional study, comments of current disadvantages
additional investigation: about instructional design	5	referring to the comments and suggestion to instructional design and the role of lecturer
In total	25	

4. Analysis, discussion and implication

4.1 Basic data statistics

The demographics of the participants in this study are shown in Table 2

Table 2. Basic data statistics

pos.	details	percentage (%)/ quantity
1	Total number of valid responses	101
2	male feedback	47.52
3	sophomore	48.51
4	junior	51.49
5	participate more than 8 professional courses in subject of logistics management	73.26

In between the 101 valid responses, 47.52% are male students. The percentages of sophomore and junior are 48.51% and 51.49%. Participates who have attended more than 8 professional courses in subject of logistics management is 73.26%. It means the most responders have the basic concept of logistics management.

4.2 comparation of two investigation feedback

From the statistical data of two investigations (shown in Table 3 and Table 4), it illustrates the vivid increasing in every skills dimension, including the grasp of professional concepts and knowledge, process orientation of logistics business, integrated view of logistics management, and basic sense of enterprises practice, particularly the basic sense of enterprises practice was increased by 40.7%.

Table 3. Feedback before the course

skills dimension	mean	Std dev.
the grasp of professional concepts and knowledge	3.356436	1.15
process orientation of logistics business	2.653465	0.97
integrated view of logistics management	1.90099	1.02
basic sense of enterprises practice	2.821782	1.06

Table 4. Feedback after the course

skills dimension	mean	Std dev.
the grasp of professional concepts and knowledge	4.186275	1.09
process orientation of logistics business	4.088235	1.02
integrated view of logistics management	3.852941	0.98
basic sense of enterprises practice	3.970588	0.97

4.3 challenges and improvement

a. about challenges and bottleneck in traditional professional education

In order to analyze the necessity of application of simulated enterprise system, we also got the statistical data from the investigation about the challenges and difficulties in professional study. It reflects the bottle neck of traditional professional education. Lack of chances to engage in realistic enterprises, lack of chances to try various ideas in practice, and difficult to Establish connections between theories and applications are the main factors that students are facing.

75.49% respondents thought their weakness of competence is “Lack of experience and solutions”

80.2% Respondents selected “they would prefer to practice in simulated enterprise-learning environment if possible”.

Above data improved the necessity, also raised the general needs in professional learning.

b. About instructional design.

However, simulated enterprise teaching system is not a panacea. There are many important factors that affect the effectiveness of teaching. Instructional design is the crucial one.

Comparing to other combination, 58.41% respondents prefer to practical oriented, practice/contest in simulated enterprise environment, efficiency evaluation, theoretical references study assistance. As indicated in table 5.

Table 5. About instructional method

Items	number	percentage
Focus more on theoretical logic, references analysis	3	2.94%
classroom oriented, good organization of study, discussion, analysis and feedback	14	13.73%
application oriented, question/task driven, case study, solution discussion, efficiency evaluation, case review	25	25.49%
practical oriented, practice/contest in virtual enterprise environment, efficiency evaluation, theoretical references study assistance	48	47.06%
blended target oriented, combination of application oriented and practical oriented.	11	10.78%

Valid responders	**101**	

In selected study loops, more than 84% Respondents prefer to practical learning model, in between 62.74% recognized it is more effective under simulated enterprises learning environment.

Table 6. About study loops of logistics management

Items	number	percentage
Question/task-discussion-references study- solution- evaluation-feedback	16	15.69%
Study target-textbook study- case study/practice- evaluation	22	21.57%
Simulated enterprises operation - strategy contest in operational tasks- references study to find solutions- evaluation review and feedback	63	62.74%
Valid responders	**101**	

When asking which are the points, do you think, the lecturers didn't pay enough attention in their instructional design, 53.47% respondents choose "applicational practice".

Moreover, In the question that study with simulated enterprise-learning system, most of the responders think lecturers should be the role of guider of practical tasks, organizer of brain storm discussion, guider of market activities and arbitrator in business transactions.

5. Conclusion

In conclusion from the case study based on investigation statistics, the obvious contribution from simulated enterprises learning system provide teachers and learner a better systematic tool to grasp professional skill in an efficient way. It is a good combination of conceptual skills, knowledge skills and practical skills in the teaching of logistics management. Through the operation of the simulated enterprises system, it effectively enhances students' practical business operation ability, team cooperation ability, and professional skills understanding ability. At the same time, students can continue to try any solution even errors in the virtual environment but without any trial-error costs, which is not possible for traditional teaching and corporate practice.

Like everything has double sides, it meanwhile raises higher requirement to instructional design and curriculum innovation. Practice-oriented and leaner-centered instructions should be finely designed for the course. The study loops in such courses should be logical organized. In the application of simulated enterprise systems for teaching, teachers need to improve their ability in practical skills of enterprises technology and capability to solve practical problems. At the same time, teachers need to have the ability to control mission progress and business processes, as well as to act as an arbitrator in the virtual market to guide and supervise legitimate business practices. Those capabilities can help lecturers who applied such system achieve professional teaching goals more effectively.

Limited by the scope of investigation, and the study was done by author and her assistance, the findings therefore may potentially have researchers' bias.

This study doesn't prove simulated enterprises learning system can take place of all traditional education in applied science, but a good compensation to that.

References

Marc Prensky, (2001) "Digital Natives, Digital Immigrants Part 1", On the Horizon, Vol. 9 Issue: 5, pp.1-6.

Patic, P. C., Duta, L., Popa, I. F., 2013, Collaborative Platform for Virtual Practice Enterprise Learning, 4th IFIP WG 5.5 Working Conference on Virtual Enterprises, PRO-VE 2013, Dresden, Germany, Volume: Collaborative Systems for Reindustrialization, Springer

Kokodei, T. O., 2009, Development of Personnel Education System with Application of Computer Simulator "Virtual Enterprise", Actual Problems of Economics, National Acad Management, no. 99/2009, Pag. 227-234

Medinschi, S., Artene, A. S., 2012, Simulated Enterprises, A Modality to Learn Students to Be Good Managers, Annals. Economic Science Series, University “Tibiscus” Timişoara, Vol. XVIII - supplement/2012

Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. In R. K. Sawyer (Ed.), Cambridge handbook of the learning sciences. Cambridge, UK: Cambridge University Press,409-426.

Andrei VASILĂȚEANU, Maria-Iuliana DASCĂLU, Ionel-Bujorel PĂVĂLOIU, George DRĂGOI, INTERACTIVE LEARNING METHODS USING A SIMULATED ENTERPRISE,The 11th International Scientific Conference eLearning and Software for Education Bucharest, April 23-24, 2015

Lave, J., & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge, UK: Cambridge University Press.

Léger, P.-M. (2006). Using a simulation game approach to teach enterprise resource planning concepts. Journal of Information Systems Education, 17(4), 441-447.

Lave, J. (1988). Cognition in practice. Cambridge, UK: Cambridge University Press.

Cheaburu, C., Munteanu, R., 2014. Learning through “Simulated Enterprise”, International Journal of Social and Educational Innovation (IJSEI) No.1/ 2014

Ravi Seethamraju, Enhancing Student Learning of Enterprise Integration and Business Process Orientation through an ERP Business Simulation Game, Journal of Information Systems Education, Vol. 22(1), pp19-29, Spr2011.

Kincaid, J. P., 2009, Simulation in Education and Training, Proceedings of the 2009 Winter Simulation Conference, IEEE

Summarized from https://www.logisticstechoutlook.com/news/

Timothy Green, Jennifer Ponder, and Loretta Donovan. Educational Technology in Social Studies Education. handbook of research of education communication and technology[M], Springer Press, Edition 4th: 573-582.

Niine, Tarvo; Koppel, Ott. Logistics Systems Engineer - Interdisciplinary Competence Model for Modern Education[J]. International Journal of Engineering Pedagogy: 5(54-63).2015.

Pierre-Majorique Léger,Patrick Charland,Harvey D. Feldstein,Jacques Robert, Gilbert Babin,Derick Lyle,Business Simulation Training in Information Technology Education: Guidelines for New Approaches in IT Training, Journal of Information Technology Education Volume 10, 2011

Bloechl, Stefan J.; Schneider, Markus. Simulation Game for Intelligent Production Logistics-The Pull (R) Learning Factory[C].6th CIRP Conference on Learning Factories (CLF), vol 54:130-135.2016,06.

Supplementing Classroom Teaching with Learning Resources: Challenges and Strategies - A Librarian's Perspective

Vijay Srinath Kanchi

Moolji Jaitha College, Jalgaon, Maharashtra, India

Abstract

The rapid rise in the Information and Communication Technologies (ICT) in the past two to three decades impacted the classrooms across the globe as never before. With the deployment of interactive boards, LCD projectors and laptops, the classrooms are transforming into digital learning centers offering never before learning experiences to the students. However, the libraries, particularly in rural environment, are not galloping adequately as the chief support systems for the learning process and are falling short in inspiring the students to use e-contents. This paper describes an attempt by the Moolji Jaitha College located in a semi urban area of India, to develop a model information retrieval and delivery interface with an aim to solve many of the challenges faced by the students in locating the reference material and receiving the content translated into their native language.

Keywords: Information retrieval, translating, higher education, e resources.

Supplementing Classroom Teaching with Learning Resources: Challenges and Strategies - A Librarian's Perspective

Introduction

India is a country that is distinct in many ways. The geographical conditions are varied – from mountainous terrains to plateaus, thick jungles to deserts and myriad other landforms. With 29 states and 7 Union Territories, each having their distinct cultural practices, languages and diverse religious practices, India is a home to 1.33 billion people and is rightly called a subcontinent. The country displays a multi-colored canvass of different mother tongues. Apart from the 22 official languages recognized by the eight schedule of the Constitution of India1, the country has 122 major languages and 1599 other spoken languages2. If dialects and variations in language are also taken into account, the figures would be much higher. The 2001 Census records reveal that there are 30 Indian languages that are spoken by more than a million native speakers and 122 languages are spoken by more than 10,000 people. English is not a native language of India and due to the colonization of Britishers in 19th and first half of 20th century, it has been in a way, imposed on the people of India. English is a second language in most part of the country and is the preferred choice only of the educated and the elite. However, owing to the dominance of English as the lingua franca connecting divergent world regions, English has become the predominant language of knowledge communication in the modern era. Thus most of the learning resources produced in the electronic format are in English language, a language a great majority of the rural populace of India is not very familiar with.

Added to this, a dichotomy exists between its developed regions popularly identified with the term India and less developed and developing regions signified by its traditional nomenclature Bharat. The English educated urban Indians have good technical competencies to handle

computers and other electronic gadgets but the rural populace has very meager technical skills. Thus the language barrier that discourages the students from making use of the e-resources produced predominantly in the English language is compounded with the inadequate technical competencies in handling computers and other gadgetry.

With such a diversity on the platter, the librarians of India, particularly working in semi-urban regions, face a challenging task in providing e resources to the students in a way that is simple to access and easy to comprehend in their preferred language choice.

THE PLIGHT OF RURAL STUDENT COMMUNITY

The Indian society is witnessing a distinct digital divide in the past twenty years or so, resulting in 'information haves' and 'information haves-not'. Though the government is ever increasing the budget outlay to educational sector in every five-year plan, the ability of the students to identify their information needs, locate and use the information available online, particularly in semi-urban and rural areas, is very concerning. The Indian metros like Mumbai, New Delhi, Bengaluru, Hyderabad and Pune are major contributors to world's software development, on par with their global counterparts, contrasted by semi-urban and rural regions of the country which still battle with the issue of providing quality education to its rural populace. India finds itself in a queer situation where the educated upper elite residing in urban areas are adopting and galloping to the changing currents, while a great majority of country’s populace, still remaining firmly anchored to agrarian economic resources, seems isolated and lost, in the cacophony of emerging technologies.

The student community of the rural India is grappling with the challenge of being part of information revolution taking place in their surrounding environment. This inability to acclimatize to the technological environment is starkly evident in case of rural students of higher education.

The World Wide Web and other electronic resources including CDs and DVDs contain such a huge wealth of information that, if they are provided to the rural mass in a palatable way, could completely transform the academic scenario and bring the underdeveloped and the developing world on par with the developed parts of the globe.

Lack of Adequate Technical Skills: A formidable Challenge

The information and communication technology revolution that engulfed the whole globe in 1990 has radically transformed the very approach towards information storage and retrieval resulting in rapid expansion of the purview of the term 'information sources'. Today the information sources no longer refer merely to printed books available in libraries and book stores but also refer to those electronic sources that provide access to information beyond the limitations of time and space. However encouraging the students to turn to the new sources of information and ensuring that such resources in new formats are positively adopted by the student community hailing from Bharat is not an easy task. The new e-resource formats demand a certain degree of technical competency on the part of the user and unfortunately there is whole lot of student community in rural India that has less than mediocre computer skills. The transition to e-learning resources is a big challenge to the academic institutions located in semi-urban and rural areas of India, as a sizable number of students, except those who are pursuing a course in computer applications are not comfortable with handling computer systems.

Retrieving the desired information from the vast expanse of information available on the web demands some degree of competencies on part of the user. The natural language expressions need to be parsed into search engine keywords and the search results are to be properly filtered so as to improve the precision in the output. Presently there are no readymade solutions available to the students and each student has to entirely rely upon his computer handling skills

and maneuver through the maze of information. Correlating the syllabus content and reference resources suggested by the affiliating university/institution with the vast plethora of information in various formats (ebooks, ejournals, audios, video lectures, computer simulations etc.,) available on the web is a challenge very few students are capable of handling on their own.

What's more, there is no single engine developed and deployed that effectively addresses the needs of rural and semi urban students in respect of information retrieval, segregation and delivery across the platforms such as windows based computer systems and android based pocket gadgets. Such an interface, if developed and deployed in every institute of higher learning would greatly improve the usage of e-resources, provide latest developments in various fields.

The new algorithms developed in the recent times in computational science are revolutionizing the behavioral and social sciences and the advances made in social technology have the capacity to integrate users with the information they need as never before. This calls for the development of Intelligent Information Retrieval and Delivery Interface and adaptive eLearning strategies that are customized solutions specific to the needs of rural and semi-urban regions. Student performance improves when online educational content is personalized. With the emphasis now being focused on Massive Online Open Content (MOOC), it is time the university and college libraries develop suitable interfaces supported by intelligent engines that identify the specific needs of the students and offer customized information resources.

The Challenge of Communication Medium

Added to this issue of migrating and adopting to the new technology based accessing methods is the challenge of the language barrier. India is a land of multiple languages. Though the national language of the country is Hindi, more than 60% the country's population has many other vernacular languages as its mother tongue. A great number of youth in the rural and semi-

urban areas still pursue their education - even at higher education levels - in their mother tongues. Owing to this their comprehension levels of English language are as rudimentary as their computer handling skills. A substantial number of e-resources are produced in English language; a language the students of rural India are not comfortable with. This compels them to bank on books published by local publishers in the language of land, which in turn are way below the international standard in terms of quality and concurrence. Even the technology and tools that enable them access the learning resources are heavily dependent on English. This severely discourages the learners from adapting to the technological environment. Thus language barrier is one of the most fundamental issues that stops the learners of higher education from favoring the e-resources to conventional books. A great deal of world class literature in every field of knowledge is produced and made available in English, a language the rural populace in India are not comfortable with. Since the learners want the accessing technologies as well as the learning material in their native languages, this leaves them out of bounds.

There have been some efforts by the premier technology universities of India like Indian Institute of Technology, Kanpur, CDAC, Pune and Bangalore who produced translation software such as Anglabharati, Matra and Mantra3. But it is very unlikely that a student would access, search for and then access an e-resource in English on his own from a maze of internet resources and then deploy a translation tool available on some other website and get the e-book translated into his native language. This is a tedious and impractical task which an average student is very unlikely to adopt. The students require a one stop solution that is easy to adopt and highly useful in its outcome. Thus the onus of providing such facility shifts on to the shoulders of libraries of higher education institutions.

THE MOOLJI JAITHA COLLEGE INITIATVE

The North Maharashtra region is relatively underdeveloped semi-urban region of India where a large number of students with high aspirations are pursuing higher education programs under Kavayitri Bahinabai Chaudhari North Maharashtra University and its affiliate colleges. Moolji Jaitha College run by the Khandesh College Education Society is a premier college of higher education in North Maharashtra region catering to the educational needs of the students of rural and semi-urban regions comprising student strength of over six thousand students in Arts, Science and Commerce faculties5. The college also has a junior college attached to it within the campus where about 3000 students pursue their education. Moolji Jaitha College, popularly known as M.J. College is affiliated to Kavayitri Bahinabai Chaudhari North Mahrarashtra University, Jalgaon and is all set to become an autonomous institution from the next academic year 2019-20.

The college is a recipient of College with Potential for Excellence for two terms (2003-08 and 2009-14) and College of Excellence for 2014-19 by the University Grants Commission of India and is an ISO 9001:2015 certified college. It has undergone three cycles of assessment and accreditation by the National Assessment and Accreditation Council, and received 'A' grade. It is a traditional college established in 1945, offering undergraduate and postgraduate programs in Arts, Commerce and Science faculties apart from professional programs in Management and Computer Science. Undoubtedly it is one of the oldest and most sought after colleges in Khandesh region since1945.

The college library is the largest academic library in this part of the globe with over 155,000 books and received the coveted status of Manuscript Conservation Center by the National Manuscript Mission. The college library is an automated library using SOUL 2.0 ILMS and offers online WEB OPAC facility to its users. A Moodle based Learning Management System (LMS) integrating teaching with the library resources was also introduced in the college by the college

library. The college is a subscriber to the Nlist program and provides access to e-resource to the students free of cost. This subscription enables the college library to provide access to 6,000+ ejournals and 31,35,000+ ebooks to the students.

Digital Learning Resource Access Centre for e-Learning

With the prevalence of the technological environment in the educational scenario across the globe in mind, the college library developed a Digital Learning Resource Access Centre with 30 computer nodes with internet access thus offering the students not only the traditional reading room facility for studying printed books, but also a digital learning room to access the online internet resources.

Figure 1. Digital Learning Resource Access Centre (DLRAC) in M. J. College

This Digital Learning Resource Access Centre facility not only provides free access to internet resources but also to the vast collection of electronic library resources that the library has been building over the years. These educational resources include videos, e-books, simulations, etc. Through Resource Space, an open source software these e-contents are hosted on a local server. Thus access to these resources is restricted only within the college campus. The intranet server also hosts the scanned images of the question papers of the previous years, dictionaries, encyclopedia, thesaurus, language learning tools, etc.

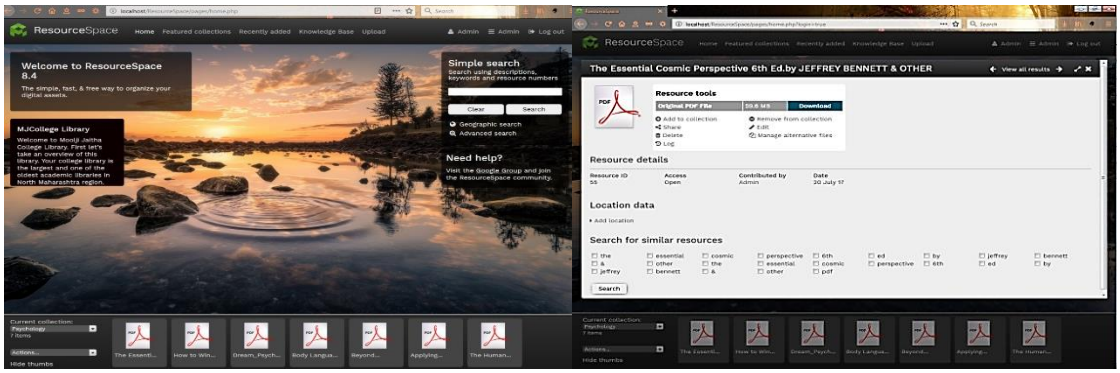

Figure 2. Provision of access to locally hosted e resources through Intranet

However the moot question of providing the syllabus related appropriate e-content without the need to search for various resources in the vast ocean of internet to students who have little technical skills that too in a language they will be most comfortable with remained unanswered. Hence it was conceived that a library portal may also be developed that offers a one stop solution to all the academic requirements of the students. This resulted in planning for a solution in the form of an intelligent information retrieval and delivery interface that runs at the background of the library portal and delivers the students with appropriate e-content.

College Library Portal – A One Stop Solution

An innovative library portal as a one stop solution for all the educational needs of the students is conceived and initiated since 2017[6]. It provides federated searching of resources from an array of pre identified web resources through a single click and also provides translation in the local vernacular language. The college library believed that an Intelligent Information Retrieval and Delivery Interface, which works on various platforms and which provides various educational resources to the students with one click and that too in the language of their choice will go a long way in upgrading academic standards of the students. This model delivery system developed by the college library proved to be of immense significance to the students of higher education hailing from the rural and semi-urban regions, whose skills and competencies in locating,

collecting and using information resources online are very rudimentary. It would be one of its kind and helps in designing adaptive learning systems for the students that takes into consideration varying needs of students with different linguistic, intellectual and technical abilities. The idea was to develop an intelligent information retrieval and delivery system based on the specific information needs of the students in the modem technological age through a single technological framework for digital reading rooms. The project envisages a cross platform delivery systems that offers state of the art digital environment for the students pursuing higher education.

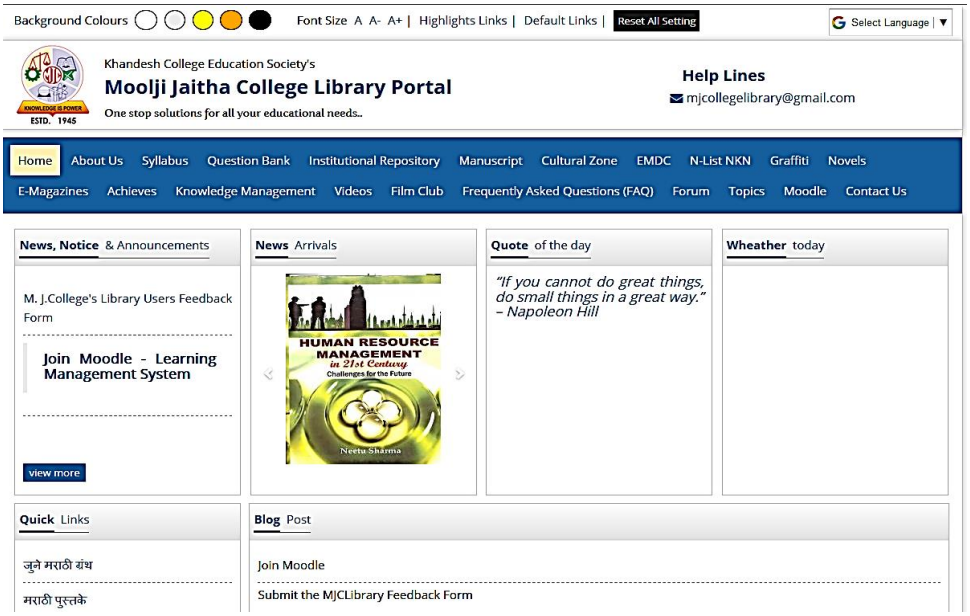

Figure 3. The College Library Portal – A One Stop Solution for all the Academic Needs of the Students

The library portal has several features that address the basic academic requirements of students not only in terms of providing e-resources suiting the prescribed syllabus but also all such information an educated person would like to know. Some of the salient features of the portal include Quote of the Day, Weather Today, News, Notices & Announcements, New Arrivals, Cultural zone displaying jokes, information on festivals, celebrations, motivational stories, messages,etc., Graffiti where authenticated logged in users can express their ideas, views on any

topic, a Forum to discuss current and trending topics with sticky and updated threads, Maps of world, India, Maharashtra and Jalgaon, provision for writing blogs on various topics of interest, previous year Question papers, Institutional Repository consisting of M.Phil & Ph.D. theses and dissertations, previous issues of the college's cultural magazine titled Ajintha, Compendia of Budding Researcher Scheme research papers, Scanned images of rare Manuscripts digitized under a university funded project, audio and video lectures recorded by the Educational Media Development Centre of the college, access to N-List site, inspirational novels, motivational videos and a plethora of other useful material. The college library also launched a learning management system (LMS) with a view to integrating classroom teaching with the library as well as internet resources. For this an open source software named Moodle was put to use. The library portal also provides direct access to this Moodle based Learning Management where each registered teacher monitors a group of students, provides them with suitable notes, solves their queries, and evaluates their progress through online internal tests[7].

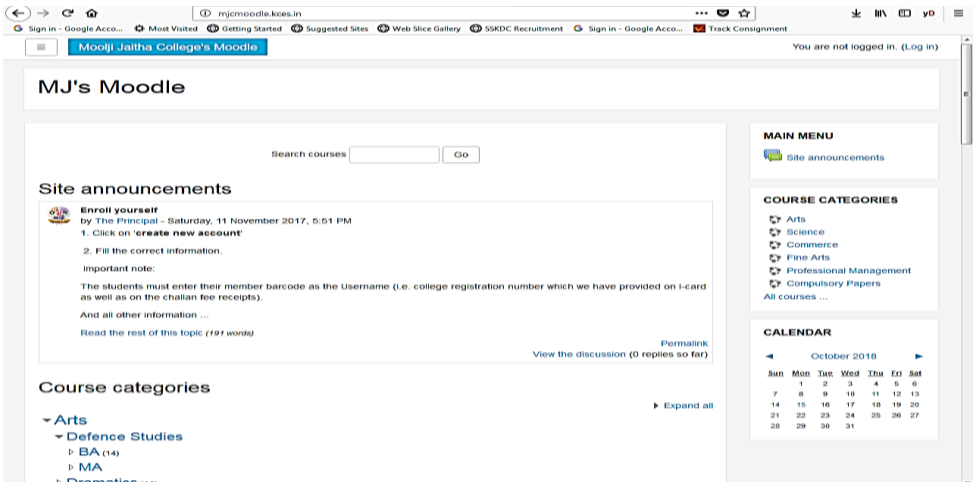

Figure 4. Moodle based Learning Management System

The library on the other hand enriches the learning management system by providing appropriate learning resources and also through constant monitoring of the activities on the LMS.

Developing and Deploying an Intelligent Information Retrieval and Delivery Interface (IIRDI)

The college library has also developed and deployed an intelligent information retrieval and delivery interface that works at the background of the library portal and provides the students with the suitable learning resources in various formats that are appropriate to the syllabus of their study. The IIRDI functions in the following way:

As the student enters the Digital Learning Resource Access Centre (DLRAC) facility the default webpage that gets loaded onto his computer screen is the college library portal. The student doesn't have to click on any software or visit any website. The library portal offers the student with a provision to select the course of his study through an array of drop down menus. Once that is done, the IIRDI fetches the syllabus prescribed for the course from the affiliating university website and displays the same through a flash player in front of him. Since the displayed content fetched from the university invariably is in non-editable pdf format, the engine parses the file into an editable format from which it generates searchable keywords and displays them as clickable web links. As the students clicks the keyword of his syllabus content thus displayed, the in-built customized search engine crawls across the pre-identified websites for possible matches and retrieves the e-resources hosted on those websites. The results are displayed as another set of segregated links under four categories: Videos, Audios, E-books, Simulations, each representing a resource in that particular format that conforms to the keyword searched based on the prescribed syllabus. If the student wishes to watch a video concerning the topic of his interest, he/she can click the video link displayed which in turn displays the video file in an in-built flash player. Similarly by clicking an audio link an in built audio gets activated which plays the particular audio resource. If the file chosen is an e-book a text window gets displayed in place of the flash player

wherein the e-book is displayed. The whole process starting from the display of syllabus to eventual display of e-resource in the format of the student's choice takes place within a single webpage and the students is not bothered to go to any other website or activate any application.

Thus the library portal relieves the student of the burden of acquiring adequate web browsing skills before he or she embarks on using the e-resources that are helpful to study the prescribed syllabus.

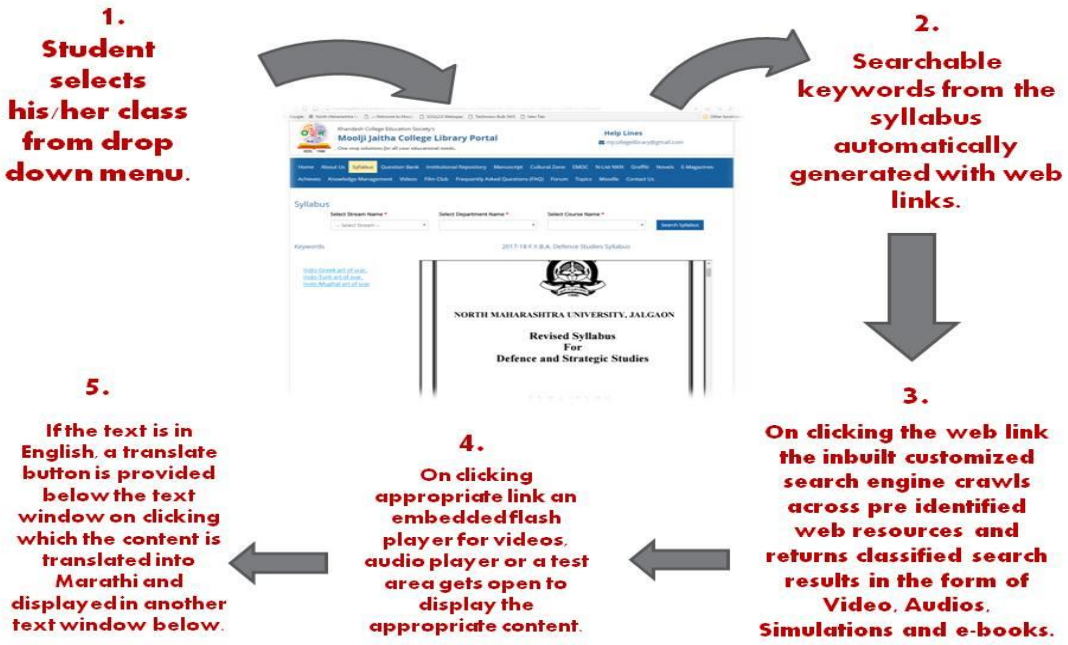

Figure 5. Flow chart of IIRDI engine

To mitigate the challenge posed by the language barrier, the library portal with its built-in IIRDI engine offers another feature. If the text of the e-book displayed is in English language, a translate button is provided right below the text displaying window on clicking which, the content is translated into the local vernacular language Marathi and displayed in another text window right below. For translating the content into Marathi the IIRDI avails the services of the Google translate engine and displays the content. Though the translation provided may not be 100% accurate, it however certainly provides the user with the content that is comprehensible, and usable.

Thus the envisaged library portal with built-in IIRDI engine addresses the two vital issues that hamper to students of rural background to utilize the e-resources, namely: the technical competency and the language barrier. The identification of specific learning resources spread across the globe and from pre-identified web resources, would ensure developing a solution with multi- perspectivity, disciplinary diversity and mutual sensitivity.

Future Applications of the Intelligent Information Retrieval and Delivery Interface (IIRDI)

The Intelligent Information Retrieval and Delivery Interface, coupled with robotic pedagogical agents and facilities to interaction between and among students, could be used on large scale in Massive Online Open Content systems, radically transforming even distance learning and online courses, let alone the contact based teaching-learning environment. The objective as stated in the mission document 'National Mission on Education through Information and Communication Technology' (NMEICT) and Inclusive and Qualitative Expansion of Higher Education in the 12 Five-Year Plan, 2012-17', could be realized by the development and deployment of such Intelligent Information Retrieval and Delivery Interfaces coupled with digital learning resource access centers that could usher in new areas of adaptive learning solutions for personal learning and open learning of the students.

Conclusion

The Intelligent Information Retrieval and Delivery Interface is designed and developed by the MJ College library as part of its library portal, keeping the local conditions and needs into consideration. This library portal supported at the background with an Intelligent Information Retrieval and Delivery system retrieves information from an array of pre-identified web resources and delivers it in a customized and segregated fashion to the students of higher education. It

incorporates the principles of library and information science with that of the computer technology and provides e-resources in an easy to access and simple way. It also addresses the issue of poor usage of e-resources by average students owing to the language barrier, thanks to the provision of translation tool in the library portal. This solution is developed as a meaningful and effective solution to the information needs of the present day student community that hails from a rural background and which is vary of utilizing the vast swathes of e-resources spread on the internet owing to their technical and linguistic limitations.

References

Department of Official Langauge, Languages Included in the Eighth Schedule of the Indian Constitution Available at: http://rajbhasha.nic.in/en/languages-included-eighth-schedule-indian-constution (Accessed on 23 Oct 2018).

Office of the Registrar General & Census Commissioner, India, General Note. Available at: http://www.censusindia.gov.in/Census_Data_2001/Census_Data_Online/Language/gen_note.html (Accessed on 23 Oct 2018).

Kanchi VS, Towards an Information Society: What Can Be Done To Face The Challenges?. *In Proceedings of IADIS E Society 2012*. Berlin, Germany, 10-12 March 2012, P.505-510.

Moolji Jaitha College, Available at: https://www.kcesmjcollege.in/ (Accessed on 23 Oct 2018).

Moolji Jaitha College Library Portal, Available at: http://mjcollegelibrary.kces.in (Accessed on 23 Oct 2018).

Mj's Moodle Available at: http://mjcmoodle.kces.in/(Accessed on 23 Oct 2018).

Active Learning Methods in Math Courses for Engineering Students and Its Evaluation

U. Tudevdagva and **A. Heller**

Chemnitz University of Technology, TUC, Chemnitz, Germany

Abstract

Math courses are most important courses of all directions of engineering students. Study of some researchers showed that many students leaving university early not finishing degree because of math courses. One of the main goal of Europe 2020 strategy of Education and Culture European Commission is to reduce drop out of students from universities. To contribute on this issue four European universities working together to support students with math courses during their study. Main idea of DrIVE-MATH - Development of Innovative Mathematical Teaching Strategies in European Engineering Degrees, is to apply new teaching methodologies and active learning methods in math courses. By our opinion, it will help to students stay motivated and learn math with success. This paper presents formative report of the DrIVE-MATH project. We reflect on our on-going report activities and expect valuable hints from researchers who are dealing with same problems.

Keywords: project, drive math, math course, active learning.

Active Learning Methods in Math Courses for Engineering Students and Its Evaluation

Introduction

One of the key goal of Europe 2020 strategy of Education and Culture European Commission is to reduce drop out and to increase finish their tertiary degree at least 40% in age of 30-34 years old. Numerous students in Europe drop out before obtaining a higher education diploma or degree (Hans Vossensteyn, Bjørn Stensaker and others, 2015). Reasons for drop out is different: a desire to work instead (reported by about 25%), or finding their studies uninteresting or not meeting their needs (given by 22%). Almost 18% cited the degree of difficulty of their studies, whereas about 10% reported that they dropped out because of family reasons. Finally, around 7% struggled with studies because of financial reasons and 5% reported health problems.

The DrIVE-MATH project came out from idea to support learning of mathematic courses in four European universities: The Polytechnic of Porto, Portugal, Chemnitz University of Technology, Germany, University Claude Bernard Lyon 1, France and Slovak University of Technology in Bratislava, Slovakia works together for establish new teaching materials and methodologies in mathematic courses. As educators, we recognize that an engineering education is acquired over a long period and in a variety of institutions, and that educators in all parts of this spectrum can learn from practice elsewhere. All partners involved in the current project have experience in previous projects, which provide background, knowledge, and experience for the current one. Some already accomplished assets will be delivered in this work (Mendonça and others, 2018).

Rapid development of technology enables to educators to apply different active learning methodologies in combination of technologies. In frame of DrIVE-MATH project, we selected

several teaching methodologies like: EduScrum, Jigsaw, problem based learning and programmed tools for mathematic senses. Next focus of our project is to update curricula of mathematic courses. Modernization and adaptation of actual curricula is important issue of universities. Nowadays science development requires interdisciplinary research and ideas. Therefore, some of the traditional curricula should be update with opportunities to use technologies and to improve learning objectives and transferring skills for students. Other key point of our project is cooperation and collaboration of educators of four universities from different countries.

Design of project activities

To reach main targets of project we planned to organize serial training workshops that will hold partner universities in systematic order (See Figure 1).

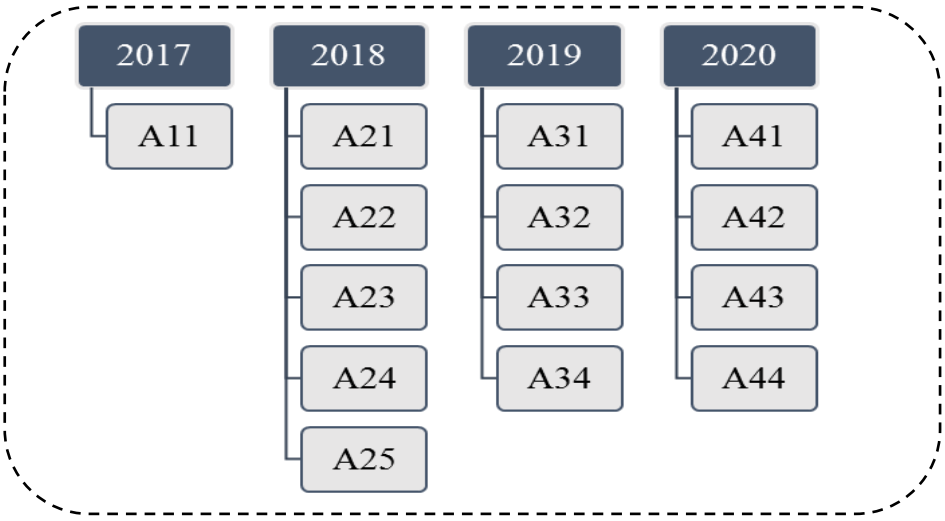

Figure 1. Scheme of planned activities

Figure 1 describes basic design of serial activities. Here, A11 standing for first activity of first year. From here we can read A44 as fourth activity of fourth year. Each activity has own title and main purposes. Table 1 shows information about serial workshops. Here, GN is general number of activities; GNA is given number of single activity.

Table 1. Activity plan

GN	GNA	Title of activity	Purpose of activity	Location
1.	A11	Training and teaching methodologies for teaching staff I	Exchange of the best teaching practices and experiences between the partner universities	Porto, Portugal
2.	A21	Curricula modernization and adaptation	Reflection and discussion around new strategies and new paradigms for instructional leadership	Bratislava, Slovakia
3.	A22	Pedagogical materials for updated curricula	Selection of corresponding teaching materials and adapt to the rapid changes that occur in students	Lyon, France
4.	A23	Innovative pedagogical evaluation	Challenge in implementation of new teaching methodologies in partner universities	Chemnitz, Germany
5.	A24	Case studies evaluation	Presentation and feedback around implementation examples of ISEP and at the partners' universities	Porto, Portugal
6.	A25	Training and teaching methodologies for teaching staff II	Second around discussion on new curricula and corresponding teaching material selection	Bratislava, Slovakia
7.	A31	Experiences in mathematic curricula for engineers	Exchange the best active learning teaching practices along the pilot implementation	Lyon, France
8.	A32	Application of EduScrum methodology in mathematics for engineers	Learn how to apply EduScrum model at high school mathematic classes	Porto, Portugal
9.	A33	Evaluation methodology training	Discuss tangible results of application of pedagogical methodologies in pervious activities	Chemnitz, Germany
10.	A34	SWOT analysis on the evaluation of active-learning methodologies	Perform a SWOT analysis of the implementation of the active-learning methods	Lyon, France

11.	A41	Role of active learning in mathematic curricula for unmotivated students	Reflection and discussion on three main aspects of motivation: relatedness, competence and autonomy	Chemnitz, Germany
12.	A42	Mid-term curricular and evaluation methodology activity	Review of ongoing results, comparison analysis between past and future activities and support improvements on the ongoing project	Chemnitz, Germany
13.	A43	Final curricular and evaluation methodology activity	Reflection and discussion on focus movement of teaching from teacher to student should be d	Bratislava, Slovakia
14.	A44	Sum-up of active learning methodologies for mathematics on engineering education	Summary of all serial activities and reflect on outcomes of project	Porto, Portugal

Best experience exchange and learned lessons from activities

During workshop days, participants presented their best case studies in class and later continued reflection and discussion on day topic.

- School of Engineering, Polytechnic of Porto. The development of student supportive learning environment is very important. The Polytechnic of Porto University uses various type of active learning methods for teaching in math classes. The EduScrum is method where students can collaborate under general task. By this method, students have to divide into groups up to five members. Advantage of this method is improvement of teamwork skill and to share own knowledge with others. Some personal characteristic of students can be limitation of this method. Next new teaching methodology which applying for math classes in School of Engineering, Polytechnic of Porto was Jigsaw method. Highlight of Jigsaw learning in classroom is opportunity to discuss topics with group members and later can teach topic to others. Some not motivated student can stay out of activity during this

kind of class. This can be side effect of Jigsaw method. CDIO is the one of active learning method which using in this university. Main advantage of this teaching is professors of different courses can cooperate. Students will receive general task for solution have to apply knowledge and learned skill from courses like: mathematic, physics and programming.

- Chemnitz University of Technology. To support students in math classes professors in TU Chemnitz offers several e-math courses for students. Dr. Wenzel from Faculty of Mathematics developed OPAL course "e-Learning based Teaching Examples" (Wenzel, 2018). Moreover improving communication channel between learning platform and students. To use learning management system OPAL should be easy for students and students have to feel compatible with feedback from system. Some researchers working in this sense to test polite feedback to students (Mikheeva, 2018). There are running project ESF Project Presentation "Digitalization of Teaching in Mathematic" where work researchers from Psychology of learning with digital media of Institute for Media Research in Faculty of Humanities. Main goal of this study is to keep motivation of students to learn math. In the summer semester of 2018 Faculty of Computer Science applied EduScrum teaching methodology for master student in main research seminar.
- University Claude Bernard Lyon 1. Many different tools uses in classroom for teaching math. OpArt and MathCityMap are some example of technology-supported tools for math teachers. The MathCityMap application is free and open course learning platform. This apps support students to use mathematical theoretical knowledge in real world problems. Most important impact of this tool is student not only can solve formulated tasks in the platform, moreover any student if like can create own task which linked to real world.

- Slovak University of Technology. Professors of STU use some of free tools to teach math courses. For example, GeoGebra is tool for dynamic mathematical software, which is free to download. Next one is Mathenmatica - Wolfram sogtware package, which is commercial. To teach math courses with fun is complicated task. Dr. Velichova is one of the main organizer of annually international conference where calls contribution of math professors (Velichova, 2017). The APLIMAT is 17 successful conferences on applied mathematics originated by the former Department of Mathematics at the Faculty of Mechanical Engineering STU in 2002. Main goal of this conference to share experiences and new activities in applied mathematics. It helps a lot to math professors to keep their motivation on teaching and research. Proceedings of APLIMAT conference is included into to SCOPUS that confirms effort of STU math professors reached own targets. This year all partner universities contributed to this conference and had fruitful and interesting discussion with many excellent math professors from Italy, France and others.

Self-Evaluation based on structure-oriented evaluation

An evaluation is the important part of our project. The partner universities using different methods to evaluate progress and result of project. TU Chemnitz applies structure oriented evaluation method for final evaluation of project.

The structure oriented evaluation model originally developed for evaluation of e-learning (Tudevdagva, 2014). To use logical structure for design of evaluation goal is basic new idea of this method. There are eight steps to use structure oriented evaluation model. In this paper, we describes first two steps of method.

Key issue of any evaluation process is definition of evaluation goal. As usually this part is not so clear, designing and discussion with groups, which can be, interest and involve evaluation

process. Structure oriented evaluation model uses logical structure, which shows transparent way evaluation goal to all interested group.

Figure 2 shows main goal of DrIVE-MATH evaluation.

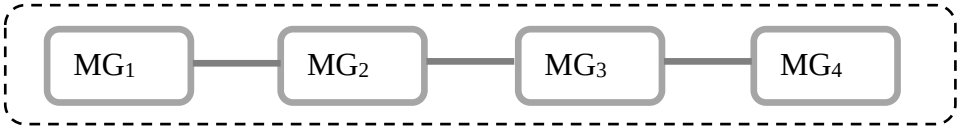

Figure 2. Logical structure for main goal of project evaluation

y structure oriented evaluation model calculation rule data collected by structure (Figure 2) will processed by formula:

$$C = \bigcap_{i=1}^{r} MG_i$$

Where, MG = {MG_1, MG_2, MG_3, MG_4} standing for main goals. Evaluation is positive if C>1. C>1 can be only if MG_i>1.

The main goals of evaluation can consist of several sub goals. Figure 3 shows sub goals of project evaluation.

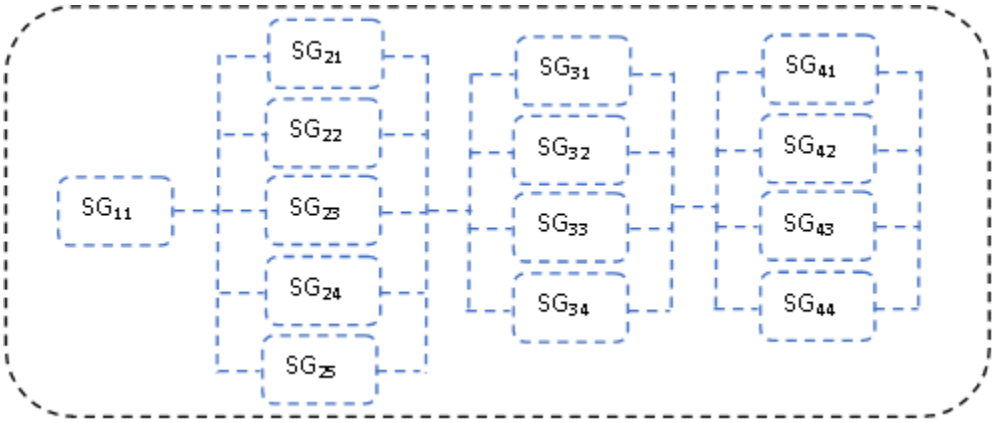

Figure 3. Logical structure for main goal of project evaluation

By structure oriented evaluation model calculation rule data collected by structure (Figure 3) will processed by formula:

$$C = \bigcap_{i=1}^{r} MG_i = \bigcap_{i=1}^{r} \bigcup_{j=1}^{s_i} SG_{ij}$$

If any sub goal reached, own target then corresponding main goal will evaluate successful.

The structure oriented evaluation request to design questionnaire to collect data for evaluation. The questionnaire has to adapt to goal structure of evaluation.

Table 1. The questionnaire for single activity

No	Criteria	Very low 1	Low 2	Middle 3	High 4	Very high 5
1	Information (about travel, accommodation etc.) received before the meeting from host university responding in time					
2	General organization during the meeting					
3	Duration and timing of the meeting					
4	The subjects discussed were relevant					
5	The activities were relevant					
6	The meeting fulfilled the established objectives					
7	The meeting fulfilled my personal expectations					
8	Effective communication amongst partners					
9	The commitment to the project by each partner (fulfilling the responsibilities set out for this project meeting, quality of the presentations and products, sharing responsibility for the meeting)					
10	The information (on tasks, materials for the meeting etc.) received before the meeting from the coordinator					
11	The coordinator facilitate understanding of the objectives and work plan for the next period					

12	The coordinator facilitates communication and collaboration between partners. Everyone was encourages to contribute to discussion					

Table 1 shows questionnaire for single activity. We will consider logical structure of this questionnaire as parallel structure and will use calculation rule for parallel structure.

Conclusion

One of the solution to reduce dropout of students from universities is to support students with learning environment and keep motivation to successful finish of study. Main target of DrIVE-MATH project is to produce new teaching materials for math courses, which can enhance teaching methodologies of teachers in classroom.

References

Hans, V.& Bjørn, S. and others. (2015). Dropout and Completion in Higher Education in Europe. Luxembourg: Publications Office of the European Union. Online available: https://supporthere.org/sites/default/files/dropout-completion-he_en.pdf

Data from Eurostat. (2016). European Labour Force Survey ad hoc module on young people on the labour market. Online available: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfso_16ymgnednc&lang=en

Mendonça, Jorge & Pinto, Carla & Nicola, Susana. (2018). Collaborative networking for educational innovation in math courses – project drive-math. 4548-4553. 10.21125/edulearn.2018.1134

Uranchimeg Tudevdagva, (2014). Structure Oriented Evaluation Model for E-Learning. Wissenschaftliche Schriftenreihe Eingebettete Selbstorganisierende Systeme, Universitätsverlag Chemnitz, Chemnitz, Germany, July 2014. 123 p., ISBN: 978-3-944640-20-4, ISSN: 2196-3932.

Norbert Englisch et al, (2018). AUTOMATED GENERATION OF TESTS FOR EDUCATION IN SOFTWARE ENGINEERING IN Proceedings of the 10th annual International Conference on Education and New Learning Technologies (EDULEARN)

Norbert Englisch et al, (2018). LEARNING SYSTEM FOR AUTOMOTIVE SPECIFIC SYSTEM ARCHITECTURE BASED ON A KNOWLEDGE BASE IN Proceedings of the 12th International Technology, Education and Development Conference (INTED), page 8996 - 9002, ISBN: 978-84-697-9480-7

Norbert Englisch et al, (2015). CROSS-SYSTEM KNOWLEDGE REPRESENTATION OF LEARNING CONTENT IN SYSTEMS FOR EDUCATION IN Proceedings of the 8th

International Conference of Education, Research and Innovation (ICERI), page 2269 - 2276, ISBN: 978-84-608-2657-6, ISSN: 2340-1095

Norbert Englisch et al (2014). GENERIC TEMPLATES FOR COURSES WITH MULTILINGUAL CONTENT IN LEARNING MANAGEMENT SYSTEMS IN Proceedings of the 7th International Conference of Education, Research and Innovation (ICERI), page 6279 - 6285. ISBN: 978-84-617-2484-0