

MONASH EDUCATION

Why is teaching science through *inquiry* crucial for boys and girls in basic education?

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Educating for an uncertain work future/workforce







Setting the scene: Key trends in a changing workforce



STEM: Its place in our futures

SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS

The U.S. will have more than 1.2 million job openings in science, technology, engineering and math (STEM)-related occupations by 2018. These include scientists, doctors, software developers and engineers. Yet, there will be a significant shortage of qualified college graduates to fill these careers. For the U.S. to succeed and continue to play a leadership role in addressing tough global challenges, we must do a better job of engaging students in these subjects and encouraging them to pursue careers in STEM-related fields. Here is a look at how early education plays a part in inspiring students to seek a higher education in STEM and what motivates students to pursue STEM-related fields. ⁴

OF JOBS IN THE NEXT DECADE WILL REQUIRE TECHNOLOGY SKILLS.⁵

The U.S. ranks 25th out of 30 in an international assessment of high schoolers' performance in math.²

The U.S. Department of Labor has projected that by 2018, the U.S. will have more than 1.2 million job openings in STEM fields.⁴

ONLY 16% OF BACHELOR'S DEGREES IN 2020 WILL SPECIALIZE IN STEM⁶

What does this mean to us as teachers?

65% of today's school kids will end up doing jobs that haven't even been invented yet.

Alexis Ringwald Co-founder and CEO LearnUp

Pushing the teaching aside ... what does this mean for learning?

Required skills ... 21C in action

Information Literacy

Appropriate applied research to any given challenge. The ability to find useful and reliable information.

Collaboration

Working together to share, advocate, and compromise on issues critical to teams success.

Communication

The ability to properly read, write, present, and comprehend ideas between a variety of mediums and audiences.

Creativity & Innovation

Exploration of imagination. Refining and improving original ideas.

Problem Solving

Experimentation of new and familiar concepts while processing information until a viable solution is reached.

Responsible Citizenship

Demonstration of proper technology use, global awareness, and moral capacity in and outside of the classroom.

What is inquiry?

- More than just finding out an answer
- Not a set of established facts or a smooth path to knowledge
- Spark of curiosity
- Desire to know
- Posing problems and questions
- Active rather than passive process

Inquiry: Where might the science fit?

- Engages in scientifically orientated questions
- Priority to evidence in responding to questions
- Formulates explanations from evidence
- Connects explanations to scientific knowledge
- Communicates and justifies evidence

(NRC, 2012)

Science inquiry: Link between 21C skills and STEM future workforce

Teaching: Why inquiry approaches to science teaching matter?

- Inquiry underpins quality teaching in science
- In their synthesis of three key documents, Hackling and Prain (2005) identified a strong convergence around six characteristics of effective science teaching
 - students are actively engaged with inquiry, ideas and evidence
- Ideal ways to enhance scientific literacy (goal of science education) were expressed through nine themes (Goodrum et al., 2001)
 - teaching and learning of science is centred on inquiry, whereby students investigate, construct and test ideas and explanations about the natural world

Learning: Why inquiry approaches to science learning matter?

- From teacher-centred delivery of knowledge to studentdriven exploration – students feel included and valued as science learners (Bybee, 2006; Goodrum, 2006).
- Inquiry-based methods emphasise that student curiosity, observations and problem solving lead to critical thinking about science (European Commission, 2007).
- Inquiry promotes ideas about science informed from:
 - experiences of science phenomena and prior understandings,
 - rich discussions,
 - teacher feedback and support, and
 - opportunities to represent understandings over the learning process (Hackling, Peers & Prain, 2007).

Sowing the seed: Promoting these qualities across basic education

So, why is inquiry crucial for basic science education?

Thank you and questions

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