International Collaboration in Geo Science Education via Project Based Learning

Svetlana Polakova[1], Joseph lane[2], Michael Losavio[3], Elena Gritsenko, Svetlana Snegova, Konstantin Klochko, Maria Firstova

[1]*Perm State University, 15 Bukireva Str., 614099 Perm, the Russian Federation, polsvetlana@yandex.ru*
[2]*Delta State University, Division of Social Sciences, 213 Kethley Hall Cleveland, MS, the USA, jlane@deltastate.edu*
[3]*The University of Louisville, Department of Criminal Law, Louisville, KY, the USA, michael.losavio@louisville.edu*

Abstract

Future Russian Geo science students are somewhat isolated from the global professional community since university students lack real-world experience as well as the use of the English language in their professional field. The International Project Based Learning Model (IPBLM) is offered to improve the Geo science students' 21st century competences by applying a variety of innovative educational tools with a specific focus on online and offline group discussions and videoconferencing with chosen partner universities. The research analyses recent "real-world" collaborative projects on Geo-ecological issues and environmental matters, such as water conservation and human/environmental interactions.

Keywords: Geoscience students, Project Based Learning, CALL, international collaboration

Introduction

Rather than focus on International collaboration, several Russian universities maintained conventional designs. These conventional designs were focused on producing specialists for local labor markets. This practice isolated Russian Geo science students from their colleagues in the global community. This isolation was aggravated by the fact that university students tended to lack real-world experiences. Some students also lacked opportunities to use the English language when communicating with their peers. Most Russian universities, including Perm State University (PSU), maintained this single-disciplinary orientation approach, which was said to "focus only on a set of trees within a great forest" (Jacob, 2015, p. 2).

The new Russian National Curriculum does not embrace training professionals in competency regarding foreign languages (Federal National Standards, «ФГОС 3++»). This practice deprives future Russian Geo scientists of global professional communication. Due to this new curriculum, Russian Geo science students have less opportunity to participate at international conferences, mutual research projects and other important academic events. This leads to Russian Geo science students to lag in their disciplines. The current ESP class curriculum is also restricted to only learning words, word combinations and collecting a glossary of terms related to different word concentrations. This current paradigm is ineffective without the practice of real-world communication within international collaboration. This research provides an overview of the initial stage of introducing the International Project Based Learning Model for Geo Science students underpinning the best teaching practices.

Research Questions

There is strong demand for Russian Geo science students to participate in "real-world experiences." Russian Geo science students need to learn via interdisciplinary approaches, approaches that are widely accepted within other academic institutions.

One commonly used teaching strategy is Project-Based Learning (PjBL) (Stozhko, et al. 2015). Introducing content from both global and interdisciplinary perspectives, require "a radical restructuring of the whole learning process." (Stozhko, et al. 2015, p. 5) The present research will focus on only the initial research in the field of teaching ESP through PjBL. The questions selected for this stage in the research are as follows:

1) Can the PjBL help students enhance their communicative skills in listening, speaking and writing? 2) Can PjBL increase motivation towards a more profound learning of English and ESP in particular? 3) Can PjBL motivate students to broaden and deepen their knowledge of globalization, as well as disciplines related to the topic of the project?

The questions stated above are the result of evidence cited from numerous publications. PjBL is widely cited in Barak and Dori's (2005) work, which compared two groups of chemistry students. Group A took a course using traditional methods while Group B – an IT-based PjBL course, achieved better results in terms of understanding chemical concepts and theories.

The steps in the PjBL approach are as follows: 1) In PjBL the student role changes from "learning by listening to learning by doing" (Stauffacher et al., 2006: 255). 2) Learning by doing must be applied to subjects that are of interest to the students, connecting knowledge to everyday life through 'real-world' tasks (de Graaf & Kolmos, 2009; Thomas, 2000; Bell, 2010; Hanney & Savin-Baden, 2010). 3) Being a learner-centered approach, PjBL requires the shift of the role of teacher from "sage-on-the stage" to "guide-on-the-side" (Nation, 2006: 109), or "from a distributor of knowledge to a process manager" Stauffacher et al. (2006: 255). 4) The enhancement of students' collaborative skills can be regarded as one of the outcomes of the application of PjBL. As Hanney and Savin-Baden explain: "Student activity revolves around a complex series of interactions between team members over time and draws on a range of key transferable skills such as communication, planning and team working" (2013). Collaboration can contribute to the active construction of meaning, through idea generating (divergent thinking), idea linking (convergent thinking), and idea structuring (categorization and classification) (Harasim, 1990: 5) The interdisciplinary nature of the PjBL approach has been specified in different studies (Danford, 2006; Lehmann, 2008; de Graaf & Kolmos, 2009; Otake et al., 2009; Hanney & Savin-Baden, 2013, Polyakova et al. 2013 etc). 6) The end-product (a "quality product") of the project (Danford 2006:12) can be categorized into three types: the research project (traditional academic output such as a dissertation, literature review or research report); the construction project (the design and production of a technical product or artefact) and the professional work context project based on international collaboration with external actors.

The peculiarities of the applied PjBL sessions at PSU are as follows: 1) the working language is English, which is not the Russian native language and therefore considered foreign for DSU students. 2) a variety of topics in general Geo science projects include biological, sociological, cultural, legal and political issues. The international nature of the cooperation between PSU and partner universities leads to the use of information technologies (IT). Thus, our course can be IT-based as well as PjBL. It is common knowledge that PjBL in many cases can incorporate modern technologies of online interaction.

Methodology

The International PjBL Model (IPBLM) is implemented within Computer Assisted Language Learning (CALL) and the Computer-Mediated Communication (CMC) approach. The CALL represents a side of e-learning where computer technology is used in the context of language learning. (Yuan, 2007: 416). The CALL environment is widely used to refer to the area of technology and second language teaching and learning (Chapelle, 2001: 3). This approach is naturally integrated into the CMC paradigm, whereby the focus is on changing both the quality and quantity of communication by allowing time for critical reflection and greater involvement in discussion than is allowed in the traditional

classroom (Berge, 1995; Fishman, 1997; Wells, 1992).

One effective component, of CMC, is video-conferencing. Recently, the term "telebridging" has been used for this new technology (only about fifteen years old). Telebridging allows for interactive meetings between individuals or groups of people located in two – or more – different locations. By "interactive" it is meant that participants in a video-conferencing session can see and hear each other. In addition, the participants can share information using different types of visual aids. Much of the research literature suggested that the synchronous conferencing tool is cost-effective as well as affordable. All studies, however, indicated that interactivity is the key of synchronous conferencing (Greenberg, 2004). The advantages of using synchronous conferencing included use as a collaboration tool for team projects or team teaching (Alexander et al., 1999; Coventry, 1994; Townsend et al., 2001). Telebridging can provide active support, including prompt feedback (Alexander et al., 1999; Chan et al., 2000; Pittman, 2003). Telebridging made it possible for distant people to access experts (Alexander et al., 1999; Pittman, 2003). Telebridging can save travel time and travel cost (Chan et al., 2000; Coventry, 1994; Wilkinson & Hemby, 2000), and it can increase interactive communication with engaging discussion while enhancing social presence (Chan et al., 2000; Coventry, 1994; Pittman, 2003; Smyth, 2005).

The term "telebridging" was introduced in 2011 as a name for a special internet-based international project regarding student and professor collaborations with partner-universities (Mishlanova, Polyakova 2011). Telebridging is an authentic peer-to-peer collaboration that takes place in virtual environment (Gritsenko E.A., Polyakova S.V., Frolovich E.M. 2013; Polyakova, Gritsenko, Losavio M. & Connor D. 2014, etc.)

The project enhanced connectivity and socio-emotional commitment to the learning process by involving Geo science students of Russian and international universities to be active participants in the learning process. Overall, students achieved greater cognitive development working together, rather than working individually. This, in turn, helped students develop their XXI century skills (Unlocking a world of potential 2015).

The Project Based Learning telebridging has been successfully implemented with students in both the Humanities and the Sciences. The project has successfully connected students at PSU and partner universities in the USA (Losavio and Polyakova 2011; Remizova et al. 2013).

2019 Geoscience Project Rationale

This academic year signaled the launch of the new IPjBL telebridges "Environmental Issues of the World", "Flint Water Crisis: Water Conservation and Human/Environmental Interaction" "Learning Science in Non-Traditional Places" (Ecological Tourism in the USA), "Legal Regulations of Environmental Safety." These projects were specifically designed for Geo science students at Perm State University, DSU State Uniersity (MS, the USA) and the University of Louisville (KY, the USA).

This research employed a three-stage module pre-conference, during-conference, and post-conference. The specifics of the project were represented by a series of online meetings, centered on a variety of Geo-ecological issues. Some of the topics that were studied and presented, during the online conferences in the second semester, were "Ecotourism", "Kizel Coal Basin", "the Permian Period", "the Kama River Basin", "The Chusovaya and the Vishera", The Disappearing Rivers, "the Kungur Cave."

It is important to note that the preparation stage was of crucial importance for the successful implementation of the tasks set for the two parties. For the first video session, Professor J. Lane and his students provided the Russian participants with materials for the video conference (the article, video presentation based on the article by J. Lane and J. Stoltman, 2016). The Russian students were able to read the information in advance.

The during-conference stage included discussion of the information presented by the American students. One of the topics was the British Petroleum Oil Explosion in the Gulf of Mexico and its aftermath. In his

five-minute presentation, Brandon (the DSU student) described a deadly explosion that occurred on the oil drilling rig Deepwater Horizon, operating in the Gulf of Mexico. The student shared his personal experience of the accident. The professor explained how the spill had affected tourism, fishing and other industries throughout the US states in the gulf coast, as well as its harmful effect on the wildlife in that area.

The second presentation was devoted to the geographical situation of the State of Mississippi, its climate, biodiversity, cultural and social background. The presenting group compared the climographs of Orenburg Region and the State of Mississippi.

The Russian students prepared several well detailed questions. The Russian students primarily asked questions about the disaster management in the states of Louisiana, Florida, Alabama and Mississippi. In addition, the Russian students asked general cultural questions about the American south and about specific historical places such as Po Monkey's Juke Joint.

The post-conference stage included the students' assessment of the telebridging project. The American and Russian participants (n=26) completed two assessment instruments that were developed by the Delphi Teaching and Learning Center of the University of Louisville. (Losavio, Polyakova, 2011: 348). These instruments, the Ideas to Action "Student Evaluation Form" and "Student Reflection Form," asked the students to reflect on their attitudes towards the international teleconference project experience and what they gained from it.

For example, the participating students were asked their opinions on whether the participation in the project helped them either connect what they had learned in class to real life situations or contributed to knowledge in the discipline studied. The participating students then evaluated how the teleconference helped them with content application, critical thinking and self-development. Analysis of the students' answers illustrated that both groups found substantial benefit in both the project activities and in the teleconference itself.

Most American and Russian participants agreed, or strongly agreed (18 students), that their interaction in the teleconference helped them to apply the skills and knowledge they gained from their major courses. Both groups of students improved their understanding in other course materials and activities. In addition, both groups of students realized how critical thinking can be used in everyday life. This experience enhanced student ability in communicating real-world ideas and interdisciplinary content. The students also indicated that this project improved their ability to analyze ideas and examine issues from multiple points of view.

The students' assessment instrument also included issues related to critical thinking such as a. Clearly identified the key issue, topic, or situation for the experiences b. Accurately interpreted relevant information c. Developed well-reasoned, specific conclusions and problems d. Considered assumptions, implications and consequences of alternative points of view and e. Precisely communicated the experience to others. Most students indicated point "d" as being relevant to their critical thinking development.

Some American students responded with the following comments on their telebridging experiences: *It helped me learn new things from new people; It has helped me see different teaching methods; I want to view different perspectives now; being a geography major, it had information for me to take in and apply in situations; It had given me the knowledge that I didn't have before; It gave me a Russian point of view on Russia; It has helped me to understand what people from another country think about the USA; I learn more from Russians.*

The Russian students provided the following responses: *It helped me to understand the differences in American and British English; I learned a lot about Mississippi; I know about the crappie fish; The conference is so educating and cool; I have knowledge about many geographical and cultural places.*

Both Russian and American students stated that it was a great experience and that they would love to do it again: *"It was perfect/I loved it". One of the American students indicated that it should be included in future classes. This gives students a great chance to connect with students all over the*

world. The other wrote that it should be a yearly experience for everyone.

Among other post conference reflections the students emphasised that *it was fascinating to learn from other cultures and that it was cross-cultural engagement; It was the first time I connected with an international class; I think it is important to connect with people all over the world; It was interesting to see how students in non-western universities learn etc.*

Conclusions and Recommendations

The telebridge project increased interest in cross cultural communication while establishing long-term, professionally oriented, IT communication between American and Russian students and professors. This project also demonstrated how telebridge and cross-cultural discussions may help students better understand their own language and culture as well as the ambiguities within their own language and culture.

Another outcome was that the telebridge had a substantial effect on both Russian and American Geo science students. In addition, Russian biology students increased their motivation in learning English as their language for professional and international communication.

Based on our educational experience of applying the IPBL with other academic institutions, the model brings together faculty and students to explore opportunities of collaborative and problem-solving. IPBL has been applied in the areas of geology, ecology and related sciences. IPBL has also been shown to promote the expansion of relationships between universities and communities.

In addition to international collaboration, the IPBL model includes critical thinking, problem solving and self-management skills. These skills can be implemented through online as well as offline group discussions, workshops, virtual museums and exhibitors, round-tables and conferences. IPBL is especially proficient within the international collaboration of several Geo ecological issues and environmental matters, such as water contamination and public health, raising environmental awareness, water management, mine water treatment and many others. Through these activities' students increased their awareness regarding differences and similarities in other countries. Thus, the key element for creating "real-world" learning was to establish and promote contacts with partner-universities and international associations that deal with geoscience.

This project facilitated the exchange of ideas regarding new and innovative opportunities, knowledge and skills for students, researchers and faculty from different Geo science disciplines. The collaboration maximized inter-university and community engagement by Geo science students and their counter-parts. A considerable benefit of this international project was that all the Russian participants had the opportunity to communicate in English, which is not their mother tongue. In addition, all the American students increased their understanding of our diverse global community.

In conclusion, the telebridge as an educational technology has enormous educational potential for the development of professional cross-cultural competence of future specialists. The telebridge project promotes the use of learner-centered approach to teaching English for Special Purposes in the IT environment.

References

Gritsenko E.A., Polyakova S.V., Frolovich E.M. (2013) International Team Teaching Project: Internet Based Communication // Foreign Languages in the Context of Culture. Perm State University. P. 77-83.

Gritsenko E.A., Polyakova S.V. (2011) Using Social Networks for Developing Intercultural Competences in Law and Social Work Students / Foreign Languages in the Context of Culture. Perm State University. P. 417-420.

Gritsenko E.A., Polyakova S.V., Remizova V.G., Losavio M., Connor D. (2014) Cross-cultural telebridge project: dealing with offenders in Russia and the USA/ Foreign Languages in the Context of Culture. Perm State University, P. 77-83

Harmer N.(2014) Project-based learning. Literature Review. Plymouth University. p.31.

Levy, M. (1997). Computer-assisted language

learning: Context and conceptualization. Oxford University Press.

Losavio M.M., Polyakova S.V. (2011) The Impact of Internet-based Intercultural Teleconference Projects on Law Students'Atttitudes Towards Learning, Comparative Systems and Other Countries// Perm Congress for Academic Lawyers. Perm State University. pp. 347-348.

Mishlanova S., Polyakova S. (2011) Internet Technologies in Project Activities at the Faculty of Modern Foreign Languages and Literatures: Telebridge Project Experience/Foreign Languages in the Context of Culture. Perm State University. pp. 77-83.

Remizova V., Polyakova S. Erzikova E.(2013) PSU-CMU Online Students' Conference: „ A Day in a Life of a Russian/ An American Student" / Foreign Languages: Linguistic and Didactic Aspects. Perm, № 20. p. 105.

Selingo J. (2013). College Unbound: The Future of Higher Education and What it Means for Students. New York: New Harvest. p. 97.

Stapleton, P. (2014). Language teaching research: Promoting a more interdisciplinary approach. English Language Teaching (ELT) Journal, 68, pp. 432-441.

Stozhko N, Bortnik B, Mironova L, Tchernysheva A, Podshivalova E Interdisciplinary project-based learning: technology for improving student cognition Research in Learning Technology Vol. 23, 2015 doi:10.3402/rlt.v23.27577.

Yuan, Z. (2007). Problems in researching e-learning: The case of computer-assisted language learning. R. Andrews, & C. Haythornthwaite (Eds.). Los Angeles, London: Sage Publications. pp. 416-436.

British Council. Unlocking a world of potential (2015) Core skills for learning, work and society. Available at: https://schoolsonline.britishcouncil.org/sites/default/files/core_skills_brochure_0.pdf

Barak, M. and Y. J. Dori (2005). „Enhancing undergraduate students' chemistry understanding through project-based learning in an IT environment." Science Education 89(1): 117-139.

Chapelle, C. (2001). Computer applications in second language acquisition. Cambridge University Press.

Deloitte Report (2019). Higher Education Industry Outlook. Available at: https://www2.deloitte.com/us/en/pages/public-sector/articles/higher-education-industry-outlook.html

Gaddis B., Napierkowski H., Guzman N., Muth R. (2000). A Comparison of Collaborative Learning and Audience Awareness in Two Computer-Mediated Writing Environments. Available at: http://eric.ed.gov/?id=ED455771