Collaborative Online International Learning Benefits Vis-À-Vis Concerns: An Empirical Study

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ABSTRACT

The paper gives an overview of some recent attempts at Maritime Studies Department (Faculty of Applied Sciences, Durban University of Technology - DUT) to introduce Collaborative Online International Learning (COIL) into teaching and learning. Namely, this experimental form of knowledge generation and sharing has been recently practiced with two overseas universities, one from Mexico (Universidad de Colima - UdeC) and the other from Brazil (FATEC-Jahu-FJU). In the first case two different subjects were matched (Navigation information systems and Software Testing Methods), while in the second one, similar subjects were coupled (Electronic Navigation Systems and Navigation). The setting-up processes realized among professors, "ice breakings" made by professors and students during the first online meetings, students' team research works on creating joint projects, i.e., Google Drive PowerPoint presentations and recordings will be described in the paper, while concomitant benefits and concerns will be discussed. An original model of non-monetary return of investment when it comes to introducing and adopting this kind of teaching and learning has been proposed, as well, and tested on the basis of the variables set by the author and estimated by the professors and students at DUT.

INTRODUCTION

The Internet has greatly altered the lifestyle and work of people around the globe. At the same time, the modes of generation and transfer of knowledge are also changed. Thanks to the technological advancements, it becomes possible to teach/learn through variety of different ways that combine face-to-face and virtual engagement (Bauk, 2017; Bauk et al., 2014; Bauk and Radlinger, 2013). The Collaborative Online International Learning (COIL) has been developed right thanks to the technological advances. In 2015 Durban University of Technology (DUT) became the first African institution to be included as a Global Network Partner in the State University of New York (SUNY) COIL system[1]. It is in line with DUT strategic plan in terms to internationalization of the University. It should contribute internationalization of the curriculum, general education, graduate attributes; providing systemic benefits for staff and students; developing innovative cost-effective

[1] URL: http://coil.suny.edu/ (last access on 24th May 2019)

strategies, etc. (Pillay and Samuels, 2016). At the current moment DUT has several ongoing COIL projects merging different disciplines/courses: medicine and journalism, chemistry and information technologies, navigation and software testing methods/engineering, etc., as a result of collaboration with several overseas universities. A number of innovative and engaging outcomes have appeared out of these initiatives of some professors and students from DUT, and foreign universities, too. Some of them are presented and caught a lot of attention at recently organized "COIL Clinic" meeting at DUT. Within this paper two ongoing COIL at DUT projects will be described in some more detail concerning their advantages and challenges. In addition, an empirical study on assessment of non-monetary return of investments in terms of professors' and students' efforts/inputs to set and accomplish successfully the COIL projects will be realized through quantitative and qualitative analysis based on the survey recently conducted among the professors and students at DUT.

1. RESEARCH BACKGROUND

Several in depth studies on collaborative online international teaching/learning and boundary areas have been done previously. Here are shortly presented some of the most comprehensive ones being available to the author. The first one deals with social media as advanced electronic tools used to support learning among nursing and midwifery students (O'Connor et al., 2018). The key findings of this study are that social media can aid learning knowledge and skills among nursery and midwifery students, enhance confidence, and facilitate professional and personal networks. It has also been concluded that social media (Facebook, Twitter, YouTube, etc.) as dynamic, interactive, online environments can affect the learning process in several ways. However, after the detail and in-depth study it has been concluded that more robust studies are required to objectively measure weather and how social media improves learning. The second comprehensive study has been realized at University of Arizona, USA (Brooks and Pitts, 2016). It deals with the issue how students consider and display their own identities through cross-cultural virtual engagement. This study was focused on USA college students who participated in a series of online conversation with students from Singapore and their conceptions on themselves relative to others in cross-cultural conversations. The study leads to a conclusion that the globally-connected classroom will become a natural extension for many universities. Therefore more critical discussions and reflections about practices and behaviors of students in their Internet-based cross-cultural exchanges are to be conducted around the globe. Within the context it is worth to mention also the study that considers transforming teaching, learning and research through practicing mindfulness and action research study (Brendel and Cornett-Murtada, 2019). The study fosters more mindful university culture through including mindful grading and assessment, awareness of students in the classroom, and cultivating self-awareness in teaching. The COIL network and projects can undoubtedly support this innovative approach to teaching, learning and doing research based on mindfulness mediation and transformative pedagogy. This kind of virtual engagement aims internationalization of students' learning experience and preparing them for a competitive international market and workplace (Anderson et al., 2010; Brooks, 2011, 2012). Collaboration in multi-cultural environment across the disciplines undoubtedly requires higher level of mindfulness in teaching, team work, research and providing accompanied services. Two below described project are at the similar line and they should contribute further development of hybrid methods of knowledge acquisition and transfer.

2. PROJECTS DESCRIPTION

In the following section of the paper are described two COIL projects recently conducted at DUT. The first considered COIL project between DUT (South Africa) and UdeC (Mexico) was conceived so to follow the phases being described below.

Phase I: Ice-breaking. On the side of UdeC students have the tasks:

− Presenting Colima/Mexico, and
− What you would like to know about Durban/South Africa?
  On the side of DUT students have the tasks:
− Presenting Durban/South Africa, and
− What you would like to know about Colima/Mexico?

The first online meeting was organized via Skype and four couples of students from both sides (selected on voluntary basis) were talking on the above topics, after the short introductory words given by the professors. The excitement and curiosity among the students from both sides was obvious.

Phase II: Team research work. Within this phase students have to accomplish the following tasks:

− Find out relevant information on producers of radar equipment (DUT and UdeC);
− Describe the purpose of radar in sea navigation (DUT);
− Find out different radar displays made by different producers (DUT);
− Provide the key information, which are to be observed from radar display (DUT);
− Apply heuristic principles in assessing radar display/software usability (UdeC), and
− Give comments on a particular radar display usability (user/seafarer centeredness) due to the heuristic principles (UdeC).

This phase has been accompanied by creating joint Google Drive PowerPoint presentations. Prior to this students from DUT and UdeC had been divided into twelve groups. Professors from DUT and UdeC gave their talks on radar basis and heuristic principles in software testing respectively, during two online meetings via Skype. Even though the students have to share their ideas via mails about the conceiving and creating joint presentations, it was not always the case, except when it comes to only few students/groups. Mexican students were complaining that African students were not responding to their mails. Therefore, students from DUT were mostly solely working on their part of the presentations, while Mexican students were also working solely on their part. However, at the very end they have created kind of joint projects. Collaboration was interrupted with several holidays/breaks from both sides in different time slots. Additionally time difference of six hours makes some difficulties. Namely, DUT students do not have transport from the campus to their lodging at the evening hours and some of them do not have Internet access at their residences. Also, some of African students were working and studying at the same time and this has prevented them to be more involved/active.

Phase III: Recordings. The third phase includes recordings of the best presentations: one from DUT and the other from UdeC side. After recordings, these two separate parts: one on radar and the other on its display usability/human centeredness should be post-produced into one joint presentation as the final outcome of the project and uploaded on to shared Google Drive folder. Currently, we are in the phase of preparation to accomplish his part of the project. In the shared folder in the Cloud are available photos and videos from online Skype meetings, as well as the Power Point presentations created by the students.

Phase IV: Evaluation. The evaluation can be done only by the professors. Students reflections can not be collected since the semester ended at DUT, and UdeC students have to accomplish the other tasks within their regular Software Testing Methods course.

Despite the aforementioned shortcomings in the realization of this joint collaborative online project, *something* has been achieved for the first time. The professors are willing to continue their collaboration during the next academic year and try to overcome or at least alleviate the observed impediments. Of course, time difference can not be revoke, neither the socio-economic status nor

living conditions of South African students, particularly when it comes to Internet access availability. But, the communication among Mexican and African students can be improved through using joint management learning platform and tracking their communication when it comes to team research work and sharing ideas about conceiving and creating joint projects, i.e., presentations and videos. Mexican students were using Google Classroom, while South African students were using Black Board. Next time we can consider using Padlet or Linkr Education, e.g. This will require additional efforts for the professors to become familiar with these online learning platforms. But, the analysis of the students' posts/chats could help professors to identify inactive students and try to motivate them to be more (pro)active, and also to identify and award those students who are (pro)active. The scheme of this COIL project is given in Figure 1.
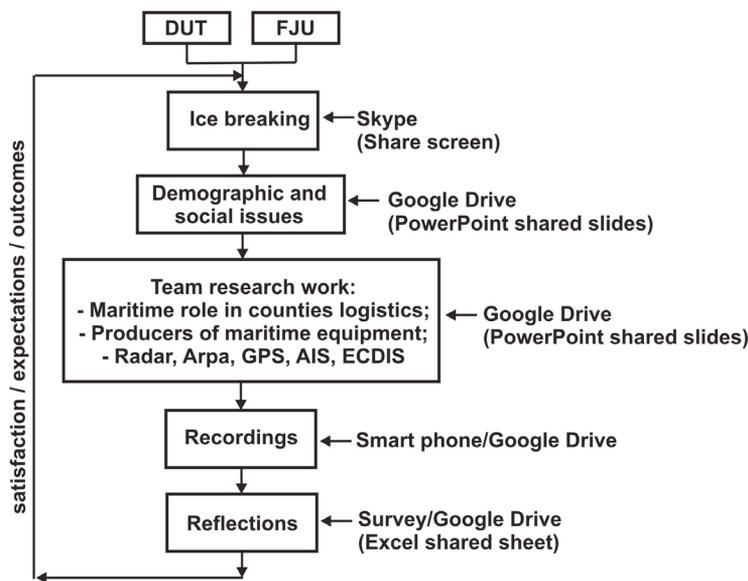

Figure 1. Scheme of the COIL project between of DUT and UdeC

The second analyzed project has been realized among DUT (South Africa) and FJU (Brazil) in the field of navigation, or more precisely in electronic and information navigation systems. The number of students was large (more than one hundred from both sides), therefore we have to divide them into five groups. The first online meeting was organized via Skype, while group leaders were talking to each other. It was a nice and amusing online meeting. Prior to the first online meeting it was an extensive communication between the professors from DUT and FJU. WhatsUp and Facebook groups were created where students should leave their threads due to the following ice breaking questions:

- What is your favorite song at the moment? (Please show us a link to it)
- What are you interested in? Do you have any hobbies?
- What is your favorite sport? What is your favorite team?
- What are your expectations for this project?
- Could you please share a picture that is meaningful for you? Explain why it is meaningful[2].

After this ice braking phase via social media and Skype, students were asked to start their joint Google Drive PowerPoint presentations following below given directions:

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[2] DUT - FATEC Navigation Systems Facebook group (created by Osvaldo Succi), URL: https://www.facebook.com/groups/1290061311148104/?ref=bookmarks (last access 14th May 2019)

− Present information about each other's countries:
− Demographics;
− Social - historical and political situation;
− Job market for seafarers, and
− The role of navigation in the country's logistics.

When it comes to the main part of the joint projects (Google Drive PowerPoint presentations) concerning electronic and information navigation systems, the professors have set five groups of questions in order to guide students through the process of creating their presentations:

Group 1: Radar (Radio Detecting and Ranging or Radio Direction and Ranging)

− In which situations radar cannot replace sharp visual lookout?
− In which situations radar is irreplaceable aid to navigation?
− Make a list of advantages and disadvantages of different modes of radar image presentations:

Relative Motion/True Motion (North-Up, Course-Up, Head-Up)

− What is meant by stabilized and unstabilized presentation?
− What is meant by variable range marker (VRM) and electronic bearing line (EBL)?
− What is meant by Plan Polar Indicator (PPI)?
− What are main differences between Cathode Ray Tube (CRT) and Liquid Crystal Display (LCD) radars?
− In which situations information provided by radar are not usable?
− Describe radar minimum range and resolution.
− Describe unticlutter-sea and -rain functions and their proper usage.
− What is meant by heading line suppress button at radar control panel and how this button works?

Group 2: GPS (Global Positioning System)

− Why Gyro and other types of compasses are still used in navigation besides GPS?
− Why speed log is still used in navigation besides GPS?
− How is GPS connected with chart datum? And what is meant by chart datum?
− How accuracy of GPS can be checked?
− If GPS is not working properly from some reason, which alternatives the navigator should use?
− What is the accuracy of GPS in horizontal and vertical plane?
− What are most often reasons for GPS malfunctions or inaccuracy?
− Who controls GPS satellites?
− Which satellite navigation systems besides GPS do you know?
− How accurate are these systems?

Group 3: ARPA (Automatic Radar Plotting Aid)

− What are ARPA advantages in comparison with manual plotting?
− Do navigators need to know manual plotting if they have available ARPA?
− With how many targets ARPA can deal well simultaneously?
− In the case of heavy density traffic which kind of display presentation one should use?
− Explain the relation between aspect and *safe targets*? (give illustrations)
− Explain the relation between aspect and *watch out* targets? (give illustrations)
− What is meant by lithographic crayon?

− How EBL can be used for quick check weather some targets are on a collision course?
− How one can avoid collision?

Group 4: AIS (Automatic Identification System)

- Why AIS cannot still replace radar?
- Which static and dynamic information AIS provides?
- What are the advantages of satellite AIS (S-AIS)?
- Who controls S-AIS satellites?
- What are the main reasons for mismatching AIS and radar targets in ECDIS?
- What are the reasons for mismatching AIS targets and vector chart representations?
- Can AIS be used for distress alerts?
- Can AIS be used for informal communications between navigators?
- Can AIS be used for global monitoring of ships' traffic?
- Are some AIS services available for free online?
- What is meant by virtual AIS?

Group 5: ECDIS (Electronic Chart Display and Information System)

− What is meant by ECDIS?
− What are key advantages of electronic charts in comparison to paper charts?
− Why some ships still do not have ECDIS?
− Do you think that all ships at international routes should have ECDIS? Explain your opinion.
− ECDIS is primarily considered as anti-grounding system. Why have some ships equipped with it grounded?
− List the most important alarms in ECDIS which can alert navigator in certain situations of potential danger?
− How do you see the role of ECDIS in the context of e-navigation?
− How do you see collaboration between crew onboard ship and operators at Vessel Traffic Service (VTS) throughout ECDIS system(s) in the future?

Up to the current moment, students have started to work on their presentations. Posts are mostly created by the South African students. It is to be expected that the Brazilian students will join them soon. At the end, the video recordings of presenters (group reps) should be made from both sides and uploaded at the shared folder. It seems that there will not be enough time for acquiring and assessing students reflections, but the at least professors can make evaluations and their reflections upon the accomplished items within the project.

The impediments in project smooth realization were time difference of five hours, some restrictions when it comes to available computer labs for such large groups of students, reliability of Internet access, etc. Some of DUT students do not have their own laptops and Internet access when they are not on campus. Also, wireless access at the campus sometimes is below satisfying level. All these caused some problems in easier and more successful work on the project. However, out of all these omissions, a certain lesson can be drawn for the next path. The scheme of the project is given in Figure 2.
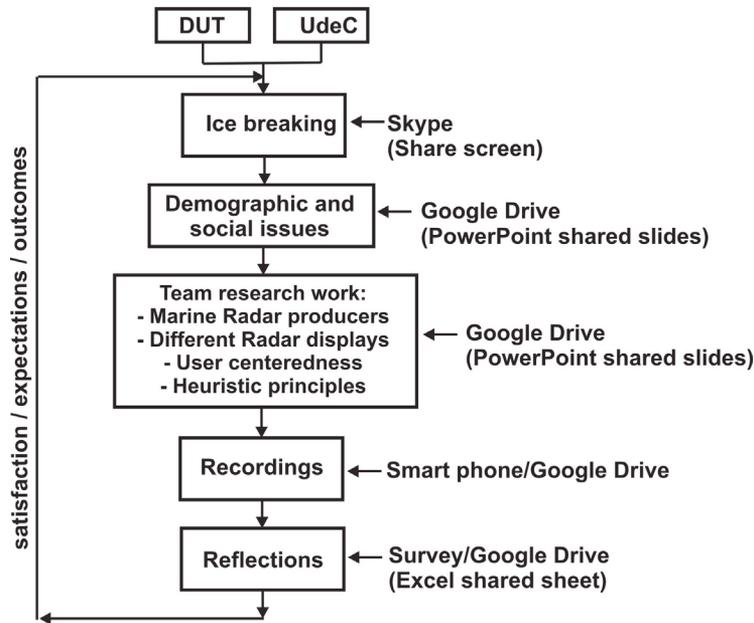
Figure 2. Scheme of the COIL project between of DUT and FJU

3. NON-MONETARY RETURN OF INVESTMENT MODEL AND ANALYSIS

During the realization of the COIL projects ten professors and hundred students from DUT have been asked to participate into survey concerning non-monetary return of investment into the COIL. This has been done entirely on voluntary basis. The professors and students have had to assess with one of the following linguistics qualifications: very high, high, moderate, low, very low non-monetary return of investment into COIL as a dependent variable in the model. This has been done in accordance to the subjective assessment of the professors' and students' time and effort input into conceiving and accomplishing the projects. Also, professors and students have had to evaluate subjectively, by one of the above listed linguistics qualifications, following independent variables in the model:

V_1 - students' satisfaction with the project;
V_2 - professors' satisfaction with the project;
V_3 - value of the achieved outcomes;
V_4 - value of the joint experiences, and
V_5 - possibility of collaboration extension.

The survey has been conducted on voluntary basis, as it is previously stated, and the obtained results were analyzed in Excel sheets by the special imbedded tool (Excel Module). Previously, linguistics qualifications given by the respondents had been translated into numerical values: very high (5), high (4), moderate (3), low (2), very low (1). Non-monetary value of return of investment into the COIL projects was calculated as a linear function of afore-listed five independent variables (V_1-V_5):

$$NMRI = \sum_{i=1}^{5} \alpha_i V_i + c,$$

Where is,

NMRI – non-monetary return of investment;

α_i - linear coefficient ($i = \overline{1,5}$);

V_i - variable ($i = \overline{1,5}$);

c - intersection with ordinate.

Functional dependence between *NMRI* as a dependant variable and independent variables in the model (V_1-V_5) has been determined by multiple linear regression, while the following results are obtained and given in Tables 1 and 2.

Table 1. Teachers' assessment of non-monetary return of investments in COIL

NMRI	α_1	α_2	α_3	α_4	α_5	c
	1.108	-0.663	0.012	0.590	0.000	-1.072
Average:	MAD	MSE	MAPE	SE	r	r²
4.1	0.292	0.108	0.796	0.466	0.791	62%

Table 2. Students' assessment of non-monetary return of investment in COIL

NMRI	α_1	α_2	α_3	α_4	α_5	c
	0.686	0.064	0.094	-0.176	0.131	1.032
Average:	MAD	MSE	MAPE	SE	r	r²
4.7	0.214	0.124	0.050	0.363	0.731	53%

Abbreviations in Tables 1 and 2 given above are as follows: MAD is mean absolute deviation; MSE is mean square error; MAPE is mean absolute percent error; SE is standard error of the regression estimate, while r (r²) is correlation coefficient (squared). Detail descriptions on their meaning and usual interpretation can be found in (Balakrishnan, N. et al., 2007), and also in references (Bauk et al. 2017; Draskovic et al. 2017; Radovic et al. 2018).
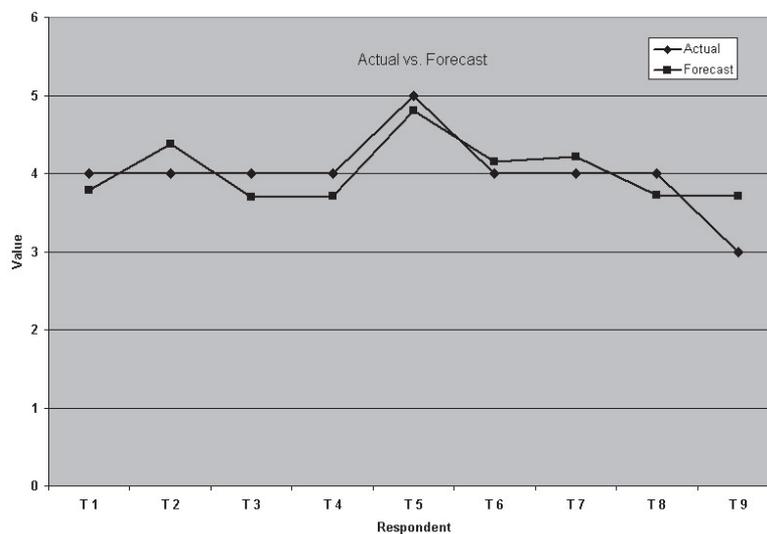

Figure 3. Teachers: Multiple linear regression model on non-monetary return of investments in COIL initiative
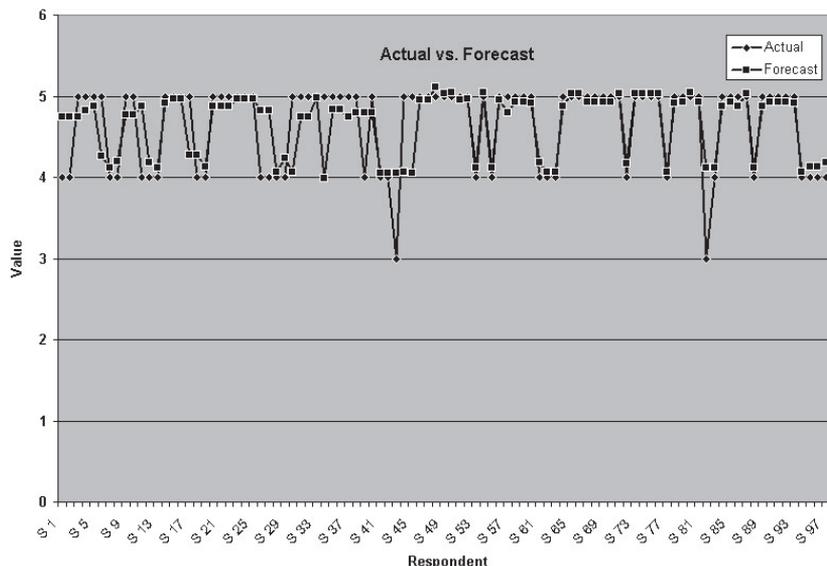
Figure 4. Students: Multiple linear regression model on non-monetary return of investments in COIL initiative

In all examined cases the interviewers' responds correspond well ($r^2 = 62\%$ for teachers, and $r^2 = 53\%$ for students) to the multiple linear regression model that gives average values in the case of *NMRI* (teachers – 4.1, and students – 4.7). In accordance to used Likert's scale from 1 to 5, the obtained results indicate very high level of non-monetary return of investments when it comes to COIL initiatives at DUT. Graphical interpretation of the obtained results in terms of comparison between actual and forecasted value of the dependant variable (*NMRI*) in the model is given in Figures 3 and 4.

CONCLUSIONS

General benefits of the COIL projects are students and staff development, international and professional collaboration, interdisciplinary nature, starts of a conversation that leads to other forms of collaboration and engagement, etc. On the other side general shortages of the COIL projects are connected to the different time zones, languages, institutional cultures and expectations, academic semester and requirements, courses contents, assessment of learning, quality assurance systems; issues of technology, lack of technical and administrative support, etc. The analysis conducted in this pilot empirical study justifies the same. Non-monetary return of investments in COIL assessed by the teachers and students at DUT is very high (above 4, i.e., 4.1 for teachers, and 4.7 for students on the Likert's scale 1-5), while its correlation with the independent variables in the model is also high (between 53% and 62%). This shows that teachers' and students' satisfaction with COIL are high, as well as the level of their positive experience, when it comes to sharing ideas and knowledge in cross-cultural environment. Both teachers and students are satisfied with the projects outcomes (i.e., the idea of joint presentations and recordings) and they believe in continuing collaboration with partner universities within COIL or similar projects. Consequently, with increasing technological capacity, Internet-connected classrooms will become a common aid for many universities. This will enable more extensive cross-cultural and cross-discipline collaboration at global scale with opening new possibilities for education and training, as well as for boosting research and service activities.

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