

Informally SPEAKING

The Newsletter of the Informal Science Education Association of Texas

February 2004

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The mission of the Informal Science Education Association (ISEA) is to improve science education in Texas by supporting partnerships among informal and formal educators.

CAST 2003 in Houston: Science education recharged

Nearly 5000 Texas science teachers attended the Conference for the Advancement of Science Teaching in Houston on Oct. 30–Nov. 1, 2003. ISEA and informal science centers were well represented at the conference. Martha Griffin Kolbe of the McGovern Museum of Health and Medical Science and Carolyn Sumners of the Houston Museum of Natural Science served on the CAST planning committee and met for many months prior to CAST, planning all of the many details that go into this conference. ISEA hosted a joint reception with the Texas Science Education Leadership Association on the Wednesday night before CAST began. Several informal science sites had tables at this event where hands-on activities were featured. Informals

had terrific booths in the exhibit hall and led many short courses and workshop sessions. ISEA hosted another great workshop on summer opportunities for teachers. Four informals - The Houston Zoo, Children's Museum Houston, McGovern Museum of Health and Medical Science and the Houston Museum of Natural Science - hosted a trick-or-treat social night at their sites on Halloween Night. Good food, good science, and spooky activities were enjoyed by all! Next year, CAST will be in Corpus Christi and Tara Schulz, Education Director of the Texas State Aquarium, is the local arrangements chair! How's that for informals working hand-in-hand with formal education? Plan on attending CAST in Corpus Christi, November 4–6, 2004.

FOCUS ON The evolution "debate": Science and pseudo-science

As science educators, we have a duty to uphold the scientific method, allow intellectual freedom, and filter out science from pseudo-science in our professional lives to help create a more learned public. Recently, we Texans were privy to the debates held during the Texas State Board of Education biology textbook adoption process. During this process, a concept called *Intelligent Design* was mentioned frequently as an alternative to evolution. Another term, *modern synthesis*, is used to describe the confluence of

molecular biology, biochemistry, genetics, paleontology, ecology, mathematics, etc., to explain aspects of evolutionary theory. This article will provide a modest background to Intelligent Design (ID), as it is used in discussions of evolution and modern synthesis.

What is Intelligent Design?

According to the Discovery Institute, a conservative think tank based out of Seattle, WA, and a proponent of ID, "The theory of intelligent design holds that

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Focus on: Science and pseudo-science, con't. from p. 1

certain features of the universe and of living things are best explained by an intelligent cause, not an undirected process such as natural selection.”

The claims of ID are formally presented and typified by authors such as Michael Behe (*Darwin's Black Box*, 1996) and William Dembski (*The Design Inference*, 1998). The authors argue that an intelligent designer (God, extra-terrestrials, an algorithm, etc.) must be behind some if not all natural phenomena, such as biological entities, evolution, and the very nature of the universe. Dembski packages ID as a theory of information, concluding that information is not reducible to natural causes, suggesting that the origin of information is best sought in intelligent causes. Key concepts of ID are *irreducible complexity*—the idea that a designed object is one that is planned in advance, with forethought by an intelligent agent exhibiting consciousness—and *complexity specification*—the idea that phenomena exhibiting the criterion of both complexity (non-chance) and specification (information coded for an intelligent message) can only have been created by intelligent beings. Dembski purports that in any given instance where information is both complex and specified, the only cause for such an event is an intelligent entity. However, the assumption that information that is both complex and specified, necessitating an intelligent designer, exists in the realm of philosophy, because it is a hypothesis that cannot be tested.

Hypothesis, Methodology, Theory

The critique leveled against ID is that it is not a theory, rather it is a philosophy about the nature of self-organizing entities and strictly speaking, ID is a hypothesis. In order for an idea to become a theory it must go through all the steps that all ideas go through. Theories must be falsifiable, based on facts, and involve hypothesis testing through methodological rigor.

Humans perceive units of information known as facts. Facts are then integrated into a coherent framework creating a causal connection between two or more variables (these variables are known as independent and dependent variables). The explanation of causality is called a hypothesis. To

determine the accuracy of a hypothesis, the hypothesis is tested. To test a hypothesis, a methodology is specified (e.g., instruments to be used, variables to be controlled, time limits, settings, etc.). If the hypothesis is demonstrated to be inaccurate using the specified methodology, then the hypothesis or the methodology can be adjusted and re-evaluated to represent the observed phenomena or more facts can be observed to relate causality. If the hypothesis is demonstrated to be accurate using the specified methodology, the hypothesis is confirmed. In order for the hypothesis to become established as a correct estimation of naturally occurring phenomena, the hypothesis must be tested by several independent observers who use the specified methodology. If the hypothesis is demonstrated by many independent observers to be a correct estimation of the specified variables using the specified methodology, then the hypothesis can be considered a theory. Because science works in the medium of probabilities and error reduction, theories can never be thought of as true, rather, theories are our estimation of causality embedded in a specified methodological matrix.

Conclusions

At best, ID is philosophy based in the rationalist tradition (think Descartes) on the nature of self-organizing phenomena and information. In order for an idea to be elevated to the status of theory it must be empirically testable and falsifiable.

As informal science educators, we face the challenge of dealing with such sensitive issues as modern synthesis and ID. Our duty is to serve the public and become a bastion of critical thinking so that others may benefit. If we are faced with an instance of contrary opinion to the scientific method, simply offer it as the best method we have of relating causality with satisfactory solutions. If someone counters that modern synthesis is “just a theory,” help them understand the nature of scientific theories. You might point out that optics is also “just a theory,” but that it works fairly well for those of us who wear prescription glasses . . .

by Shane J. Macfarlan
Lubbock Lake Landmark

Science Learning Collaboratory:

Bringing local museum resources to middle school teachers via the web

Museums are now taking the needs and interests of K-12 teachers much more seriously. The federal Institute of Museum and Library Services (IMLS.gov) recently released, "True Needs, True Partners," the results of its 2001-2002 survey of over 15,000 museums of all kinds in the U.S. IMLS found that the median museum expenditures on K-12 programming have increased four-fold since 1995, with over \$1 billion spent on over a million hours of educational programming in 2002 alone. In addition, over 72% of museums now use the web for some kind of online teaching and learning, and over 50% of museums communicate regularly with teachers and educators by email. Finally, many of these museums are now struggling to find ways to align their wealth of informal learning resources with state standards

In early 2002, a group of educators in California decided that teachers in the San Francisco Bay Area needed much easier access to the vast array of museum resources that were available on the web, as well as being able to determine how these resources were aligned with California state science standards. Despite the fact that all the science-technology museums in the Bay Area have web sites and over \$1 Billion worth of both informal learning and formal science education curriculum resources, many teachers still do not take advantage of this wealth of science learning resources. Also, many teachers, especially those in middle schools, are not able to visit science museums with their students during the school year.

Seeing this need, DesignWorlds for Learning, Inc., in collaboration with Rockman et cetera (a non-profit organization), designed and developed the Bay Area Science Education Collaboratory, a growing web-based educational resource and online learning and professional development community for science education. The Collaboratory was designed especially for use by teachers and parents, as well as by museums, universities and other science education providers. It provides teachers with a 'light switch easy' interface and easy access to a wealth of local informal

science resources, as well as grade-level appropriate alignment to state science standards. Not only does this Collaboratory have a local or regional focus (thus encouraging families and schools to visit and take advantage of the diversity of different museums available in the Bay Area), but it is also designed by and for teachers, working in partnership with museum educators, scientists, and college students and faculty. In addition, teachers are paid stipends and have received college credit for active participation in workshops at various informal sites as part of designing and "seeding" this dynamic learning garden. They then select, design and annually edit the "best of the best" to include in the Collaboratory. The initial pilot for this project was funded by the William and Flora Hewlett Foundation, with an additional recent grant from the Elizabeth & Stephen Bechtel, Jr. Foundation, and in less than a year, it has been a feature story of EarthNews Radio (through NPR affiliate station KALW in the Bay Area). I met Dr. Ted Kahn, President and CEO of DesignWorlds for Learning and the founding director of the Collaboratory, when he presented his work at a poster session at the first San Francisco Bay Area Institute of the NSF-funded Center for Informal Learning and Schools (CILS) at U.C. Santa Cruz in August 2003. After many discussions, and the gained support of the Texas ISEA, we have decided to work towards getting this same project implemented in Texas. Dr. Kahn will be a featured speaker at the upcoming ISEA Conference in Port Aransas.

by Christy Youker, PhD

For more information on this fun project, contact Christy Youker at christyyouker@texasbb.com or Ted Kahn at ted@designworlds.com. To learn more about the Bay Area Science Collaboratory, please visit the DesignWorlds website at www.designworlds.com.

WEIRD SCIENCE FACT

Xenobiologists have used computer simulations to study the characteristics of theoretical life forms that are based on left-handed DNA.

(www.wikipedia.org)

Participant Questionnaire

Circle all that apply to your organization:

- | | |
|-------------------|--------------------|
| Aquarium | Art Museum |
| Botanical Garden | Business/Industry |
| Children's Museum | K-12 Educator |
| Nature Center | Science Center |
| State Park | College/University |
| Government | Zoo |
| Other | |

Circle all that apply to yourself:

- | | |
|----------------------|-------------|
| Educator | Interpreter |
| Exhibit Designer | Consultant |
| Higher Ed. Professor | Supervisor |
| Classroom Teacher | Student |
| Other | |

Please indicate which ISEA conferences you have previously attended:

2003	2002	2001
2000	1999	1998

Is your informal institution listed in the Regional Resources section of the Dana Center Science Toolkit? Yes No

If not, would you like to be? Yes No

To review the Dana Center Science Toolkit, see www.scienceTEKStoolkit.org

Informal Science Education Association

Thinking Across the Disciplines

7th Annual Conference
March 3-5, 2004

University of Texas
Marine Science Institute
Port Aransas, Texas

www.statweb.org/isea

Conference Program Questions?

Contact junkdeb@mail.utexas.edu

Registration Questions?

Contact cappy.manly@tpwd.state.tx.us

ISEA presents Thinking Across the Disciplines

REGISTRATION FORM

What is the Informal Science Education Association (ISEA)?

Formed as an action team in 1996 by the Charles A. Dana Center, the ISEA is a non-profit association with members from a variety of organizations including museums, zoos, aquaria, parks, nature centers, universities and other science-rich institutions. The ISEA hosts an annual conference featuring nationally renowned speakers, dynamic workshops, field experiences, and networking opportunities.

Conference Location:

The University of Texas Marine Science Institute has active research programs in marine science disciplines including the physiology, biochemistry and ecology of marine plants and animals; dynamics of marine ecosystems; biogeochemistry; mariculture; toxicology; and environmental monitoring. It is the oldest marine research station on the Texas Gulf Coast. For more information about the UTMSI, visit www.utmsi.utexas.edu.

Lodging:

Conference participants can either stay in dorm-style lodging at the UTMSI or make arrangements at a local hotel. Two local hotels will be offering state rates for conference participants:
Allister Inn
Best Western Ocean Villa

For more information, visit
www.statweb.org/isea

CONFERENCE HIGHLIGHTS:

Keynote Speaker: Thomas Darwin, Ph.D.

Dr. Thomas Darwin is the Director of Professional Development and Community Engagement at the University of Texas at Austin. He currently teaches courses on communication, consulting, learning, ethics, and entrepreneurship, as well as workshops on effective collaboration, innovation, and community engagement.

Featured Speaker: Ted Kahn, Ph.D.

Dr. Ted Kahn of Designworlds for Learning, Inc, of San Jose, CA, is co-developer of the Bay Area Science Education Collaboratory. This web-based science learning resource was designed with informal science sites and middle school teachers.

Featured Speaker: Allison Brody, Ph.D.

Dr. Allison Brody is the Director of Educational Programs at the Oklahoma City Zoo where she uses inquiry in her educational programs for teacher professional development and schools.

FEATURED EVENTS:

Short Course: Math Momentum for Informals

This short course presented by ASTC, the Ft. Worth Museum of Science and History, and TERC, a leading educational resource center, will explore the role of math in science centers, focusing in particular on data. Participants will consider how to identify and create experiences that will allow visitors to broaden and question their view of math and data and to begin to own math for themselves.

GEMS Workshops: Great Explorations in Science and Math

Learn about the hands-on GEMS curricula developed by the Lawrence Hall of Science at the University of California, Berkeley.

Boat Trip: UTMSI Research Vessel, The Katy

Tour the Gulf of Mexico on the UT Marine Science research vessel. ****Katy trips are an additional \$20, payable by cash on-site.**

Send completed registration form to:
Informal Science Education Association
P.O. Box 91983
Austin, TX 78709-1983

Name: _____

Title: _____

Institution: _____

Email address: _____
Important: All conference correspondence will be done by Email!

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Conference fee:
(includes food and dorm lodging) \$150
(food only, no dorm lodging) \$100

Late conference fee (after 1/31/04)
(food only, no dorm lodging) \$175
(food only, no dorm lodging) \$125

On-site Registration Fee
(food only, no dorm lodging) \$200
\$150

Conference fee enclosed: _____

Send a check or money order (no PO's please) payable to ISEA. Refund requests must be submitted by 2/15/04. No refunds after 2/15/04. Fees can be transferred to another educator from the same organization. Please submit transfer request in writing.

Limited scholarships available. See ISEA website for details. Scholarship request deadline is 1/31/04.

Space in Featured Events is limited. Please rank the events in order of preference:

_____ GEMS (Thurs. 9:30-12:00) _____ GEMS (Fri. 9:30-12:30)

_____ Math Momentum _____ Katy (Wed. 3:00-5:00)

_____ Katy (Thurs. 9:30-11:30) _____ Katy (Thurs. 3:00-5:00)