Let's talk about integrating technology in inclusive science classrooms

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Paper presented at the 2004 National Science Teachers Association (NSTA) Annual Convention, Atlanta, GA, April 1-4

Abstract

Recent data from the National Center for Education Statistics (2002) noted that students with disabilities make up 13.2% of the student population in public schools. Due to recent federal government legislation that includes the *Individuals with Disabilities Education Act* (1990) and *No Child Left Behind Act* (2001) more and more school districts are moving students out of self-contained science classrooms (where they often received little or no science instruction) and into inclusive science classroom settings, a 30% increase in the last decade. This steady increase of inclusion is highly beneficial to students, but it creates special challenges for teachers of science, many of whom were not trained in special education. In inclusive science classrooms, all students are expected to meet *standards* for science education. These *standards* include developing understandings of science content knowledge and scientific thinking skills (National Research Council, 1996).

Our group developed a science instructional practices inventory to be used by inservice and preservice teachers to reflect on their practices and thinking of classroom instruction and technology use in inclusive science classroom settings. *The Classroom Instruction with Technology for Inclusion: The Science Instructional Practices Inventory* (*CITI:SIPI*) was developed in collaboration between two university faculty members, a science educator/researcher and a special education educator/researcher, partnered with a classroom science teacher and a special education teacher who co-instructed in an inclusive high school science classroom. The development of the *CITI:SIPI* was informed by (1) educational research, (2) recommendations from national organizations involved with enhancing teaching and learning, and (3) data gathered from curricular implementations in inclusive science classroom settings through the collaboration.

The *CITI:SIPI* is an instrument for inservice and preservice science teachers to use to reflect and think about a variety of factors they must manage to influence student science learning in inclusive classrooms. These include instructional strategies, inquiry supports, assessment tasks, and classroom culture. In addition, *CITI:SIPI* items prompt science teachers to think about how to (1) use pedagogical content knowledge to customize learning materials to meet the diverse learning needs of students, (2) use instructional technology appropriately in different instructional contexts, and (3) improve communication with a variety of individuals within the school community.

The instrument consists of three major divisions: *Curriculum and Instruction*, *Technology*, and *Communication*. Each of these divisions is subdivided into related categories. Each category is further subdivided into distinct sections. Figure 1 displays each category with the three divisions and its sections. Each section of the *CITI:SIPI* consists of a series of questions and reflective statements about one's instructional practices and learning environment. This session primarily focuses on the **Technology division** of the inventory.

The *CITI:SIPI* instrument is available online at: **http://www.lehigh.edu/~amb4/citi/**

Overview of Presentation

- **Brief History of the Inventory Development**
- **Use of the Technology component of the Inventory**
- **Recommendations for use of the Inventory**

Inventory Development

- **A Partnership**
  - **Lehigh University-Science Education and Special Education Faculty**
  - **Emmaus High School-Inclusion classes**
- **Two years in development through**
  - **Piloting a Web-enhanced textbook**
  - **Use of research data**

Roles of School-Based Participants

- **Biology teacher in an inclusive classroom setting**
- **Special Education Teacher**
  - **Observed student attention during instruction**
  - **Assisted students during activities/lab**
- **Classroom instructional aide also assisted**

Role of University Researchers

- **Participant observers. They became "part of the furniture."**
- **Provided feedback after laboratory and classroom activities**
- **Offered pedagogical advice for the improvement of student learning**

Computer Implementation

- **Computer lab: 20 operating PC desktops. One PC connected to a Dukane projector**
- **Classroom: 7 desktops on mobile carts connected to an 8 port Ethernet**
- **One computer classroom model with laptop attached to an LCD projector**

Evaluated Curriculum

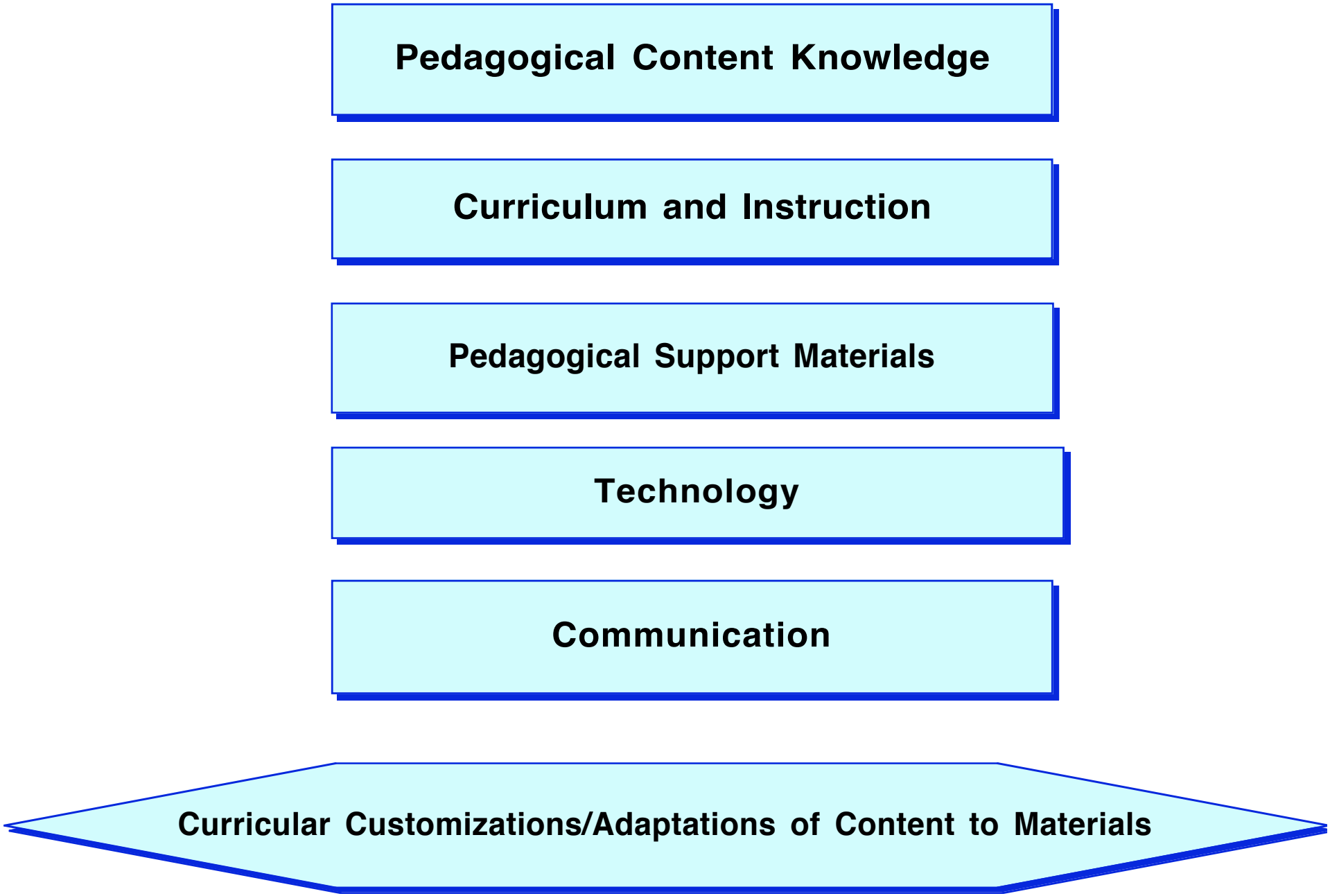
- **NSF evaluating field test of a new curriculum (*Exploring Life*)**
- **Web-integrated high school biology curriculum**
- **4 "E" Learning Cycle model**
- **Inquiry-based lab program including Guided Research labs**
- **Concept focused on the "Big Ideas" of biology**

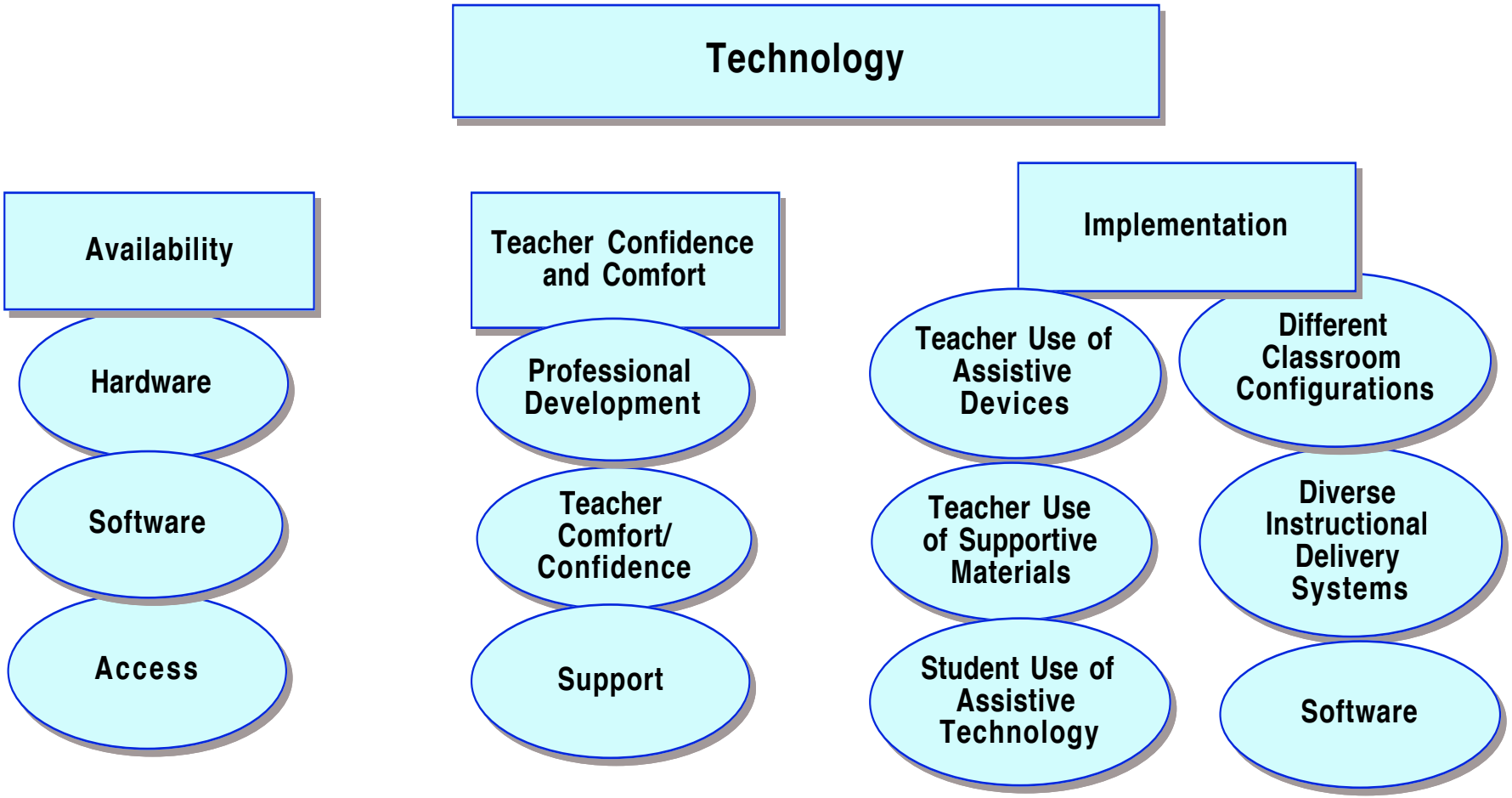
Role of Technology

- **Drag and drop features allow for visual and tactile experience**
- **Learners can pace their instruction through use of control bars for pause and replay**
- **Auditory responses draw attention to key points**
- **Approach instruction in different ways (diverse modalities)**

Classroom Instruction with Technology for Inclusion: Science Instructional Practices Inventory (CITI/SIPI)

WHAT IS IT?


Pedagogical Content Knowledge
Curriculum and Instruction
Pedagogical Support Materials
Technology
Communication
Curricular Customizations/Adaptations of Content to Materials


Technology
Availability
Hardware
Software
Access
Teacher Confidence and Comfort
Professional Development
Teacher Comfort/ Confidence
Support
Implementation
Teacher Use of Assistive Devices
Different Classroom Configurations
Teacher Use of Supportive Materials
Diverse Instructional Delivery Systems
Student Use of Assistive Technology
Software

Use of the Inventory

- **Pre-professional development**
  - **Training of prospective teachers**
  - **Mentoring student-teacher**
- **Professional Development**
  - **Personal use of teacher**
  - **Mentoring new teachers**
  - **Planning for professional development programs within a science department**
  - **Planning professional development programs within a school district**