

The Effect of the 5E Instructional Model on Student Engagement and Transfer of Knowledge within a 9th Grade Environmental Science Differentiated Classroom

Background

My classroom consists of students with a wide range of learning needs and backgrounds. As part of a small boarding school in New Hampshire, my teaching practices center on the core ideas of individualized instruction and mastery-based learning. Best practices include direct instruction and cooperative learning within a differentiated classroom containing three levels of instruction: foundational, standard, and accelerated. I teach four classes of 9th grade Environmental Science with a class size capped at 14 students.

Over my teaching experience I have found that my students often find it difficult to transfer the knowledge and skills they have learned to new situations. In this project I compared student engagement and ability to apply scientific knowledge and skills after learning through the BSCS 5E instruction model and the direct instruction teaching model.

Direct Instruction Teaching Model	BSCS 5E Instructional Model (Guided Inquiry)
Anticipatory Set: activates student interest	Engage: students engage in an activity which prompts them to question what they think they know
Link: connection to what has been previously learned	Explore: students explore a question or problem
Presentation: teacher presents and explains lesson concepts	Explain: students are given the opportunity to learn a concept or skill with teacher guidance
Guided Practice: students are given the opportunity to demonstrate knowledge under teacher's guidance	Elaborate: students apply the new concept or skill to a new situation
Independent Practice: students practice concept or skill individually	Evaluate: students demonstrate skill or concept individually



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Research Design

How does a student-centered learning experience through the 5E Instructional Model influence the ability of students to demonstrate critical thinking skills within a differentiated classroom?

- How does the use of the 5E instructional model influence the ability of students to understand and transfer knowledge?
- What affect does the 5E instructional model have on student engagement in and attitude toward science?
- How will a student-centered approach, using the 5E instructional model, change my role as a teacher within the classroom?

Data was collected over eight weeks in which the treatment, the 5E instructional model, was alternated with direct instruction. Pre and post-assessments, student surveys, student recognition scores, tally sheets for engagement, interviews, peer observations and reflective journaling were utilized to make comparisons.

BSCS 5E Instructional Model



"Science hasn't always been my favorite class, but Ms. Dodge makes the classroom a positive environment for students to learn and grow. She tries new teaching styles and it mixes up the class a bit, from presentations to labs."

~Brewster Academy Student from Class of 2020

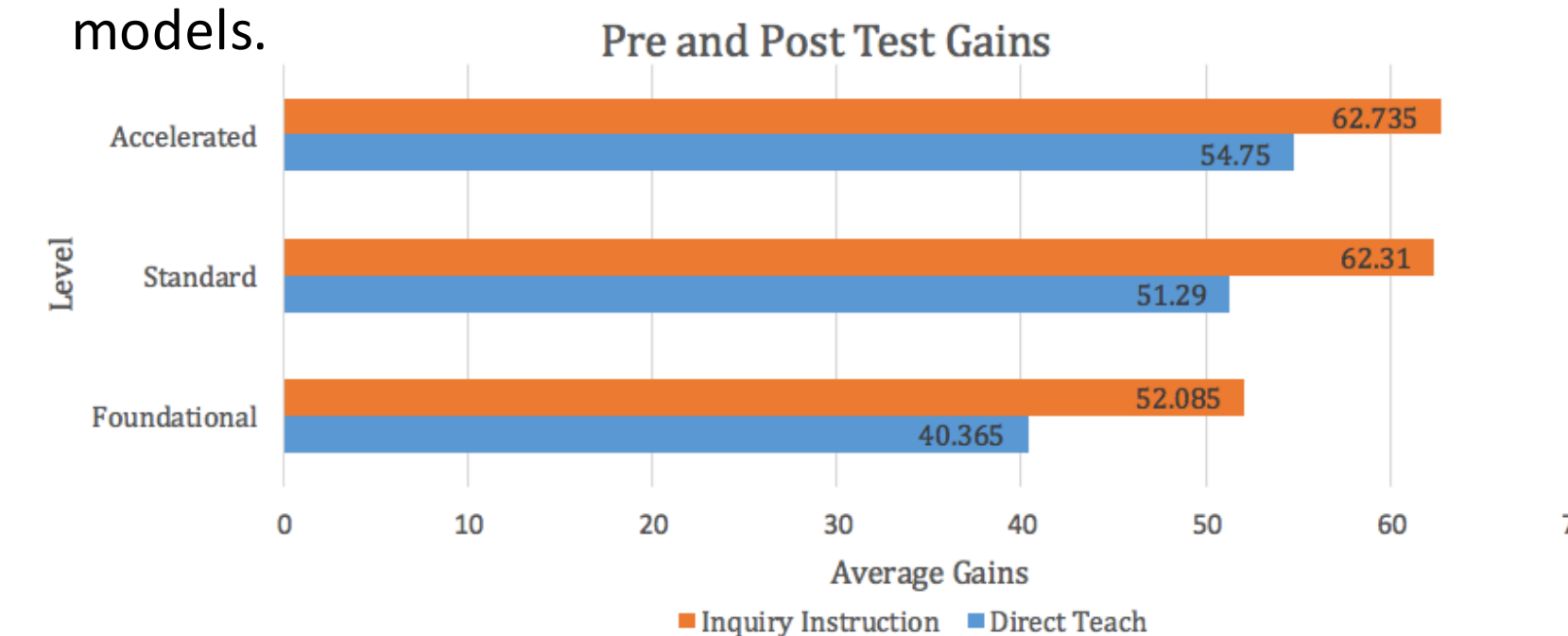


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Data

How does the 5E instructional model influence the ability of students to understand and transfer knowledge?

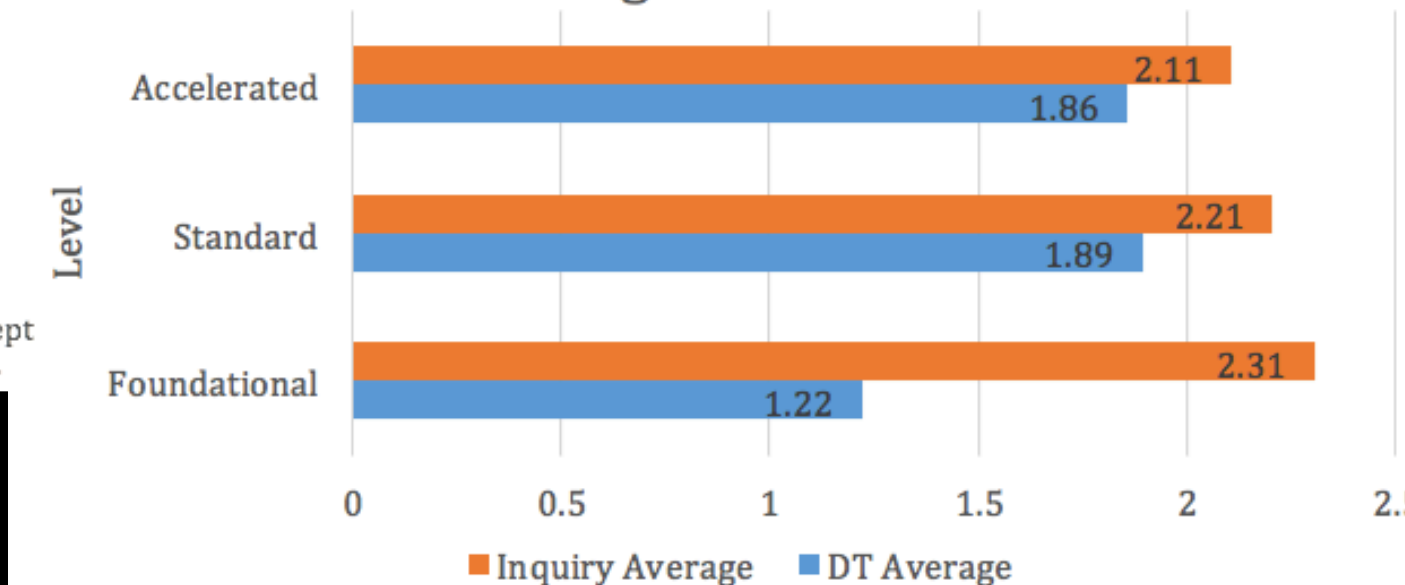
Students at all levels showed greater gains when learning with the 5E instructional model. Students at the lowest levels demonstrated statistically significant gains, while those at the highest level performed well when using both instructional models.



What affect does the 5E instructional model have on student engagement and attitude toward science?

Students showed greater engagement in lessons using the 5E instructional method as it allowed for more hands-on learning opportunities and less teacher centered instruction. Students self-reported greater engagement during lessons presented through the 5E instructional model and this was also noted in peer observations and engagement tallies.

Student Self-Assessment of Engagement During Lessons



How will a student-centered approach, using the 5E instructional model, change my role as a teacher within the classroom?

The inquiry approach shifted my role from the source of information in the classroom to a guide for my students as they developed their own understanding. This transition helped provide students with more opportunities to be active learners and to take ownership of their learning experience. In addition, trying a new teaching method has expanded my ability to reach students of all learning abilities.

Conclusions



"I like this class because we actually learn things and put them to use instead of just learning things and taking tests."

~Brewster Academy Student from Class of 2020

Students perform best when they have the opportunity to do science. The 5E instructional model allows students to explore scientific ideas and form conclusions through their experiences. This differs from direct instruction, in which students are given key pieces of information and then are expected to practice the concept or skill. While both instructional methods provide valuable learning opportunities, the 5E instructional model gives students a greater sense of investment in their learning and allows for the acquisition of a deeper understanding of how a process works. For students in the lower instructional groups gains were significantly greater than those in the accelerated placement, who performed well using both methods of instruction. By utilizing inquiry instruction in my teaching, I will be able to reach a greater range of students and provide more active learning experiences. As a teacher using inquiry methods within my classroom, I have focused more of my time and energy on giving students the opportunity to build understanding of a concept rather than sharing the answer and then discussing the reasoning of why the answer is correct. The focus of my class has moved more toward student growth and this has had a positive effect on the engagement of my students and their ability to understand the concepts they have learned.

