Using Radical and Social Constructivism for English Language
Learners in Science Education

C. Matt Seimears
Emporia State University Teachers College

- In education, we face important decisions that will affect our lives and the lives of countless millions, and we need to contemplate these choices systematically and thoroughly.

Introduction
These choices about the future of our society and education are especially urgent because we are at present in a period of increasing diversity, largely due to high rates of immigration. Over the past three decades, the number of immigrants arriving in the United States each year has increased from less than 300,000 to almost one million (U.S. Bureau of the Census, 2000, p.10). The current wave of immigration includes groups from all over the globe. Students whose home language is other than English are projected by the United States Census Bureau to be 40 percent of the school age population by the 2030s, and possibly sooner if the present demographic trends continue (Thomas, et al., 2001). Today, one in every three children nationwide are from an ethnic or racial minority group, one in every seven children speaks a language other than English at home, and one in fifteen children was born outside of the United States (Garcia, 1997). According to Key (2004), in New York City, there are more than one hundred languages represented in public school classrooms. The same phenomenon is the norm in many areas of the country. The state of Pennsylvania is linguistically diverse, the languages spoken in Pennsylvania are 37% Spanish, 7% Italian, 7% German, 5% other German languages, 3% Vietnamese, 3% Korean, 5% French, 3% Polish, 4% Chinese, and 3% Russian. In Rochester, Minnesota schools serve students speaking over 60 different languages. Some of the most common languages spoken by students in these classrooms include Spanish, Korean, Cantonese, Mandarin, and other dialects of Chinese, Haitian-Creole, and Russian.

Can our educational system successfully deal with this diversity of cultures, races, and English Language Learners? Concerns about increasing diversity are often impacted by many other minority issues and grievances that remain unresolved. In fact, problems of African American, Native Americans, Hispanic Americans, and Asian Americans today are as alarming as they were generations ago (Healey, 2003).

Who are English Language Learners? English language learners (ELLs) are a diverse population of students who are learning English in school. They may be: Immigrants from countries all over the world seeking educational or economic opportunity, refugees from poverty stricken countries, countries wounded from natural disasters, Native Americans or other native born Americans, children with developed literacy skills in a first language, migrants, and children of military personnel.

They may be: Immigrants from countries all over the world seeking educational or economic opportunity, refugees from poverty stricken countries, countries wounded from natural disasters, Native Americans or other native born Americans, children with developed literacy skills in a first language, migrants, and children of military personnel.

ELLs come from a variety of linguistic backgrounds. After English, the most common languages in the United State are Spanish, Chinese, French, German, Tagalog, Vietnamese, Italian, Korean, Russian, and Arabic, followed by many other languages.

While these English Language Learners may be all ages, come from a wide range of ethnic backgrounds and different economic situations, and come to this country for a variety of reasons, they all have in common the desire to speak English and learn. Over the years educators have grown to understand the needs of students who are new to the English language. Throughout the history of education many different terms have been used to describe or characterize children whose second language is English. For example, students with Limited Proficiency (LEPs), students whom English is a
Second Language (ESLs), or Second Language Learners (SLLs). Currently educators refer to these children as English Language Learners (ELLs) or (CLD) students. This shift in language represents a more accurate reflection of the process of language acquisition.

Almost every school district requires students to receive some type of science-based curriculum. Science content alone can create significant barriers for all students, especially English language learners. Students are prone to shut down in science because they may not understand what the teacher is trying to convey to them; add a language barrier to that in an English-only classroom, and ELL learners may have a difficult time interpreting what the teacher is teaching. However, it might be possible to reduce the language barrier in an English-only classroom when teachers provide students with constructivist teaching. The following study investigates factors that influence ELL students’ ability to develop science cognitive skills in English-only science curriculum/classrooms.

Students who are learning English as a new language, especially younger students, often have difficulty interpreting the meaning of logical connections in mathematics and science discourse (Jarrett, 1999). If there was a way to reduce the language barrier, teachers may be able to connect with all ELL students. Looking at the language barrier in science education, do students have the capabilities to understand science terminology if they do not understand the meaning of the term in their native language? In certain cases, teachers try to remove or reduce language barriers in their English-only classrooms, the teacher may have a difficult time teaching the science content to the ELL students if the barrier has not been reduced, because of challenging standards for English and content area instruction. The “No Child Left Behind Act” requires states to establish challenging academic science content standards for all students, and Title III of this act indicates that ELLs are not exempt from meeting these high expectations. In many cases, these students are expected to “digest” the curriculum with some added support. The curriculum and state and national tests are not being written with these linguistically and culturally diverse students in mind. These students are faced with the double challenge of understanding American culture while at the same time trying to learn American curriculum.

Most classrooms are not completely comprised of ELL students. At the middle school level, science teachers have integrated classrooms, and depending on the school funding for Title I purposes, they may have students who are “newcomer” English Language Learners or English Second Other Language teachers who work only with ELL students. If a classroom is an English-only classroom, the teacher may have to connect with a number of students. Not all students have language barriers, not every student struggles with science curriculum, and in order to find that connection, a teacher must incorporate a style of teaching that relates to every student in the classroom.

It is apparent that science education in grades K-12 needs reform. The problems that need to be addressed are complex; simplistic or shortsighted solutions are not likely to succeed. Both pre-service and in-service teachers need to have their knowledge upgraded in three areas: science content, how students think and learn, and instructional strategies. All three areas should be addressed as a coherent package (Mestre, 1991).

What is Constructivism?
The constructivist believes that each learner must construct meaning for himself or herself that the only learning that can take place is that which is connected to the individual’s already-existing knowledge, experiences, or conceptualizations. What children learn is not a reproduction of what they observe in their surroundings, but the result of their own thinking and processing (Martin, 2005).

What is Radical and Social Constructivism in Science Education?
According to Staver (1998), examining a specific constructivist style or process of teaching in a classroom, might focus on the student instead of the teacher. Staver describes radical constructivism as a focus on cognition and the individual, and describes social constructivism as a focus on the language or group (Staver).

“Radical and social constructivism share much in common, which can be illustrated by my synthesis of their foundational principals and assertions. First, knowledge is actively built up from within by each member of a community and by a community itself. Whether an individual’s knowledge is viewed as knowledge by his or her community is dependent upon the consistency of what the individual knows with what the community agrees to consider is knowledge. Second, social interactions between and among individuals in a variety of community, societal, and cultural settings are central to the
building of knowledge by individuals as well as the building of knowledge by communities, societies, and cultures. Language of course is the means of this social interaction. Third, the character of cognition and a language which is employed to express cognition is functional and adaptive. Fourth, the purpose of cognition and language is to bring coherency to an individual’s world of experience and a community’s knowledge base, respectively.” (Staver, 1998, p.504)

Social constructivism emphasizes the importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding (Gredler, 1997). Based on this definition alone, it is clear that the perspective and ideas of social constructivism can be applied to the topic of cultural awareness for educators and to the teaching strategies that educators use in the classroom. One example may be how students construct knowledge based on a social context and relationships when they have class discussions, interactive demonstrations, collaborate in small groups (learning communities), active engagement, use dry erase white board “pair and share activities,” hands on lab activities and when they learn in contexts that are personally meaningful and enable them to share their opinions with others. When the emphasis is on social learning, students will inevitably learn about the cultures, attitudes, and values of others in their group. It is the teacher’s role to help students improve their social skills so that they can learn from each other in the best way possible.

Language relates to social constructivism because language is a tool we use to communicate with each other. There must be some common form of communication in order to build knowledge from our social interactions. Difficulties may develop when there is a communication gap and people misunderstand each other. Teachers may not understand the language/slang of the students, non-native speakers may not understand the words of native speakers, and words may contain hidden attitudes and prejudices that insult or alienate others. It is essential that we closely examine our word choices when talking to others, especially as teachers. We must also be attentive to the ways we teach non-native speakers, as well as be attentive to the ways in which non-native speakers might misunderstand. The importance and understanding values, backgrounds and attitudes of our students is a way to adapt our language and teaching methods to best reach them. Knowledge about and the use of social constructivism is important to education in many ways, first educators need to teach some level of uniformity. Looking at the English language and how people speak the language, we can see a variety of differences and at times we may not see any uniformity. Educators may be able to see differences in the English language; however, they may not be able to detect the different registers of the English language. There are different registers that students use, including nonverbal, causal, and formal registers that science teachers may not have the skills or background to detect. Because of socioeconomic differences in the classroom there are different levels of language as well as understanding the information being conveyed by the teacher.

Social constructivism may be a missing link in science education, and using a radical constructive teaching method, pedagogy, and inquiry to align the curriculum with various cultures/English Language Learners might be the answer. Individual schools, teachers, school boards, communities and administrators must closely examine the group/groups of students that are attending their schools. In many instances the group may not speak the same language as the educator. In many instances, the language is the same.

It is unrealistic to expect students from different cultures to “digest” the curriculum if the educators do not understand the culture from which these students come. The critical part of teaching is being able to communicate and form a connection with one’s students. The communication and connectedness cannot happen if there are cultural misunderstandings. Obviously, this task becomes increasingly more difficult if the group of students being taught possesses only one or two students who come from a different culture and speak a different language.

References


