Spanglish Software Engineering: A Curious International Learning Experience

Prof. Barbara Victoria Bernal, Kennesaw State University - Marietta Campus (formerly Southern Polytechnic State U.)

Barbara Victoria Bernal is a Emeritus Professor of Software Engineering at Kennesaw State U. (formerly Southern Polytechnic State U. (SPSU)), where she has worked since 1984, serving as undergraduate co-ordinator for software engineering (2002-2005); undergraduate coordinator for information technology (2004-2005); and chair of software engineering (2005-6). She was awarded the SPSU Outstanding Faculty Award in 1995. She received her M. Ed. and B.S. from Georgia State University (1979, 1981). Prof. Bernal teaches the User-Centered Design, Ethics, and Software Engineering courses at SPSU. The areas of Software Engineering, User-Centered Design and Software Engineering are the focus endeavors. She is a co-founder of the SPSU Usability Research Lab (ULAB) and is directly involved in corporate-sponsor ULAB projects. She has given numerous papers, tutorials and presentations locally and internationally on User-Centered Design, Usability and Software Engineering topics. Barbara is engaged in educational support through her company Software Education and Support (SES). She does specialized software development and evaluation as a consultant. Barbara has been active member of ASEE for the last 13 years both at the section and national levels serving in the Board of Directors as the Zone II Chair (2012-14). In the ASEE Southeast Section, she has served as Southeast Section President in (2008-2009); Software Engineering Division Chair (2001;2006;2011); Conference Proceeding Editor (2003-present); and website developer for the Section Paper submission/review (asee.spsu.edu). She was awarded the ASEE Southeastern Section Tony Tilman Award in 2007.

Dr. Jeffrey Chastine, Southern Polytechnic State University

Dr. Chastine has academic and industry experience in mobile and interactive system development. He served as Chief Software Architect at a Manhattan-based mobile media development company developing augmented reality systems. He has also designed and implemented numerous mixed-reality systems for a variety of platforms and clients, including the British pop phenomenon, Duran Duran, and is currently developing augmented reality games for mobile platforms. Academically, he is an active researcher with several ACM and IEEE publications in virtual and augmented reality. As a graduate student in the Graphics, Visualization, and Usability (GVU) Center at the Georgia Institute of Technology, he contributed to early research in the nascent field of self-harmonizing karaoke software. He currently serves as a Professor in Computer Game Design and Development, teaching courses such as Computer Graphics (OpenGL), 3D Modeling and Animation, and Production Pipeline & Asset Management. He has served in a variety of capacities academically including Interim Department Head, Associate Dean of the College of Information and Mathematical Sciences as well as the Graduate Program Director of the Masters of Archival Studies at Clayton State University.
Abstract

Computing has seen a significant paradigm shift towards international software development, yet few opportunities mimic this methodology in the academic practice. Faculty efforts for opportunities involving international collaboration are sought out with interest. During August 2014, Southern Polytechnic State University (SPSU) faculty from Marietta, GA, USA traveled to La Salle University in Arequipa, Peru to deliver a special Software Engineering (SWE) winter program: Software Architecture and Computer Gaming Design. The program studied the current understanding of software engineering practices within two different international arenas, SPSU and La Salle. This paper discusses details and initial results of the 2014 winter program executed by SPSU bi-lingual faculty to La Salle participants with limited English understanding. Previously the courses were successfully delivered at SPSU in English. This new venture involved translating the course content into Spanish for La Salle. Initially the La Salle participants did not recognize key SWE terminology in Spanish. Once the term was expressed in English the SWE concept was recognized by all participants. In the post-course survey, the students gave positive reviews for the final delivery medium: projected slides in English combined with Spanish lecture which we call Spanglish – a combination of Spanish and English. A cycle of knowledge building emerged from the American and Latin cultures in the preparation and execution of the courses. The student participants aligned their knowledge and understanding of their Latin American software engineering practices to the new perspective given in the program. The experience educated both faculty and participants of the agreements, differences, and challenges to the software architecture and game development curriculum, terminology, and development trends. The process of the collaborative knowledge distribution and assimilation that was built and experienced in the two courses was surveyed with the student’s views about pre-understandings, personal comprehension, opinions and final assimilation of the course content.

Keywords: Software Engineering Curriculum, Language Barriers, Models of Software Engineering Education, International Collaboration

Introduction

Currently it is paramount for software engineers to develop the skills and background necessary to effectively work, communicate and innovate on an international scale. Employers’ expectation for collaboration with international counterparts is an increasing computing industry standard. The effects of the globalization have been felt in the software engineering arena through software engineering projects realized by diverse professionals located in different continents with different industrial background, culture, time zone, and language.\textsuperscript{1-2}

International student exchange programs provide educational, personal, and long-term benefits. As a result, some educational programs include international experience as a graduation requirement while others strongly recommend it. To foster global experience, academic
Institutions seek ways to provide diverse, multicultural, and meaningful educational experiences. The vision for international experiences includes the student’s development of skills and maturity needed for the global industry. We realized that one way to accomplish the goal of international dialogue for students at a low cost is to have international faculty travel to the students. Wouldn’t it be interesting to have an entire classroom of students educated in a different language and country? Interest in the possibility for an international faculty exchange program grew.

During the last decade significant conversations between universities in Arequipa, Peru and Southern Polytechnic State University (SPSU) in Marietta, Georgia for possible software engineering faculty exchanges took place. The universities participating in the conversations in Peru were San Agustin National University, San Pablo Catholic University and La Salle University. All are similar sized academic institutions with bi-lingual faculty (expertise in Spanish and English) who were interested in these collaborations. The long-term goal was establishing formal, lasting relationships with several Arequipan universities. Original incentive for faculty exchange was associated with the new software engineering program in development in Arequipa. SPSU has experience and success in the SWE ABET accreditation. San Agustin National University wants their SWE degree to be in line with SWE ABET accreditation. Explorations and reviews about the tenets of SWE educational approach are on-going. Initial outcome include: 1) increasing the knowledge of the SWE discipline and the SWE program variation; and 2) heightened expectations for both academic institutions to experience master/apprentice relationships. The analysis and review of faculty exchange and future faculty/student exchange was conducted with reviews/comparisons to the past international exchange program from these institutions. Along the way, we have learned from the challenges of establishing, conducting, and maintaining international collaborations. Success and failures have occurred. In 2011 San Agustin faculty was target to teach winter term 2012 at SPSU. The challenges of J-1 visa, health insurance, housing, etc. were met and working. But the faculty exchange did not happen due to a key participant’s family emergency. But in 2013 a SPSU faculty member traveled to San Agustin to teach for the summer term and the program officially launched.

Program

Computing disciplines have traditionally had difficulty in finding cultural opportunities that are clearly linked to program educational objectives. However, recent trends indicate a significant paradigm shift towards international software development teams. The United States and South America on-going faculty conversations served as development of the software engineering curricula offered at the new La Salle University in Arequipa, Peru. The University’s inauguration took place on March 2012. As part of the new SWE program’s assessment, La Salle University proposed a special software engineering 2014 winter program: Software Architecture and Computer Gaming Design. These two classes were a good medium for a verification of the knowledge in the software engineering academic community (current SWE students, current SWE professors, alumni, and individual software developers).

The 2014 winter program was the result of three-year planning and collaboration efforts managed primarily by the SPSU and La Salle faculty. The bi-lingual SPSU professors gained a
deeper understanding of the challenges and rewards for international knowledge exchange while preparing the Software Architecture and Computer Gaming Design courses. Both courses were first experiences delivering English content translated into Spanish. The translation of the SWE content from English to Spanish proved to be a challenge due to the scarce Spanish SWE resources readily available. Translating the SWE lectures was challenging because of variations in the key terms used in Latin America. Pre-course research for correct SWE terms revealed a common practice of the English term included in the Spanish rendition. This was also true in the classroom. The course participants, recruited from the current SWE undergraduate student body, recent employed graduates of La Salle, practicing Alumni, individual software developers, and the La Salle faculty reported in a post survey that they gained a substantial increase in software engineering knowledge from the international experience. The students gave positive reviews for the winter program’s bilingual final format: projected slides in English combined with Spanish lecture.

What are the challenges involved in translating English to Spanish in relatively new disciplines with jargon and emerging technologies? There were limited resources to assure correctness in the translations. Often no standardized Spanish terms existed, and so we used English terms interlaced in the Spanish text. The Library of Congress shows subject headings in the field of software engineering with flag icons to represent the origin of terms which are used internationally rather than translated into native languages (screenshot to the left). When we interviewed Spanish-speaking software professionals, they reported commonly using English terminology for software terms.

**Proposed Courses**

La Salle University has their Winter School during the first week of August. Keep in mind that summertime in the United States is South America’s wintertime. The Software Architecture and the Computer Gaming Design with enrollments of 21 and 18, respectively were the only courses offered for the 2014 Winter School. These two course program were targeted by La Salle’s SWE Director, Percy Huertas Niquen, as a response to the special needs of key SWE students, working alumni, specific software developers and La Salle’s faculty. These groups wanted more depth in the two subject areas of Software Architecture and Game Design. These two classes were a good medium
for a verification of the knowledge in their SWE academic and professional community.

Assessment Methodology

Initial investigations into avenues for the student’s feedback about the courses were discussed and constructed as a specific survey addressing socially responsible leadership, efficacy, and identity development. The development of learning outcomes by education organizations have taken shape and been refined during the last decade for several reasons. Primary drivers are the recognition and adoption of the continuous improvement movement in higher education and the intent of accreditation organizations to place the burden of proof for education quality on the university. Placing the burden of proof for education quality have led to the replacement of detailed degree program content imperatives with learning outcomes that allow the university faculty to develop and demonstrate how to best educate their students. Focusing on learning outcomes motivated this investigation.

The goals of this assessment were to investigate fundamental elements to improve teaching abroad, including tackling language barriers and their impact on understanding, and appropriate duration of courses. The investigators asked each participant to fill out an anonymous summative survey (consisting of qualitative and quantitative measures). The survey collected their opinions about how the courses went and how the course could improve.

Survey Results

The post-course survey created on line and an email with a URL link to the survey was sent out to the 39 students. The students had 3 weeks to complete the survey and offer feedback. The overall response rate of the survey was 44%. The initial question of the survey was answered by all survey participants. The majority of the students were satisfied with the course.

The second question in the survey was an investigation of the students’ learning and recognition of the goals of the course. The effect of what was learned the students experienced with relation to the learning and recognition of new/unknown/different/expansion of their knowledge and understanding. The survey was administered upon receipt of preapproval by the Institutional Review Board (IRB), four months after the end of the courses.
Question 3 also gathered data about whether the participation in the Winter Program increased or decreased learning attributes. Exposure to the different SWE education, views, explanations and cases presented in the translated classes did make a difference to the students. The students wanted to compare their SWE practices against a foreign viewpoint. Students agreed the course increased greatly their understanding of the theories taught in the classroom, as seen in item 2g.  

2. To what extent did participation in the Software Architecture Course affect the following? (Please use numbers 1 to 5 where 1=decreased greatly, 2=decreased somewhat, 3=had no effect, 4=increased somewhat, 5=increased greatly.)

- 2a. Your clarity regarding academic goals
- 2b. Your clarity regarding career goals
- 2c. Identification of personal strengths related to academic subject
- 2d. Identification of personal weaknesses related to academic subject
- 2e. Identification of personal strengths related to workplace activities
- 2f. Identification of personal weaknesses related to workplace activities
- 2g. Your understanding of theories taught in the classroom
- 2h. Your technical knowledge in your field
This initial data comprises learning characteristics which can be hypothesized as “valuable” to the participant in specific areas. The course impacted the students’ academic and career goal. Overwhelmingly they reported that their problem-solving skills, their application knowledge and their critical thinking skills improved. The students had particular learning outcomes in mind when they entered into the Winter Program. They had repeatedly asked for these courses because of challenges they were encountering in their software projects. The initial feedback data above strongly shows that the students connected the world of software projects and the world of learning.\(^3,6\)

It is interesting to note that the lowest increased attribute was the communication skills (Spanish to English translation). As you will see below they also gave feedback that the SWE terms are easier to communicate if you keep the term in English and do not translate.
4. The instructor had not delivered this course in Spanish previously. We are interested to know how this impacted your learning. Please rate your level of understanding of the lecture:

- translation did not hinder my understanding
- understood a majority
- understood about half

Question 4 measured the impact of the translation with regards to their learning. As you can see in the chart, the students did not have major problems.

Students were focused on the specific learning the condensed courses provided. The courses were chosen because these bodies of knowledge were considered challenging and not well understood by the students. The candid comments given to La Salle’s SWE Director, Percy Huertas Niquen, supported the collaborative endeavor with the foreign professors. The students expressed confirmation of their current SWE and computer science foundational knowledge once the courses were underway. Student articulated increased awareness of how/why the foundational knowledge fit into the advance material. The students observed their ability to complete the courses labs and exercises. This active reasoning in the classroom influenced their acceptance of their ability to engage in international SWE projects.

The survey participants gave the following specific recommendations:

- **60% answered to leave the slide material in English and keep the conversation in Spanish;**
- **6% answered to continue to improve the Spanish lecture delivery.**
- **20% answered with comments about the logistics (lunch, slides availability, etc);**
- **20% left unanswered**

Two student’s thoughts about the English Spanish translation are shown below in the original Spanish form, then in translated English (shown in italics):

- En el mundo el uso de algunas palabras, en especial respecto a nuestra carrera estan internacionalizadas y se les reconoce muy bien de esa manera, tratar de traducirlas a veces, en mi opinion, es a veces dificil y causa confusion. Usarlas en su idioma nativo (ingles) es algo totalmente aceptable :)

*In the world the use of some words, especially with respect to our industry are internationalized and is very well recognized them in that way, try to translate them sometimes, in my opinion, is sometimes difficult and cause confusion. Use them in your native language (English) is something completely acceptable :)*

- No hay ninguna queja con respecto al idioma del instructor porque de la manera mas facil y clara trato de enseñar y lo comprendi a la perfeccion.

*There are no complaints with regard to the language of the instructor because of the ease and clarity used to teach and I understood perfectly.*

**Conclusions**
The 2014 SPSU faculty invitation was an extension of previous collaborations with other Arequipan Universities. The invited SPSU faculty delivered two SWE classes in Spanish to the La Salle participants. The five day courses measured and confirmed SWE knowledge in current SWE students, current SWE professors, alumni, and individual software developers educated at La Salle.

This investigation of SWE knowledge met with interesting translation challenges. The bi-lingual SPSU professors gained a deeper understanding of the challenges and rewards for international knowledge exchange while preparing the Software Architecture and Computer Gaming Design courses. The students’ feedback obtained through the administration of an anonymous, online survey gave assurances that the use of English SWE terms, even to non-English speaking participants, was uniformly recognized.

Collaboration on complex software engineering and research projects with colleagues and collaborators across the world is the trend in this industry. Communication problems exist when the cultures and languages differ. English to Spanish translation and communication were experienced with the interesting solution expressed as Spanglish Software Engineering. We offer the information as contribution to the body of knowledge on international faculty exchanges. There were lessons learned, results of a survey, and discussions on the feedback. We look forward to more conversations, data and progress in this arena.

References
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