Technology, Peer Collaboration, and ZPD in the Dual Language Classroom

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ABSTRACT

In this study, Vygotsky's concept of the zone of proximal development (ZPD) and the concept of scaffolding will serve as the theoretical basis for an investigation of peer collaboration in a fourth grade dual language math class. The students will be divided into five groups of four. Each individual group will consist of two English dominant students and two Spanish dominant students who are academically in the same mathematical skills range. They will be taught a computer program called Scratch, which teaches computer programming, plus mathematical and problem solving skills. For two weeks, three groups will be taught the core concepts of Scratch in Spanish while the other two groups will be taught the same concepts in English. Students will be shown a basic video game that was created using Scratch, and will be asked to work with their group to reproduce the same game using problem solving and their pre-taught Scratch skills. A microgenetic approach will be used to gather data on the interaction of the students within their groups. One set from the Spanish dominant groupings, and one set from the English dominant groupings will be chosen and will be videotaped during three-½ hour sessions to collect data for this study.

Introduction

To be able to establish best practices in SLA in a dual language classroom setting, it is vitally important to better understand the ways students acquire their second language. It is important to look at how collaboration, peer interaction, and status of the targeted language influence the student's ability to learn their second language.

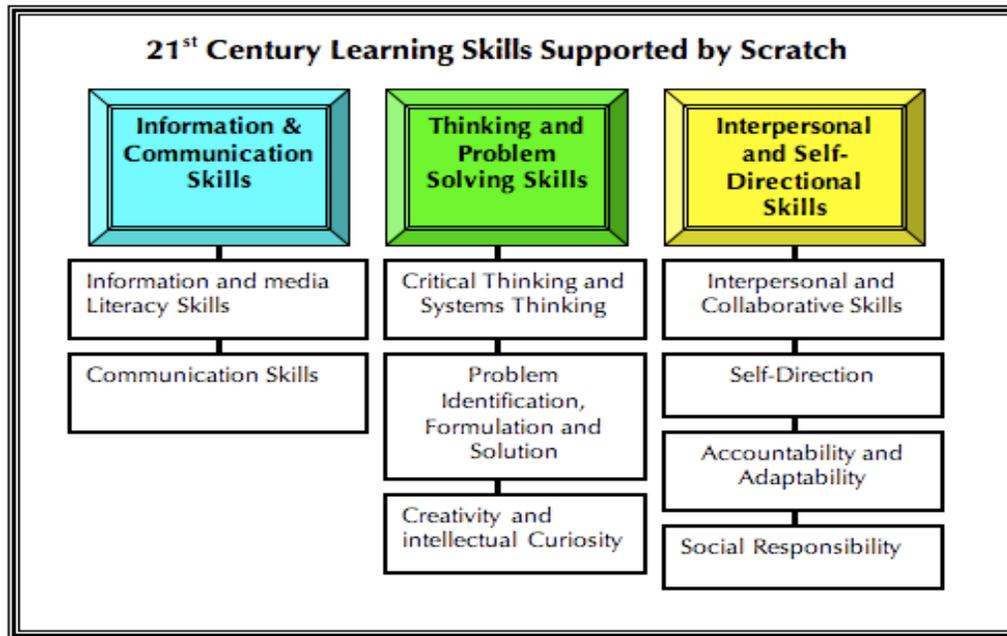The main goals of this study will be to answer the following questions:

1. When the students are in ZPD, who assumes the expert role, and who assumes the novice role? Do these roles change and shift due to the language in which the students are working (targeted language), or does the student's individual computer and math skills affect these roles?

2. Do students communicate in the target language, or do they switch to their L1?

3. Are the students using scaffolding in their L1 or L2?

4. Are the students using code switching to better communicate with their co-members?

5. Is learning enhanced through collaboration and the ZPD?

6. The study will also assess the social dynamics of the classroom. English, and the native English speakers tend

to dominate the classroom, even when the target language is Spanish. When we pair students with the same math skills, and teach them Scratch in Spanish, will the Spanish speaking students take a lead role, or will they defer to their English speaking peers?

In the following section I discuss how Vygotsky's concept of the ZPD and scaffolding can be applied to peer interactions when learning a computer program called Scratch, in a dual-language classroom. I will then describe how the groups will be organized and the methods that will be employed in this study, including how the data will be collected and analyzed. Finally, I will discuss the possible outcomes and the expected findings.

Literature Review

Scratch is a new programming environment developed by the Lifelong Kindergarten research group at the MIT Media Lab (http://scratch.mit.edu). Scratch supports the development of **21st Century Learning Skills** , as described by the Partnership for the 21st Century (http://www.21stcenturyskills.org). The report *Learning for the 21st Century* identifies nine types of learning skills, divided into three key areas.

21st Century Learning Skills Supported by Scratch

Information & Communication Skills	Thinking and Problem Solving Skills	Interpersonal and Self-Directional Skills
Information and media Literacy Skills	Critical Thinking and Systems Thinking	Interpersonal and Collaborative Skills
Communication Skills	Problem Identification, Formulation and Solution	Self-Direction
	Creativity and intellectual Curiosity	Accountability and Adaptability
		Social Responsibility

Michael Resnick, a member of the Lifelong Kindergarten group at MIT, and one of the developers of Scratch, believes that traditional education does not teach learners to become creative thinkers and creative problem solvers. He believes in the ***Kindergarten Approach*** to learning is a much more effective way to teach 21st century learning skills.

"In a society characterized by uncertainty and rapid change, the ability to think creatively is becoming the key to success and satisfaction, both professionally and personally. For today's children, nothing is more important than learning to think creatively – learning to come up with innovative solutions to the unexpected situations that will continually arise in their lives.

Resnick describes the kindergartner approach to learning as a process where children are encouraged to imagine a project, create it, play with it, share it with others, and reflect on the process. This process is repeated over and over.
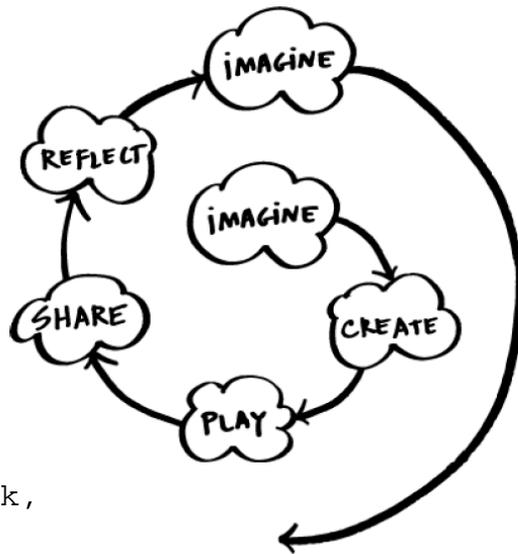
((Resnick,

Scratch is ideally suited for children to work collaboratively to create a variety of media projects, including interactive story telling using animation, video games, music and art, using computer programming and math skills.   Scratch has been translated into several languages, and can easily be switched so all prompts and commands are given in the target language.

This research study is based on Vygotsky's Sociocultural theory. The ZPD and scaffolding are two essential concepts in this theory which can be explained as a system of ideas that looks at learning as fundamentally a social act, that takes

place in a specific cultural environment.

Best practices in a dual language classroom all have their foundations in collaborative learning. Cooperative strategies produce more opportunities for content related communication among students than a traditional teacher-centered classroom. Primary language use is permitted in a cooperative grouping, but the strategy seems to promote acquisition of the target language. (Lessow-Hurley, 2005)

We will use the Vygotsky's process of **other-regulation,** **(**which is mediated using language), where learners carry out tasks under the guidance of more skilled "experts" whether that be a teacher, parent, or as in this study, a peer. The learner will learn through collaborative talk, and shared understanding how to complete tasks with the goal being that the learner will then **appropriate** the learned knowledge and skills into their own consciousness. The supportive language and tasks that the students use as stepping stones to achieve this shared knowledge are known as **scaffolding.**

As the students begin to create their project using creativity and problem solving skills in their target language, they will enter various Zones of Proximal Development (ZPD). Vygostsky defines the ZPD as:

The difference between the child's developmental level as determined by independent problem solving and the higher level

of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (Zygotsky cited in Mitchell and Myles, 2004)

Researchers have begun to look at how the ZPD can be used in L2 acquisition.
Ohta defined the ZPD concept in L2 acquisition as "the difference between the L2 learner's developmental level as determined by independent language use, and the higher level of potential development as determined by how language is used in collaboration with a more capable interlocutor" Scaffolding in the L2 would thus consist of those supportive behaviors, adopted by the more expert partner in collaboration with the L2 learner, that might facilitate the learner's progress to a higher level of language development. (Ohta cited in De Guerrero and Villamil, 2000)

To gather our data I will be using another Vygostsky principal, Microgenesis. Microgenesis is the act of catching that action or learning as it happens. Vygotsky claimed it was "grasping the process in flight". Vygostsky believed that a thorough minute analysis was necessary to capture learning as it develops.

Any psychological process, whether the development of thought or voluntary behavior, is a process undergoing changes right before one's eyes. The development in

question can be limited to a few seconds, or even

fractions of seconds. . . . Under certain conditions it

becomes possible to trace this development. (Vygotsky cited

in De Guerrero and Villamil, 2000)

Methods

In this study, I will be gathering data on and analyzing a

fourth grade dual language classroom (Spanish/English) to assess

their L1 and L2 usage as it relates to problem solving, creative

thinking, and collaboration with peers. The students being

studied have all been in a dual-language classroom since

Kindergarten. The language ratio in which they have been taught

has been:

Kindergarten and First grade: Spanish – 90%, English 10%

Second Grade: Spanish – 80%, English - 20%

Third Grade: Spanish – 70%, English - 30%

Fourth Grade: Spanish – 60%, English - 40%

There are ten native English speakers and ten native

Spanish speakers. At the school where they attend there is only

one dual language strand, so these students have been together

in the same classroom since Kindergarten. Therefore social and

educational patterns and dynamics have been firmly established.

Although the majority of their instruction has been in Spanish,

English is definitely the dominant language in all social

situations, and in any situation where the teacher is not directing language usage. The native English speakers tend to take a dominant role in most classroom activities.

There are several subject areas where the role of language dominance is diminished, including math and computer science. Therefore I have chosen to use a computer program called Scratch as the basis of this study.

Looking at and using the concepts of Zone of Proximal Development and Scaffolding, I will be analyzing how group dynamics change and shift according to the target language used, and the individual student's math and computer skills.

Students will be divided into five groups of four students each.   As the purpose of this study is to analyze language usage and skills, and not math and computer skills, the students will be divided using the following criteria:

Each group will have:

- Two native English Speakers

- Two native Spanish Speakers

- Using the student's NWEA and ISAT mathematical data, plus
   classroom data gathered by the teacher on the student's
   math and computer skills, students will be grouped
   according to skill level. Example: Students with high
   mathematical and computer skills will be grouped together,
   etc.

For two weeks during the student's one-hour math period, the students will be taught the core concepts of Scratch. Three groups will be taught in Spanish. All vocabulary, concepts, and instruction will be given in Spanish. The language of the program will be switched to Spanish. All classroom discussion about the program will be held in Spanish.

The remaining two groups will be taught exclusively in English. All vocabulary, concepts, and instruction will be given in English. The language of the program will be switched to English. All classroom discussion about the program will be held in English.

At the end of two weeks, the students will be shown a basic video game that was designed and created using Scratch. All concepts needed to reproduce the game will have been taught during their two weeks of instruction (10 hours total). Students will be challenged to reproduce the game. The game will be projected onto a screen, so the students can refer to it at all times.

Students will be instructed to work in their groups using the target language in which they have been taught the program to reproduce the game. There will be one laptop assigned to each group where they will work together to produce the game. Teacher's instructions will be written on the board in the targeted language, and will state the following:

1. Work with your group to reproduce the video game.

2. You can be creative and use different sprites (animated characters) and backgrounds.

3. Be a good team member! Listen, Share, Cooperate!

4. If you have questions, ask one of your teammates. Work together to find answers and solve problems.

5. No teacher assistance allowed!

Two groups will be chosen, one from the Spanish dominant groups and one from the English dominant groups. We will videotape each group for 3 ½ hour sessions. Each ½ hour session will be taped on separate days. The video camera with an

external microphone will be set up on a tripod directly in front of students. The teacher will start the camera recording, and then will leave the area, so more authentic data can be collected.   After the 3-½ hour sessions are completed, the videotapes will be reviewed and transcribed. In the transcription, we will be concentrating on collecting data on all four participants in the group. The main focus of the transcription will be to focus on language usage. We will be looking at body language and gestures in correlation to dominant behavior and language usage. All data collected will then be analyzed using the research questions outlined in the introduction.

Expected Findings / Conclusion

Spanish Language is of lower status in this dual language classroom. In most classroom transactions, the native English speakers take the lead. Although the Hispanic students speak English much better than the native-English speakers speak Spanish, the Hispanic children rarely take on leadership roles. The native-English speakers struggle with their oral Spanish language, and therefore tend to switch to English whenever possible. However when working with computers, this phenomenon is lessened.

The native Spanish speakers tend to produce high quality products when working with visual arts and computers. This in

turn boosts their self-confidence. I hope to find that by using a computer program that is assessable to all students, and by teaching the program in the target language, the Hispanic students will take a lead or "expert" roles in producing the game.

I am also interested to see how language is used in the student's transactions, scaffolding and creative problem-solving abilities. I hope to find that collaboration increases learning. I am interested in seeing how the ZPD shifts and changes due to language, math, and computer skills.

With the face of the nation's school changing with the influx of immigrants, educators are scrambling to find ways to teach children that are fair and equitable. Initiating dual language programs is one way to insure that all students receive a quality education, while learning two languages. It is vitally important that we better understand the social and cultural dynamics that are involved when teaching in a dual language classroom. We need to investigate the status of the languages that are spoken, and how the students use their language to learn and communicate.

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