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## SIOP components: Application and assessment through PBL in a content-language college classroom

Componentes SIOP: Aplicación y evaluación a través de ABP en un aula universitaria de contenido y lengua

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### Abstract

*This article describes the circumstances and outcomes of an on-going research which explores the effectiveness of explicitly exercising a relationship between two of the eight components from the constructivist model SIOP (Sheltered Instruction Observation Protocol): Application and Assessment, through PBL (Project-Based Learning) in a content-language context at university level. It begins by compiling thoughts from various theorists who emphasize the importance of opening real application avenues to assess students learning. The research took place in a bilingual college in Bogotá, Colombia, during the second semester of 2011 and the first semester of 2012. The data analysis was taken from a group enrolled in a sixth semester class. Results make clear that through accompanying students through the proper use of PBL ladder, as an application tool, they will be able to value their own process of learning.*

**Key Words:** SIOP (Sheltered Instruction Observation Protocol), application, assessment, evaluation, PBL (Project Based Learning).

### Resumen

*Este texto describe las circunstancias y resultados de una investigación de acción, la cual explora la efectividad de establecer explícitamente la correlación entre dos de ocho componentes del modelo SIOP (Sheltered Instruction Observation Protocol, "Protocolo de Observación de la Instrucción Contextualizada"): Aplicación y Valoración a través de ABP (Aprendizaje Basado en Proyectos) en el contexto de contenido-lengua a nivel universitario. Comienza sintetizando varias ideas de recientes teóricos, quienes ponderan la importancia de la aplicación en contextos reales, como medio para valorar los procesos de aprendizaje. La investigación se realizó en una universidad en Bogotá, Colombia durante el segundo semestre de 2011 y primero de 2012. El análisis de la data se obtuvo de un grupo de estudiantes de sexto semestre. Los resultados demuestran que el acompañamiento y uso apropiado del PBL, como instrumento de aplicación, llevan a los estudiantes a apropiarse y a valorar su proceso de aprendizaje.*

**Palabras Claves:** aplicación; valoración; aprendizaje basado en proyectos; modelo de apoyo; SIOP (Sheltered Instruction Observation Protocol).



## INTRODUCTION

Followers of constructivist theory believe that through cooperative learning teachers can focus their attention on the importance of helping students realize their full academic potential. Therefore, planning is based on the following essential challenges: carrying out an inquiry; detecting, analyzing and suggesting possibilities; stimulating the student's creative, analytical and critical abilities regarding cases, themes, and concepts relevant to the study; and, as a result, drawing independent conclusions when assessing the usefulness, applicability and appropriateness of concepts, models and frameworks. Having this in mind, most recent studies on constructing knowledge talk about the fundamental roles of application and assessment. The purpose of counting on these components in the lesson plan is to provide meaningful feedback for improving student learning, instructional practice, and educational options. Consequently student performances reflect their level of accuracy in the content.

In order to conduct this action research, a group of student teachers at Institución Universitaria Colombo Americana, ÚNICA, in Bogotá, Colombia were selected. The fundamental question arose from observing that the students at ÚNICA, in most cases, come from educational backgrounds in which they take (assume) a passive role in acquiring knowledge. In other words they come from classroom environments in which they do not feel that they are responsible for controlling their own learning process, but instead are accustomed to relying solely on the teacher's evaluation criteria.

### Background

ÚNICA is a bilingual university committed to being a diverse community that fosters intellectual personal growth, as well as the self-confidence to construct knowledge. Preparing future bilingual teachers, Universidad ÚNICA wants to contribute to providing excellent quality education for Colombian youth.

In 2008, faculty teachers created a special research team. The University, as a bilingual institution, wanted to investigate the viability of the adaptation of the SIOP (Sheltered Instruction Observation Protocol) model *Making Content Comprehensible for English Learners*, an innovative



constructivist program created to help second language learners to enhance their target language abilities through the content curriculum.

A year was spent studying the model components: lesson preparation, building background, comprehensible input, strategies, interaction, practice/application, lesson delivery, and review and assessment. Next these modules were in the classrooms. This study's particular contribution to project was in presenting the benefits of the Application component as well as strategies for including it in lesson plans.

### **Area of Focus**

The focus of this research sets out to ratify that PBL (Project Based Learning) permits the achievement of the goals of application and assessment as stated in the SIOP model with the understanding that application is fundamental in the process of assessing learning.

### **Research Questions**

This study addressed the following research questions:

1. How do students coming to ÚNICA recognize assessment?
2. How do students coming to ÚNICA recognize application?
3. How different students' understanding of these two SIOP components, Application and Assessment, change after an intervention in which students are accompanied through the use of Project Based Learning in a content-language context?

### **Theoretical Framework**

Constructivist theory holds that each person constructs knowledge as an individual through a relative building process (Vygotsky, 1978). To construct knowledge is an individual learning process. Each individual, says Short (2006), produces his own reality. For this reason, he suggests that teachers adjust the input they give to students according to students' own needs. Most recent studies on constructing knowledge discuss the fundamental roles of application and assessment. The purpose of application and assessment is to provide meaningful feedback for improving student learning, instructional



practice, and educational options. Therefore, students' performances reflect their level of accuracy in the content. In this sense, assessment is defined as "the gathering and synthesizing of information concerning students learning" (McLaughlin & Vogt 1996, pp. 104, 106) and occurs throughout a lesson, as evidenced in lesson plans in periodic review to determine if students understand and apply content concepts.

Authentic assessment is characterized by its application to real life, where students are engaged in meaningful tasks that take place in real-life contexts (McLaughlin & Kennedy, 1993). Assessment is usually multidimensional because teachers use different ways of determining student performance. In support of this, Buehl (2001) studied the importance of recognizing student's learning process as an individual process. He additionally states that a teaching strategy based on constructivism has to be perceived by students as something understandable, relevant and useful.

Nunan (1989) discusses activities that require comprehending, producing, manipulating, or interacting in authentic language while attention is principally paid to meaning rather than form. This is not as easy as it may look. Good assessments must be aligned with specific standards and learning targets; have adequate breadth and depth; affect what is important for students to know and be able to do; be fair and equitable for all students (that is, not reflect cultural, gender, ethnic, or other biases); be aligned with instruction; have appropriate rubrics or scoring criteria attached that already distinguish between levels of performance; be doable within the specified timeframe; be valid and reliable for the purposes for which they are to be used (that is, measure what they say they are measuring and provide consistent results over time and across groups); be readily understood by students; and give information that is useful for students' or instructional improvement.

Among the various available methods for the application and assessment of knowledge, teachers can rely on the PBL (Project Based Learning) model, a comprehensive approach to building learning. In PBL, students depart upon a comprehensive process of questions in response to a complex problem or challenge. While allowing for some degree of students' voices, projects should be carefully planned, managed, and assessed to help



students learn by means of academic content and at the same time to generate genuine products.

Through its instruction, students participate in an interdisciplinary and cooperative display of skills. As a result, learners can value the meaning of accountability: The reciprocal nature of the investigation improves all of these valuable experiences, as well as supports a better appreciation for social interaction (Barak & Raz, 1998). Nevertheless, in order to be considered as a PBL project, the essential activities of the project must involve the renovation and manufacture of knowledge (Brownlee, Purdie, & Boulton-Lewis, 2003). The essential activities of the project must represent a challenge to the student, through the process of apprenticeship; students are encouraged to engage in mutual construction labors. In the same mode, as the learners move along, they are progressing from the novice level towards becoming active contributors.

On the other hand, problem-solving and critical thinking Menken (2000) are necessary elements when implementing PBL. Well-planned and executed lessons involve making connections and forming a deeper understanding of concepts and skills. Students also begin to employ self-learning and obtain meta-cognitive reinforcement for retaining and transferring knowledge. Self-assessment can be defined as the way students find their own path through their own learning process. Application then is a crucial instrument to benefit the students in this process. Guided practice can result in more rapid progress in mastering content goals.

Nowadays, Mohan & Davison (2001) integrating technology into projects provides a strong connection with real-world scenarios. Students need to participate in various actions. Throughout the learning process, scaffolding, as a way to put the building blocks in place in order to facilitate learning when a new topic is introduced, should be employed as a systemic approach to supporting the students to focus on the assignment, as well as on their environment, and their community.

According to Lou and MacGregor (2004), motivation to construct knowledge can be accomplished through class projects, especially if the learners have been given explicit instructions on the current objectives. PBL activities are designed to answer a question or solve a problem, thus



stimulating students to arrive at the central concepts and main beliefs of the subject matter. These activities include organization, research, communication, group participation, leadership, reflection and self-assessment. The depth of content understanding demonstrated provides a meaningful way to assess knowledge.

Reflecting on the studies mentioned above, we can summarize that in order to assess the progress of students' learning processes; we need to allow them to reflect upon their own ideas and opinions, to exercise voice and choice and to make decisions that affect the outcomes of assignments. Integrating PBL as a tool to apply knowledge will enable students to achieve their learning goals.

### Literature Review

The theoretical concepts presented above have been applied broadly to form an underlying principle for using PBL as an application tool to assess knowledge. At this point it is important for the reader to see how this relationship has been effective in different scenarios. The subsequent section will offer a short review of studies with the goal of giving an idea of the literature published on the subject.

To relate application with assessment, studies by Geeslin (2003) and Yorke (2003) argue how the teacher, through observation and application of knowledge will be able to assess whether the students understand content concepts. The teacher will then be able to determine if the learner can move on to the next topic. The key when delivering a lesson is for students to understand the content objectives of the lesson and how knowledge will be assessed progressively. The teacher should avoid making judgments about students' progress.

Other researchers, such as Stefanou and Parkes (2003) assert that authentic assessment is multidimensional and should include materials such as audiotapes, videos, creative work and art discussion, performance, and oral group responses. They argue that a teacher can plan for multilevel answers and can incorporate activities that use research to create new and fun products. In this manner the teacher can level content with language



proficiency. Performance could be periodically assessed using rubrics as an effective tool. Rubrics can easily be used to summarize the goals and objectives of the lesson. Rubrics give the students the opportunity to see their own progress and periodically assess their level of proficiency. Rubrics also allow learners to read and share information with other actors such as classmates or parents.

To follow up, Doppelt (2003) has discussed the implementation of PBL in a flexible environment. This program was put into action in five schools in the northern peripheral region of Israel. In each school, there were 15 pupils per class, tenth through twelfth grades (inclusive). The research tools were analysis of pupils' portfolios, observations of class activities, interviews with pupils, teachers and school management, and assessment of pupils' projects. Based on the importance of PBL, the basics of this experiment applied four steps to extract the cognitive and emotional skills of the student: defining significant goals for the pupils as well as for the teachers, changing the learning environment, carrying out original projects taking advantage of the pupils' special skills, and abilities and changing assessment methods for project-based learning activities in a computerized environment. The purpose of the study was to implement assessment in a scientific technological environment which allows the students to achieve better projects regarding the integration of different subjects. PBL allowed integration of subjects and thus provides a challenge for pupils to solve interdisciplinary problems. Working on a technological project, the pupils used several competencies such as planning, building the program, and documenting their progress.

To describe how to enhance PBL through online group cooperation, Lou and MacGregor (2004) recently considered how learning surroundings are analyzed and how the use of technology can be an asset to develop PBL. The purpose of the plan was to improve student-centered learning. The study explored the benefits of an online collaborative learning unit used with students in higher education. In this context, the project focused on socio-cultural aspects shaped by the use of technological tools. The use of these tools encouraged students to work independently, both in face-to-face classrooms and online scenarios. The outcomes presented some illustrations of



how computer-based work can be used to support collaborative learning among students in a higher education environment.

In a different scenario, ChanLin (2008) describes a study in which students aged 10–11 in a science class used technology-based PBL as a significant tool in the learning process. The purpose was to show how students were able to integrate computer technology as a tool to follow the steps of the Based Learning Project, including conducting research, collecting information and presenting it to their classmates. As the culmination of the project, students created web pages for public viewing. Thus pupils had the opportunity to interact and share knowledge with peers, teachers, and the community. The outcomes of the study point to how computer technologies can be used to promote student-directed scientific inquiry of problems in a real-world situation. Through the use of technology to support their research, students were able to demonstrate the ability to synthesize and to connect scientific tasks.

Looking for ways to pilot PBL and e-portfolio assessment in an undergraduate course Gülbahar and Tinmaz (2006) developed a project in which the participants were senior year pre-service teachers in the Department of Computer Education and Instructional Technology in the faculty of education of a private university in Turkey. In order to gather information on students' perceptions about the project-based learning approach, semi-structured interviews were conducted with each student. This study tried to answer the question of how to teach more effectively. The study results point to the application of different educational approaches: the behaviorist, the cognitive, and the constructivist. The study shows the relevance of constructivism and its tools. Using constructivist tools the students had a chance to learn by doing while at the same time enhancing their critical skills and shaping their learning process as active participants. As for the assessment, the e-portfolio method was favored by all students. As they received weekly feedback about the assignments and had the opportunity to redesign the assignments before the final submission, the students had repeated chances for self-improvement and appraisal of their own learning processes. In the end, the use of e-portfolios facilitated a learning-centered model for teacher candidates.



## METHODOLOGY

For the purpose of this study we conducted an entrance questionnaire, an open-ended survey and an interview. They were analyzed qualitatively, as “the literature on action research supports the assertion that qualitative methods are more appropriately applied to action research efforts” (Mills 2007, pp. 55). The reason was to identify how students’ perceptions of the research questions changed throughout the course of the project, before, during, and after the implementation.

### Participants

The students selected for the research are involved in a content-based instruction program at ÚNICA, a bilingual university located in Bogotá, Colombia.

The participants were students who were enrolled in the Micro–Middle Education class during their sixth semester. In this class future teachers observe how middle school students learn best and what they need to know and do to create an effective learning environment. Consequently, theory and observation practice are blended to serve the ultimate goal of giving them solid foundations so that they can make well-informed decisions. Even though these students had participated in related school projects in previous semesters, when weighing the implications of use of previous learning in real application and authentic assessment, they had trouble turning theory into practice. Therefore, this group was considered a good beginning to the ongoing action research project.

### Context

This studied applied an action research methodology. After considering the experience of integrating the Shelter Instruction observation Protocol (SIOP) in the classes and the students’ difficulties understanding the correlation between the two components of application and assessment; the aim of the investigation was identified. Subsequently, an agenda was planned and set to follow the observations, analysis and reflections. The second semester of 2011



was dedicated to formulating the theoretical framework and conducting a literature review. Beginning in 2012, the data collection instruments were applied, the students were accompanied through the process of developing a PBL. We devoted the first month of this semester to applying the first two data collection instruments (pre-quest and survey). The remainder of the semester was devoted to developing the PBL. The last instrument to collect data (interview) was applied on the last day of class. To be cohesive with the nature of the class program, as a final PBL product the students were asked to present a creative piece of work to motivate in middle scholars the use of L2 (English). Over the course of exercising the project, the students submitted project entries every two weeks and submitted the final product by the end of the semester.

### Data Sources

Three different tools were implemented and distributed among the students of Micro-Middle Education class. The data was collected in the following order and the following tools were used:

1. **Questionnaire:** The researcher organized a meeting with the students at the beginning of the first 2012 semester to distribute the questionnaire. The questionnaire contained four open-ended questions created by the researcher. The objective of the questionnaire was to identify the prior knowledge that students had about Assessment, Project Based Learning, Application, and Evaluation. The questions also aimed to estimate the degree of differentiation that students had between assessment and evaluation. Each question was intended to gather information about students' previous experiences with these topics.
2. **Survey:** By the middle of the first semester 2012, for the period of the project implementation, the researcher and students organized and assembled a fair in which they showed projects created by NICA students. Those projects were performed at different semesters and they had different purposes. At the end of the fair, a survey was given to the students with four different questions. They had to appraise the projects



as tools for assessing and applying knowledge. They also value the quality of the projects and the satisfaction of performing them.

3. **Interview:** At the end of the project implementation the researcher conducted a wrap-up interview. Over the interview the researcher wanted to identify the students' understanding of the relationship between the two SIOP components, Application and Assessment, after an intervention through the use of PBL in a content-language context. The answers were videotaped and then transcribed for the purpose of the analysis.

## RESULTS

### Data Analysis

#### *Entrance questionnaire*

The answers showed that some members of the class had little previous knowledge about application. Some believed that application consisted in activities performed over the course of the school year, and some saw application as something separate from learning. The overall analysis showed that the students in general were unfamiliar with the concept or perceived as a method for conducting experiments in a laboratory. The majority of students revealed that they saw evaluation as a way to report knowledge acquisition and to measure via exams, quizzes and tests. The analysis also indicated that some students still did not grasp the concept of evaluation. (In any case, they believed teachers had the responsibility of weighting students' knowledge acquisition). In sum most students did not understand assessment. They misperceived it as: evaluative methods, collaborative work or keeping track of grades, among other beliefs. The answers illustrated that the majority of the students related PBL to the accomplishment of experiments that are done in the school within the subjects.

#### *Midterm Survey*

Through analysis of the survey administrated after the fair, we observed that students viewed this event, in which projects were displayed, in a clear way,



as a way to assess learning. They also saw the fair as a way to appraise learning processes. (The students started to realize the variety of application devices). The survey showed that most of the students felt very satisfied with the works on. Some indicated that they felt somehow satisfied and no one indicated feeling dissatisfied. In terms of the quality of the projects exhibited during the fair, the survey provided evidence that the students valued the projects as superior and/or of high quality.

### ***Interview after the Intervention***

In the post intervention interview, the students indicated awareness of the relationship between application and assessment was evident when planning and implementing their own PBL. The majority of the students expressed positive feelings towards the implementation of PBL as a tool to apply and assess their process of learning. After submitting their projects and reviewing their progress with the teacher, most felt satisfied, comfortable, and most important, challenged. This means that students saw the effectiveness of the intervention from its beginning to end. Few students felt that following the directions to apply PBL was difficult. In sum, most of the class experienced that PBL gave them independence from the instructions of the teacher. They also felt that PBL was a good tool to managing their time used in the projects. The interview answers showed that the majority of the students feel challenged when searching for authors or information when applying project based learning. The remaining students were divided into students that stated that the most challenging part consisted in, respectively, the creation of new and original projects, the attitude towards the project, or the process of thinking about the end of the project.

### **Results**

The results are presented as conducted for each of the three research questions. In accordance with the methodology used in the study, it is important to highlight that in order to compare the students' answers we carefully planned three different moments to apply the collecting data instruments.



Before the intervention, when answering the questionnaire, most of the students did not display accurate knowledge about the shelter components, application-assessment, or the constructivist contribution to their educational path. On the contrary, they perceived these concepts as exterior and separate items which were not connected to their own learning processes. Moreover, their concept of PBL was fragmented and more related to laboratory experiments rather than to the appraisal of knowledge. Most students perceived conventional evaluation as the more relevant manner to report the sum of knowledge acquired.

Over the course of the intervention, the class assembled a fair to exhibit creative pedagogical works produce by ÚNICA students. After the exhibition they answered a survey which was designed to explore the possible connection they could make between application through PBL and assessment and its implications in the evident success of the fair. Students and professors actively attended the fair and, after assessing the quality of the products exhibited, the community decided to include the productions as part of the university library. Analyzing the survey answers, we found clear indications that the class felt highly motivated to continue to be part of the study.

Regarding the observations and analysis completed during the course of the intervention, students periodically submitted five entries describing progress of their project. Each entry was carefully reviewed by both teacher and student. In each meeting, after receiving feedback, students showed cautious understanding of how to follow the project ladder. From step one (having the final aim in mind) to the final step (the creation of a new product), they were able to assess their own advancement, considering both short-term as well as final objectives.<sup>1</sup>

It is important to point out that as the intervention evolved we clearly observed that in most cases procedural mistakes decreased and students' motivation to complete the project increased.

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<sup>1</sup> For an example of a final product, see <http://www.joomag.com/magazine/the-rising-generation-the-rising-generation/0300229001339210393>.



In sum, after presenting their final products, in the final interview students expressed the ability to connect SIOP components Application and Assessment through PBL. They felt satisfied to have risen to the challenge of taking charge of their learning process. While they also pointed out the difficulties they encountered throughout the course of the project, they felt thankful for the opportunity to participate. Furthermore, they recommended extending this kind of exercise to other subjects in their studies.

## DISCUSSION

### Limitations in the Study

For this study, one of the limitations was to set the right agenda out of class in which the two students working per product would have the appropriate feedback before continuing to the subsequent project's entries. Students had different schedules and diverse personal activities. We found this fact more as a difficulty since, in the end all groups obtained the feedback before continuing with the following step.

### Conclusions

Bearing in mind the investigation questions previously stated, we must highlight the relevant theories. Cummins (2000) is one of the theorists who provide a great deal of support for the importance in current teaching of implementing application and assessment when delivering a content-language lesson. Similarly, Diaz-Lefebvre (2006) asserts that when students are empowered to monitor their learning process, they become active participants in reaching a clear understanding. The findings show that students coming to ÚNICA, in most cases are not able to identify the relation between these components, and as a consequence they have difficulty with active participation and implementing these theories in their own learning processes.

As this situation is familiar to other colleagues, this study can help teachers use constructivist methods to encourage students to appraise their methods for acquiring knowledge. Our project focuses on two components of



the SIOP model, which has been put into practice in our university with promising results.

Over the course of the research project, students came to recognize that the use of PBL as an application tool helped them to reach content and language objectives. They therefore felt motivated to be active participants in the construction of their professional development. At the same time, as they related previously held and newly gained knowledge, students were challenged to formulate further questions to be solved. After presenting the final products, students were encouraged to store their products in the university library. The new works will be used as didactic texts in future teaching practices.

Implementation of the SIOP model is fairly recent; to the extent of our knowledge, ÚNICA is so far the only Colombian bilingual university to use it. Therefore, this study adds interesting literature in support of the effectiveness of using SIOP components in real PBL scenarios.

### ***Action Plan***

The first aim we have in mind is to share the findings with the faculty at the university to open avenues to reflect, as well as to hear new propositions on how to incorporate these practices in our content-language classes. Students involved in the project will be invited to present their PBL final products. This activity might open up possibilities to share our experiences with other college bilingual faculties. The students will be encouraged to add their works to the university library and to collaborate with their peers in order to gather other insights and perspectives. In addition, if this article is approved by the university's research directors, we will attempt to have it published in an academic journal.

It is believed that by making this kind of research visible to faculties with similar teaching vision and curriculum we will contribute to enlarging the teaching literature in numerous dynamic ways. This journey could be accomplished by planning events such as presentations, workshops, and informal gatherings. Educators can be gratified to learn, as we have, that there



are many avenues to help our students to shape their own teaching and learning profile.

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