Selecting and Balancing Goals for Professional Development in Astronomy

George Nelson

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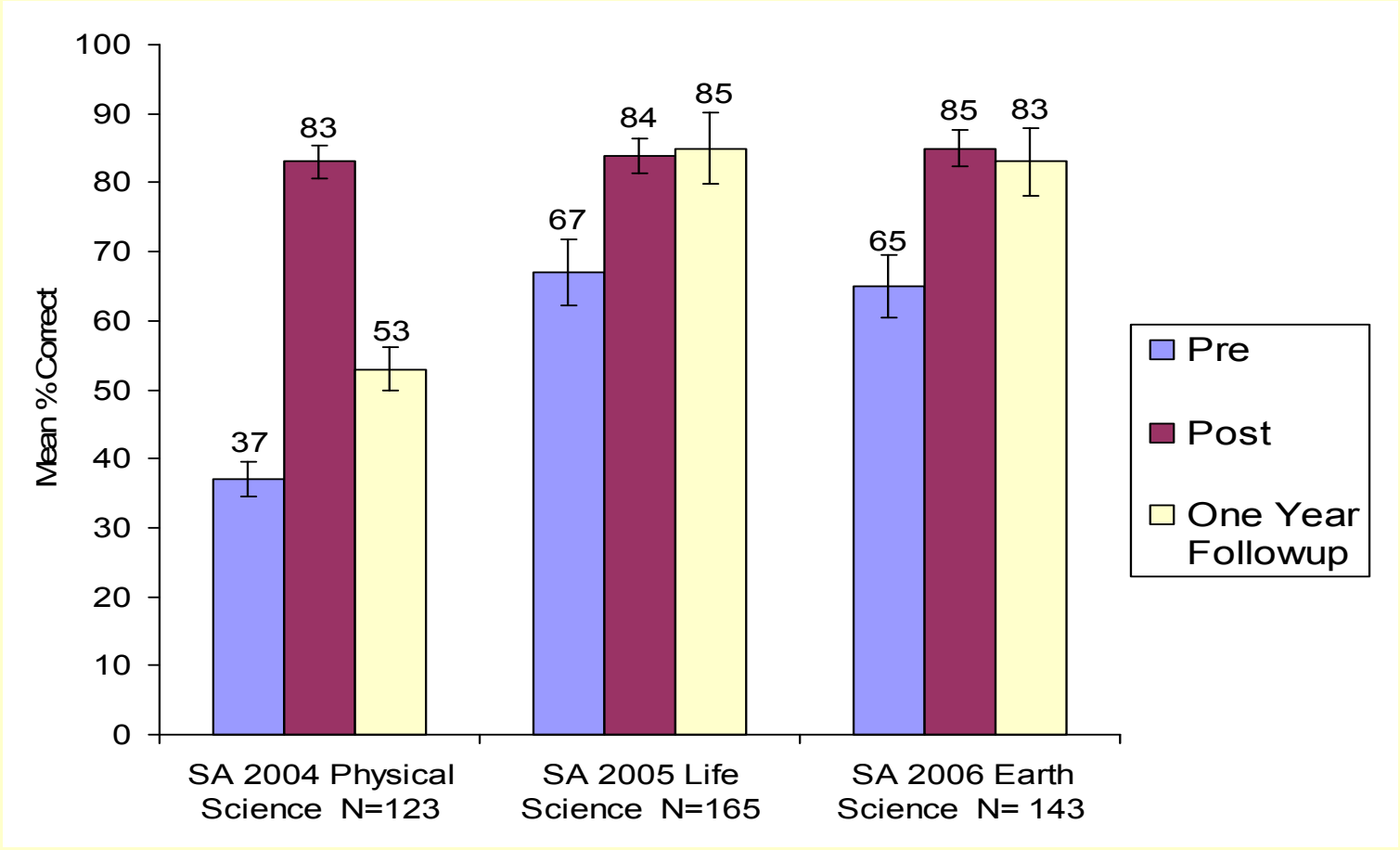
NORTH CASCADES AND OLYMPIC Science Partnership

Teacher Leaders: Content Knowledge



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Teacher Leaders: Pedagogy

Rate your understanding of the topics below both BEFORE and AFTER your Summer Academy (SA) experience.	% Clear to Very Clear Understanding					
	SA 2004 (N=144) Before/After		SA 2005 (N=152) Before/After		SA 2006 (N=130) Before/After	
How to elicit students' thinking	46	90	68	92	70	98
How to help students construct their understandings	49	91	60	90	66	96
How **students** learn science	59	95	79	98	81	99
My own learning process	72	98	87	99	90	100

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Washington Standards

K-1 The Sun and the Moon have patterns of movement that can be observed and recorded.

2-3 The Sun and Moon have patterns of movement that can be inferred by observing and recording shadows cast by the Sun.

4-5 Earth is spherical in shape. It spins on its axis and orbits the Sun.

6-8 Our Solar System is held together by gravity. Moon phases and eclipses are explained.

9-12 Physical principles apply to the origins and development of the Earth and the Universe.

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Detailed Standards

Grade 9-12 Content Standards

9-11 ES1A Stars have —life cycles. During their active periods, stars produce heavier elements, starting with the fusion of hydrogen to form helium. The heaviest elements are formed when massive stars —die in massive explosions.

9-11 ES1B The Big Bang theory of the origin of the universe is based on evidence (e.g., red shift) that all galaxies are rushing apart from one another. As space expanded and matter began to cool, gravitational attraction pulled clumps of matter together, forming the stars and galaxies, clouds of gas and dust, and planetary systems that we see today. If we were to run time backwards, we would find that all of the galaxies were in the same place 13.7 billion years ago.

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Performance Expectations

Connect the life cycles of stars to the production of elements through the process of nuclear fusion.

Cite evidence that supports the —Big Bang theory (e.g., red shift of galaxies or 3K background radiation).

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Big Ideas in Astronomy

From 3000 BCE -- *preserving appearances*

Patterns, Geometry (phases, eclipses), Scale (size of Earth)

From 17th-19th Century -- *explaining motions*

Gravity, Light, Scale (size of Solar System, distance to nearby stars)

From 20th + Century -- *describing physical characteristics of objects*

Gravity (structure of planets, stars, galaxies, and universe), Energy (E&M, thermal, nuclear), Scale (space and time), Chemistry

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Curriculum Resources

Physics by Inquiry (McDermott *et. al.*)

Lecture Tutorials in Astronomy (Slater, Prather, *et. al.*)

Project Star (Sadler)

GEMS Space Science (Barber *et. al.*)

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