Examining the Impact of Lesson-Analysis Based Teacher Education and Professional Development across Methods Courses, Student Teaching, and Induction

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ViSTA Plus:
Videocases for Science Teaching Analysis Plus

ViSTA Plus is:

A multi-year pre-service teacher education program for elementary teachers that spans the methods course, student teaching, and the first year of teaching.

Video-based Inquiry into Practice:
Line of Research

ViSTA Plus is also:

. . . part of a 13+ year line of research on professional development, involving studies:

- At elementary, middle and high school
- Of in-service and preservice teachers
- Of face-to-face and online PD
- Across the NSF cycle of innovation
- Of PD leadership development
- At different scales, up to district wide sustainability

ViSTA Plus:
Videocases for Science Teaching Analysis Plus

ViSTA Plus is also:

- A research study examining the impacts of this approach to teacher education and professional development, and comparing to traditional approaches.
- A collaboration with the University of New Mexico and the University of Houston, Victoria.

ViSTA Plus

- A study in three phases

WE ARE HERE!

	Methods Course	Student Teaching	First Year Teaching
ViSTA Plus	Teacher data	Teacher and Student Data	Teacher and Student Data
BaU	Teacher data	Teacher and Student Data	Teacher and Student Data

ViSTA Plus Goals:
Turn Teacher Preparation "Upside Down"

The NCATE Challenge:

- Offer a preservice curriculum that intertwines practitioner knowledge with academic knowledge from the outset
- Emphasize knowledge in use – both science knowledge and teacher knowledge – in the context of real problems of classroom practice.

The ViSTA Plus Answer:

- Build a video-based, analysis of practice of practice program that spans
  - A methods course
  - Small group reflection in practice during student teaching
  - Collaborative lesson planning and analysis of peer videos in the first year of teaching

ViSTA Plus Design Principles

1. Conceptual Framework

Student Thinking

Science Content Storyline

THE STUDENT THINKING AND SCIENCE CONTENT STORYLINE LENSES

STeLLA CONCEPTUAL FRAMEWORK

Student Thinking — **Science Content Storyline**

Learning to analyze science teaching through two lenses

allows you to learn and use strategies for more effective science teaching.

SCIENCE TEACHING

Strategies to Reveal, Support, and Challenge Student Thinking	Strategies to Create a Coherent Science Content Storyline
1. Ask questions to elicit student ideas and predictions	A. Identify one main learning goal
2. Ask questions to probe student ideas and predictions	B. Set the purpose with a focus question or goal statement
3. Ask questions to challenge student thinking	C. Select activities that are matched to the learning goal
4. Engage students in analyzing and interpreting data and observations	D. Select content representations and models matched to the learning goal and engage students in their use
5. Engage students in constructing explanations and arguments	E. Sequence key science ideas and activities appropriately
6. Engage students in using and applying new science ideas in a variety of ways and contexts	F. Make explicit links between science ideas and activities
7. Engage students in making connections by synthesizing and summarizing key science ideas	G. Link science ideas to other science ideas
	H. Highlight key science ideas and focus question throughout
8. Engage students in communicating in scientific ways	I. Summarize key science ideas

ViSTA Plus Design Principles

2. Theory of teacher learning

Situated Cognition and the Culture of Learning

JOHN SEELY BROWN ALLAN COLLINS PAUL DUGUID

Many teaching practices implicitly assume that conceptual knowledge can be abstracted from the situations in which it is learned and used. This article argues that this assumption inevitably limits the effectiveness of such practices. Drawing on recent research into cognition as it is manifest in everyday activity, the authors argue that knowledge is situated, being in part a product of the activity, context, and culture in which it is developed and used. They discuss how this view of knowledge affects our understanding of learning, and they note that conventional schooling too often ignores the influence of school culture on what is learned in school. As an alternative to conventional practices, they propose cognitive apprenticeship (Collins, Brown, & Newman, in press), which honors the situated nature of knowledge. They examine two examples of mathematics instruction that exhibit certain key features of this approach to teaching.

The breach between learning and use, which is captured by the folk categories "know what" and "know how," may well be a product of the structure and practices of our education system. Many methods of didactic education assume a separation between knowing and doing, treating knowledge as an integral, self-sufficient substance, theoretically independent of the situations in which it is learned and used. The primary concern of schools often seems to be the transfer of this substance, which comprises abstract, decontextualized formal concepts. The activity and context in which learning takes place are thus regarded as merely ancillary to learning—pedagogically useful, of course, but fundamentally distinct and even neutral with respect to what is learned.

Recent investigations of learning, however, challenge this separating of what is learned from how it is learned and used.[1] The activity in which knowledge is developed and deployed, it is now argued, is not separable from or ancillary to learning and cognition. Nor is it neutral. Rather, it is an integral part of what is learned. Situations might be said to co-produce knowledge through activity. Learning and cognition, it is now possible to argue, are fundamentally situated.

In this paper, we try to explain in a deliberately speculative way, why activity and situations are integral to cognition and learning, and how different ideas of what is appropriate learning activity produce very different results. We suggest that, by ignoring the situated nature of cognition, education defeats its own goal of providing useable, robust knowledge. And conversely, we argue that approaches such as *cognitive apprenticeship* (Collins, Brown, & Newman, in press) that embed learning in activity and make deliberate use of the social and physical context are more in line with the understanding of learning and cognition that is emerging from research.

Situated Knowledge and Learning

Miller and Gildea's (1987) work on vocabulary teaching has shown how the assumption that knowing and doing can be separated leads to a teaching method that ignores the way situations structure cognition. Their work has described how children are taught words from dictionary definitions and a few exemplary sentences, and they have compared this method with the way vocabulary is normally learned outside school.

People generally learn words in the context of ordinary communication. This process is startlingly fast and successful. Miller and Gildea note that by listening, talking, and reading, the average 17-year-old has learned vocabulary at a rate of 5,000 words per year (13 per day) for over 16 years. By contrast, learning words from abstract definitions and sentences taken out of the context of normal use, the way vocabulary has often been taught, is slow and generally unsuccessful. There is barely enough classroom time to teach more than 100 to 200 words per year. Moreover, much of what is taught turns out to be almost useless in practice. They give the following examples of students' uses of vocabulary acquired this way:

Me and my parents correlate, because without them I wouldn't be here.

I was meticulous about falling off the cliff.

Mrs. Morrow stimulated the soup.[2]

Given the method, such mistakes seem unavoidable. Teaching from dictionaries assumes that definitions and exemplary sentences are self-contained "pieces" of knowledge. But words and sentences are not islands, entire unto themselves. Language use would involve an unremitting confrontation with ambiguity, polysemy, nuance, metaphor, and so forth were these not resolved with the extralinguistic help that the context of an utterance provides (Nunberg, 1978).

Prominent among the intricacies of language that depend on extralinguistic help are *indexical* words—words like *I*, *here, now, next, tomorrow, afterwards, this*. Indexical terms are those that "index" or more plainly point to a part of the situation in which communication is being conducted.[3] They are not merely context-sensitive; they are completely context-dependent. Words like *I* or *now*,

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COGNITION IN PRACTICE

Mind, mathematics and culture in everyday life

JEAN LAVE

University of California, Irvine

CAMBRIDGE UNIVERSITY PRESS

ViSTA Plus Design Principles

3. Program form

Module 1	Module 2	Module 3
The practice-based methods course	The student teaching experience	Continued support through the 1st year of teaching
Spring Semester 2014	**Academic Year 2014-2015**	**Academic year 2015-2016**
• Introduces the STeLLA two-lens framework • Introduces students to the process of video analysis • Intertwines learning about science content and teaching pedagogy using two content areas related to energy and matter – food webs and water cycle	• Model lessons support student teachers in enacting strategies in classroom placement • Student teachers videotape one lesson of the series • In online small groups, participant's analyze video clips of their own and their peers' teaching	• Small group teams develop grade-appropriate, STeLLA-based lessons • Teachers videotape one lesson of the series • In online small groups, participant's analyze video clips of their own and their peers' teaching

ViSTA Plus Design Principles

4. Analysis of Practice

- Video of other teachers using program strategies establish a common vision of the strategies and classroom possibilities
- Video of participants teaching common lessons provide an rich initial experience to analyze each teacher’s enactment of the strategies

ViSTA Plus Research Study

ViSTA Plus

Video-based Analysis of Practice of 3 Years during:

Methods Course

Summer Institutes

Study Group Meetings

88 hours of PD

COMPARISON

Business-as-Usual:

Methods Course

Student Teaching

First Year Teaching

Same science content learning goals

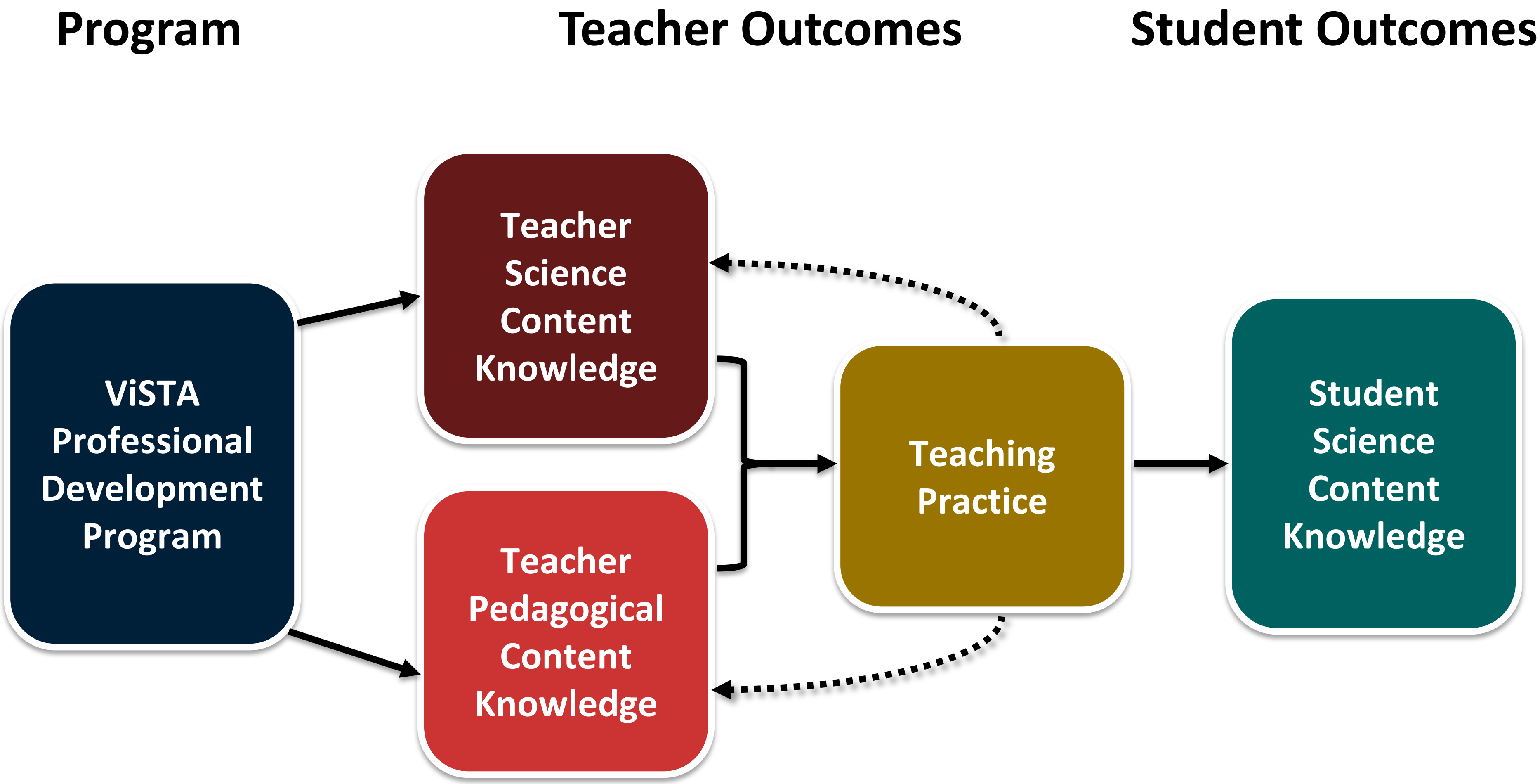
Research Questions

- What gains do ***teachers*** in ViSTA Plus and BaU program experience in science content knowledge, pedagogical content knowledge, and science teaching practice?
- What gains do elementary ***students*** of teachers in ViSTA Plus and BaU groups experience in knowledge of science content?

An Interesting Time to Do Research

- A significant period of change in their lives.
- From students to professionals.
- From being contained to widely distributed.
- New schools, new principals, new district rules, new curricula, new standards, etc. etc.
- Multiple pathways
- Life events
- Fires

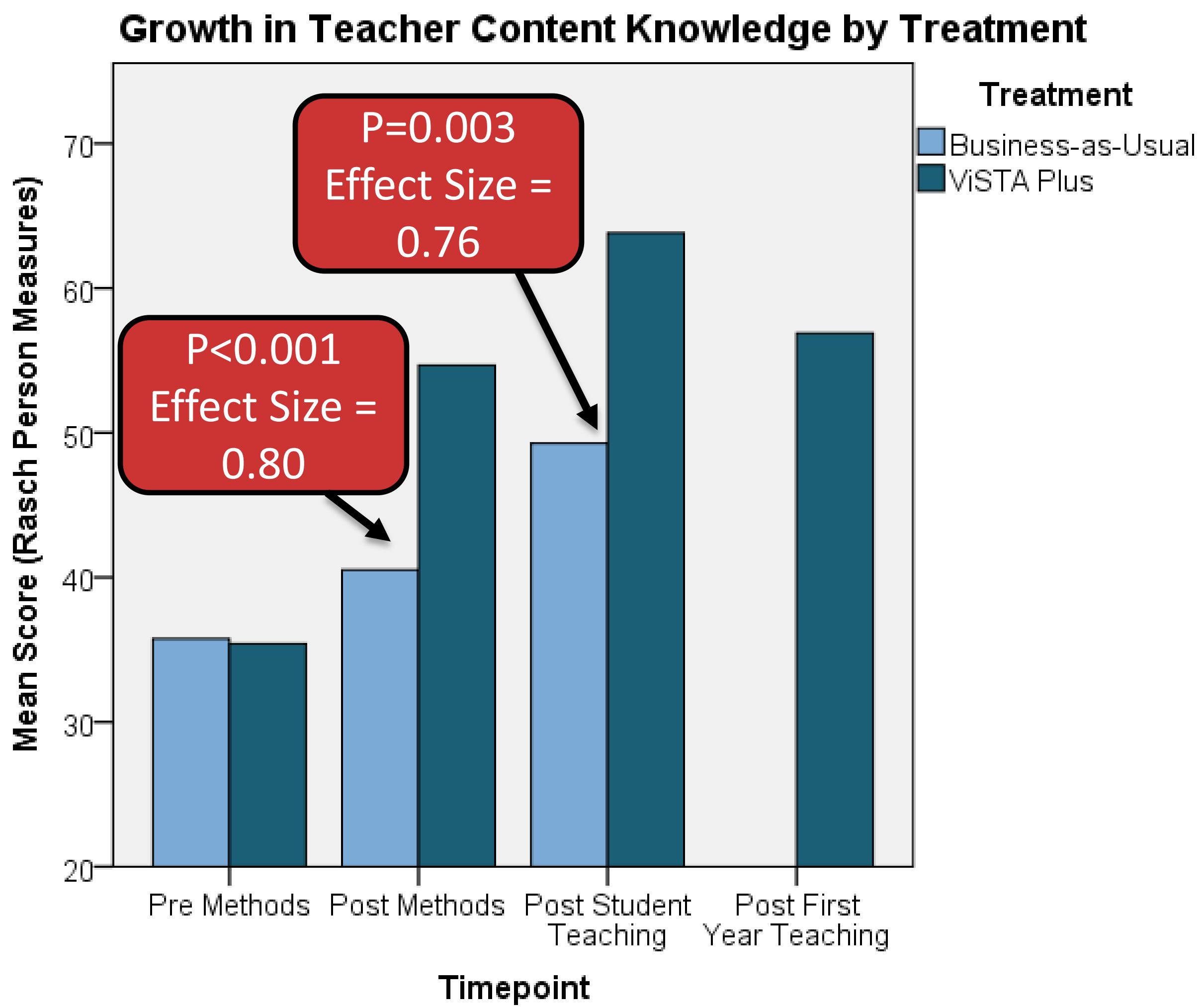
ViSTA Plus Theory of Change



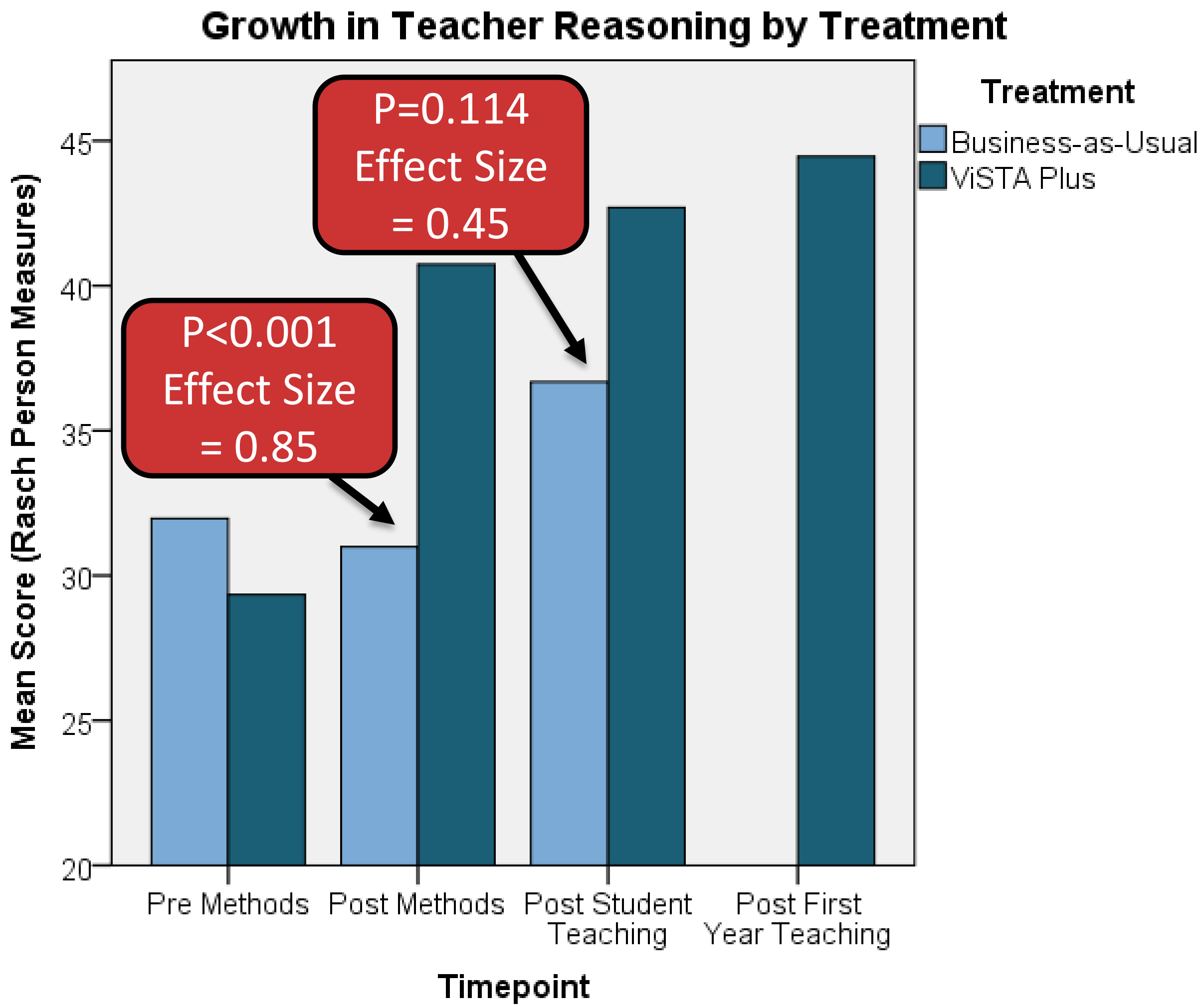
Population and Attrition

	ViSTA Plus	Comparison
Methods Course	53	67
Student Teaching	28	17
First Year Teaching	19	3

ViSTA Plus Results – Teacher Content Knowledge

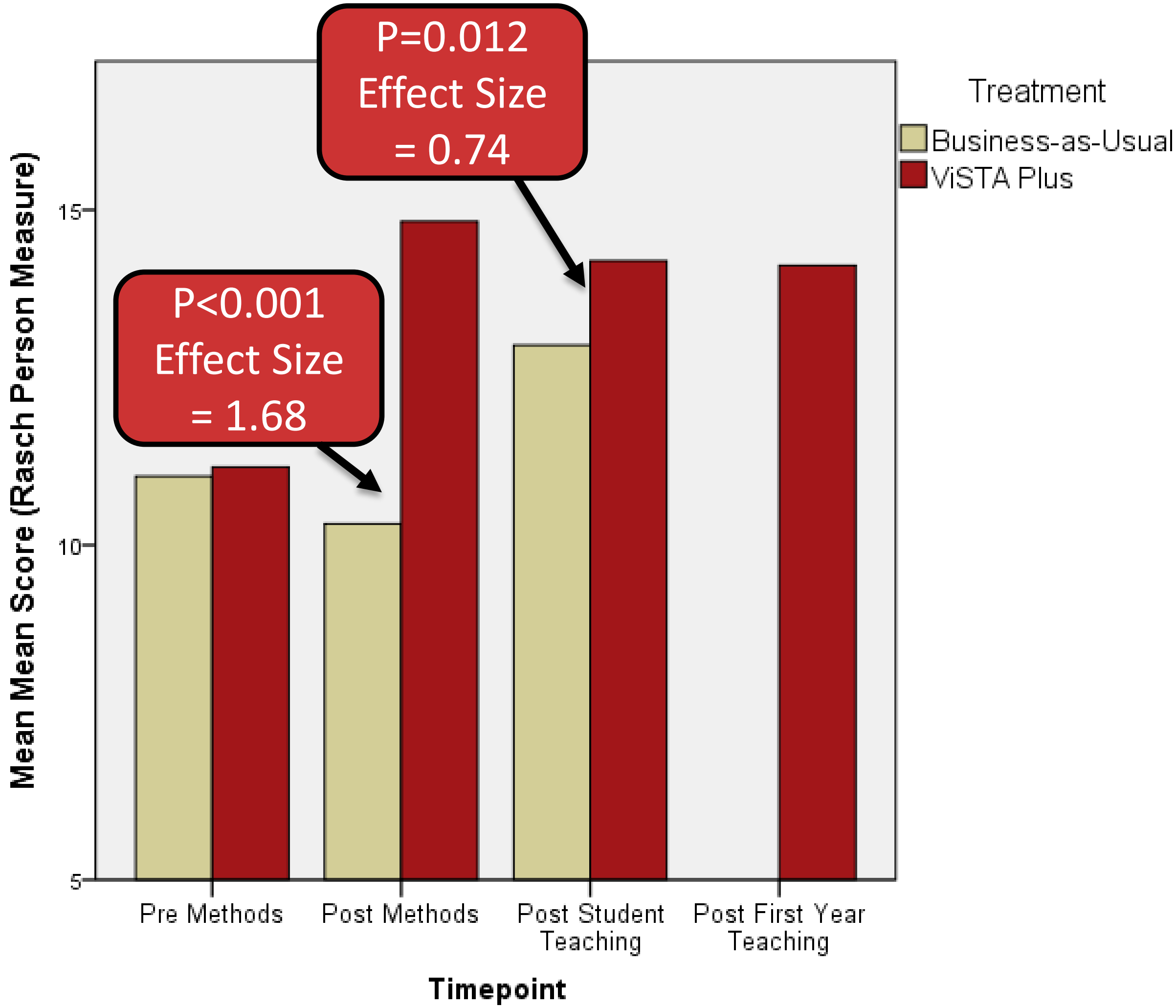


ViSTA Plus Results – Teacher Reasoning

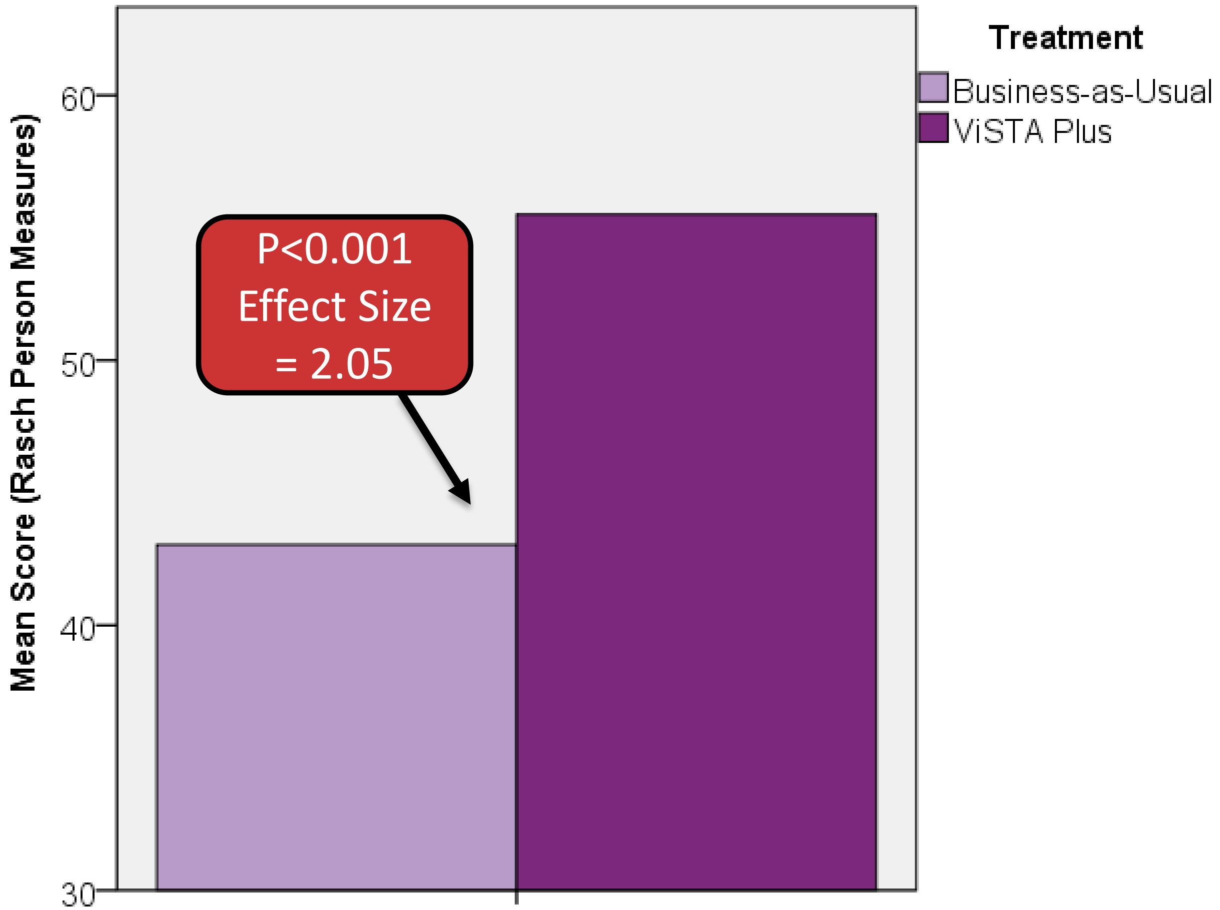


ViSTA Plus Results – Teacher PCK

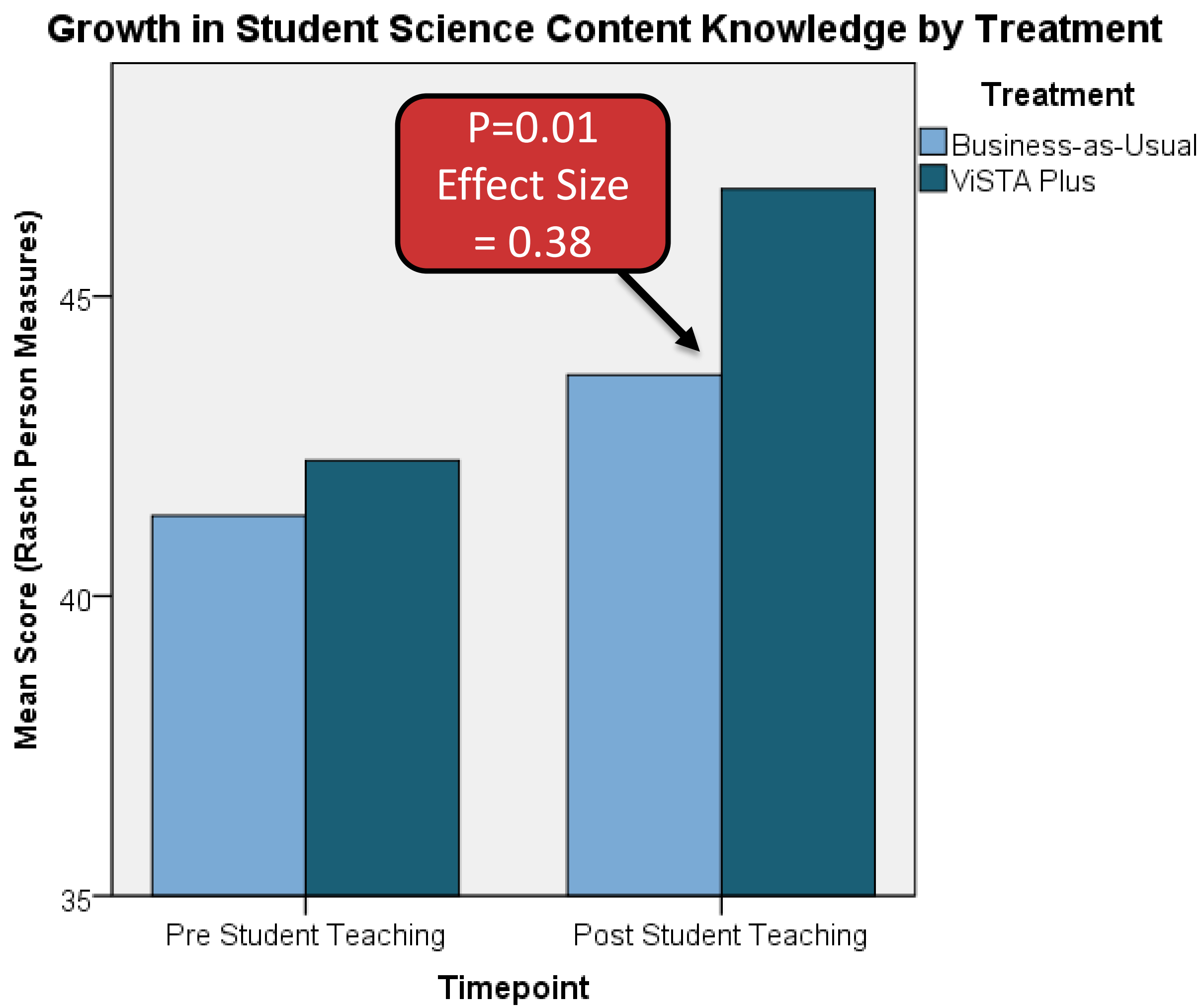
ViSTA Plus Results – Teacher PCK



ViSTA Plus Results –
Teacher Practice (Student Teaching)



ViSTA Plus Results – Student Content Knowledge



Qualitative Analysis

- Anonymous responses from participant surveys
- Participant reflections after study group meetings
- World Café
- Story Corps Interviews

Teacher Feedback and Transformation

- What did participation in ViSTA Plus do for you as a teacher?
  - Greater confidence in science content knowledge (less fear of science content)
  - Greater ability to plan coherent lessons with targeted learning goals (not simply fun activities)
  - Greater skill at using questions to help students investigate their own thinking (not simply telling them the right answer or the right vocabulary term)

Obstacles, Barriers, and Challenges

- Low priority given to science instruction at the schools
- Little respect from their colleagues for new ideas
- Pressure to follow pre-determined curriculum
- Emphasis on teaching to the test (covering the material) rather than on deeper student learning

Teacher Reflection on Student Impacts

- Students learned to express their own thinking, not just right answers.
- Engaging in science through reasoning, rather than being told, supported students' identities and self efficacy for academic work.
- Students were engaged and motivated for science learning.

Next Steps

- Disseminate results
- Develop resources
- Engage the community

    bscs.org/vista-workshop-registration

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