Title: The impact of high school science pedagogies on students' STEM career interest and on their ratings of teacher quality  
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The article explores the impact of various pedagogical approaches in high school science classes (biology, chemistry, and physics) on students' interest in pursuing STEM careers and their perceptions of teacher quality. The study surveyed 7507 freshmen from 40 U.S. colleges, asking them to retrospectively report on their experiences with 32 different pedagogies in high school and to rate their teachers' quality. The survey also tracked changes in students' STEM career interests from the beginning to the end of high school.

The research utilizes Social Cognitive Career Theory (SCCT) as a framework, highlighting the importance of experiences that build self-efficacy, self-concept, and outcome expectations in shaping students' career interests. The findings suggest that while pedagogies significantly impact students' perceptions of teacher quality, their influence on STEM career interests is more nuanced and varies across different science subjects.

**Key findings include:**

1. **Teacher Quality**

* F1-Engaged and F3-Career had positive effects on teacher quality in biology, chemistry, and physics.
* F4-Assessment was significant for biology and chemistry, not for physics.
* F2-Active had negative effects for biology and physics, not for chemistry.
* F5-Quantitative had a negative effect on biology teacher quality, no significant effect on chemistry or physics.
* Lectures had a positive effect on physics teacher quality.

1. **Specific Subject Pedagogies**

**Biology:**

Positive: F1-Engaged, F3-Career, F4-Assessment, conceptual understanding, textbooks, hands-on labs, labs addressing world views.

Negative: F2-Active, F5-Quantitative.

Gender and Race: Male and Black students rated their teachers higher.

**Chemistry:**

Positive: Similar factors as biology, including F1-Engaged, F3-Career, F4-Assessment, conceptual understanding, textbooks, hands-on labs, and labs addressing world views.

Negative: None detected for teacher quality, but F1-Engaged negatively impacted STEM career interest.

Gender and Race: Male students gave higher quality ratings. Black students gave the highest quality ratings, followed by Hispanic students. Asian and White students rated their teachers the lowest.

**Physics:**

Positive: F1-Engaged, F3-Career, conceptual understanding, lecture, textbooks, hands-on labs, and labs addressing world views.

Negative: F2-Active.

Gender and Race: Male students gave higher quality ratings. Black students rated their teachers higher than other races, while students of other races/ethnicities gave equivalent ratings.

1. **Pedagogical Effects**

**Positive for Both Outcomes:**

In physics, career-focused and conceptual understanding pedagogies improved both teacher quality ratings and STEM career interests.

**Opposite Effects:**

Biology: Conceptual understanding positively rated teachers but negatively impacted career interests.

Chemistry: Engaged pedagogies (intensive discussion and connecting to everyday life) had positive effects on teacher ratings but negative effects on STEM career interests.

Physics: Textbook use positively rated teachers but negatively impacted career interests.

**Pedagogies that Only Predicted Teacher Quality:**

Positive Effects: Hands-on labs and labs that addressed world views significantly predicted teacher quality but did not impact STEM career interests. This might be because these pedagogies provide personal attention, leading students to appreciate their teachers more.

Negative Effects: Surprisingly, some active pedagogies (guest speakers, field trips, science videos) negatively impacted students' ratings of their teachers' quality in biology and physics, possibly because students perceived these activities as a lack of effort from the teachers

**Key Terms and Definitions**

1. Social Cognitive Career Theory (SCCT): A theory that explains how career interests develop based on self-efficacy, outcome expectations, and personal goals. It emphasizes the role of learning experiences in shaping career choices.
2. STEM Career Interest: The desire and inclination of students to pursue careers in Science, Technology, Engineering, or Mathematics fields. This interest is influenced by various factors, including classroom experiences and the perceived relevance of science to everyday life.
3. Teacher Quality: Students' evaluations of their teachers' effectiveness, which can be influenced by factors such as engagement, clarity, supportiveness, and the ability to make the subject matter interesting and accessible.
4. Pedagogies' Effects on Teacher Quality and STEM Career Interests: The study explores how different teaching methods impact students' perceptions of teacher quality and their interest in STEM careers. Engaging, hands-on, and relevant pedagogies were generally found to positively influence both outcomes, although there were notable differences based on gender and race/ethnicity.
5. Self-Efficacy: The belief in one's ability to succeed in specific situations or accomplish a task. It plays a crucial role in how goals, tasks, and challenges are approached.
6. Inquiry-Based Learning: An educational strategy where students follow a process of exploring and investigating to construct their own understanding and knowledge of the subject matter.
7. Real-World Applications: Teaching methods that connect academic concepts to real-life situations and problems, making the learning process more relevant and engaging for students.