Instructional Strategies that Enhance Teaching and Learning

By

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Presentation Outline & Goals

• Outline:
  – Establish Context
  – Tell Stories
  – Share “What Works”
  – Putting the Pieces Together

• Goals:
  – By the completion of the presentation, attendees will be able to identify two to three:
    • of the most common learning problems experienced by students who are d/hh
    • reasons for those learning problems
    • multimedia and instructional strategies that can be used to address those learning problems
Establish Context
Barriers to Learning

• What are the barriers to learning your students face?
  – Language...delays due to lack of incidental learning...lack of vocabulary
  – Lack of personal experiences
  – Lack of expressive ability
  – Not practicing....doing their home work...stays in the classroom
  – Emotional health...isolation...self esteem
  – Lack of support for learning
• How do you use technology to address those barriers?
  – Smartboards
  – Video phone
  – DVD recorder/player on laptop
  – Instructional software to assist with learning
  – Tyewell transcription system
  – Video clips...united streaming
  – Internet
  – Document cameras
• What preparation, or support, have you received in the use of technologies to enhance teaching and learning?
  – PATINS project in IN
Tell Stories
A brief story about a long journey

• In 1971, when I graduated with a B.S. in Deaf Education, I thought I knew it all.

• Once I began teaching, I began to realize how little I knew and how much I was teaching from the “seat-of-my-paints,” rather than proven instructional strategies.
• This realization led me to go back to school from 73-74 for a M.Ed. (Vocational Rehabilitation & Emotional Disturbance) and once more from 77-80 for a Ed.D. (Linguistics & Research Methodology).

• In 1980, I went from trying to figure out how to teach, to preparing individuals to become teachers of students who were deaf/hard of hearing (d/hh)!
• By 1991, I had just about had it, and was seriously considering leaving the field of Deaf Education. I was burned out and even less confident in my knowledge of how to teach students who were d/hh. It seemed that the more I learned, the less I, or anyone else, knew.

• This is when, as a result of attending a conference, I had my epiphany regarding Deaf Education.
Epiphany

• Students:
  – The primary problem of students who are deaf/hard-of-hearing (d/hh) is not too little hearing, but too much isolation from peers, meaningful learning opportunities and high expectations for academic performance.

• Teachers:
  – The primary problem of PK-12 deaf education professionals is not too little effort, but too much difficulty in collaborating with peers, in sharing effective instructional practices and accessing needed learning resources.

• Faculty:
  – The primary problem of deaf education teacher preparation is not too little innovation, but too much theory that is not grounded in the day-to-day instructional practices of the nation's most effective professionals for students who are d/hh.
• This epiphany occurred just as personal computers and the Internet began to emerge as educational tools.

• I saw these, and later technologies (e.g., LCD projectors, document cameras, SmartBoards, video phone, PowerPoint, Inspiration, etc.), as way to enhance Deaf Education.
• Between 1991 and 2006 I received over $5,000,000 in grants to enhance teaching and learning by reducing isolation, sharing “what works,” recognizing instructional excellence and encouraging the use of instructional technologies within the field of Deaf Education.

• The Deaf Education Web site (http://www.deafed.net/) was one of the products of these grants
• All of these grants were based on the premise that increased technology use would eventually result in an improvement of the academic performance of students who are d/hh.

• Unfortunately, this premise has yet to be realized.

• It was not until 2007 I that I began to understand why.
My Mistake

• In 2007 I began to read the research of Richard Mayer on multimedia learning.
• It was through this reading that I began to understand why my efforts were not resulting in the improved academic performance of students who are d/hh.
• Prior to this time, I had focused upon the use of technologies to link individuals and to share information.
My Mistake (cont.)

• I had assumed that if I used technology effectively and efficiently to convey targeted information in a visually appealing, interesting, and interactive manner, that it would improve the quality of learning, i.e., individuals would actually use the information within their day-to-day work.

• The problem with this approach is that it did not address a critical factor, i.e., how individuals actually learn.

• This is when I begin to consider the possibility that we could improve our student’s academic performance by matching how we teach, to how they learn.
Share “What Works”

- Students that experience the greatest difficulty learning are very likely to experience the greatest benefit from the effective multimedia design.
- Student learning can be improved via effective multimedia design, design that is based on not what can be done, or what seems interesting, or innovative, but rather on how we learn.
• "...the learner is an active sense-maker who experiences a multimedia presentation and tries to organize and integrate the presented material into a coherent mental representation.
  – ...the teacher's job is to assist the learner in this sense-making process.
  – ...the goal of multimedia presentations is not only to present information, but also to provide guidance for how to process the presented information.
  – ....multimedia is a sense-making guide, that is, an aide to knowledge construction."
• = Student as an individual who is actively trying to understand.

• = Teacher as the individual responsible for assisting/guiding students in developing targeted understanding.

• = Multimedia instruction as a instructional mechanism.

• = Individuals learn through their use of two perceptual channels, i.e., seeing and hearing.

• = Each channel has a limited amount of information it can process at any one time.

• = Individuals actively try to make sense of that they see and hear through association with previous experiences/understanding.
Principles of Multimedia Learning

- Quality of Learning
- Coherence
- Signaling
- Redundancy
- Spatial
- Temporal
- Segmenting
- Modality
- Pre-Training
- Personalization
- Multimedia
Coherence Principle

- **Coherence Principle:** "People learn better when extraneous material is excluded rather than included."
  - Traditional role of teachers...one that is based on an information processing model of instruction...
  - "...knowledge transmission - the idea that learning involves taking information for the teacher and putting it into the learner."
  - Alternative role of teachers...one that is based on a cognitive processing model of instruction....
  - "...knowledge construction - the idea that learners actively build mental representations based on what is presented and what they already know."
Coherence Principle (cont.)

• Implications for Multimedia Instruction" = "Do not add extraneous words and pictures to multimedia presentations. Do not add unneeded sounds and music to multimedia presentations."
Example - Coherence Principle

Diagram

Extraneous Information
Signaling Principle

• **Signaling Principle**: "People learn better when cues that highlight the organization of the essential material are added."

• **Implications for Multimedia Instruction** = "When a learner might otherwise be tempted to focus on extraneous material in a multimedia lesson, signaling should be used to guide the learner's cognitive processing."
Example - Signaling Principle

“What are we talking about?”

At one level...we are talking about enhancing parent’s ability to observe, understand, and respond to their children.

At another level...we are talking about establishing a system to protect children from the horrors of neglect and abuse.

At both levels...we are talking about improving the “odds” that our children will grow up happy and successful.
Redundancy Principle

• Redundancy Principle: "People learn better from graphics and narration than from graphics, narration, and printed text."

• Implications for Multimedia Instruction = "...do not add on-screen text that duplicates words that are already in the narration."

Note: it is not known if this principle applies to captioning.
Example - Redundancy Principle
Spatial Contiguity Principle

• Spatial Contiguity Principle: "Students learn better when corresponding words and pictures are presented near, rather than far from each other on the page or screen."

• Implications for Multimedia Instruction = "Present words and pictures near, rather than far from each other."
Example - Spatial Contiguity Principle
Temporal Contiguity Principle

• Temporal Contiguity Principle: "Students learn better when corresponding words and pictures are presented simultaneously rather than successively."

• Implications for Multimedia Instruction = "Present corresponding words and pictures at the same time rather than separate from each other in time."
Example - Temporal Contiguity Principle

Prevent Child Abuse America
Segmenting Principle

• **Segmenting Principle:** "People learn better when a multimedia message is presented in user-paced segments rather than as a continuous unit."

• "In viewing a fast-paced narrated animation that explains the steps in a process, some learners may not fully comprehend one step in a process before the next one is presented, and thus, they may not have time to see the causal relation between one step and the next."

• "...the segmented versions allowed the learners to digest a portion of the narrated animation before moving on to the next."

• "The essence of the segmenting principle is that when the essential material is too complex for the learner to grasp it all at once, the material should be broken down into smaller segments that the learner studies sequentially."
Segmenting Principle (cont.)

- Implications for Multimedia Instruction = "When the essential material in a narrated animation is too complex - that is, when processing the essential material requires more capacity than is available to the learner - then break the narrated animation into meaningful segments that can be presented under the learner's control."
Example - Segmenting Principle
Pre-Training Principle

• Pre-Training Principle: "People learn more deeply from a multimedia message when they know the names and characteristics of the main concepts."

• "...pre-training provides prior knowledge that reduces the amount of processing needed to understand the narrated animation."

• "Students who have appropriate prior knowledge already know the names and characteristics of the key components, so they can devote their cognitive resources to building a causal model."
Pre-Training Principle (cont.)

• **Implications for Multimedia Instruction** = "When students would be overwhelmed by a multimedia lesson that uses many new terms to explain complex material, provide pre-training concerning the key terms before presenting the lesson."
Example - Pre-Training Principle

**Impact of CA/N:** (Wang, C-T., & Holton, J. (2007)

- **Poor Physical Health...**
  - e.g., chronic fatigue, altered immune function, hypertension, sexually transmitted diseases, obesity

- **Behavior Problems...**
  - e.g., aggression, juvenile delinquency, adult criminality, abusive or violent behavior

- **High-risk Behaviors...**
  - e.g., a higher number of lifetime sexual partners, younger age at first voluntary intercourse, teen pregnancy, alcohol and substance abuse

- **Social Difficulties...**
  - e.g., insecure attachments with caregivers, which may lead to difficulties in developing trusting relationships with peers and adults later in life

- **Poor emotional and mental health...**
  - e.g., depression, anxiety, eating disorders, suicidal thoughts and attempts, post-traumatic stress disorder

- **Cognitive dysfunction...**
  - e.g., deficits in attention, abstract reasoning, language development, and problem-solving skills, which ultimately affect academic achievement and school performance);
Modality Principle

• **Modality Principle:** "People learn more deeply from pictures and spoken words than from pictures and printed words."

• "In the animation-with-on-screen-text version, both pictures and the words enter the cognitive system through the eyes, causing an overload in the visual system. In the animation-with-narration version, the words are off-loaded onto the verbal channel, thereby allowing the learner to more fully process the pictures in the visual channel."

• "According to the cognitive theory of multimedia learning, the processes required for meaningful learning cannot be fully carried out when the visual channel is overloaded..."
Modality Principle (cont.)

- **Implications for Multimedia Instruction** = "When making multimedia presentations consisting of animation and words, present the words as narration rather than as on-screen text."

- **Note:** "There may be situations in which printed text can foster meaningful learning, especially when it is used in a way that is consistent with the spatial contiguity principle. Printed words may also be appropriate when learners are non-native or hearing impaired or when lessons contains hard-to-pronounce words and symbols."
Example - Modality Principle
Multimedia Principle

- **Multimedia Principle:** "People learn better from words and pictures than from words alone."
- "When words and pictures are both presented, learners have an opportunity to construct verbal and visual mental models and to build connections between them."
- "The instructor's job is not only to present material but also to help guide the learner's cognitive processing of the presented material."
- "...the act of building connections between verbal and pictorial mental models is an important step in conceptual understanding..."
Multimedia Principle...(cont.)

• Categorization of text illustrations...
  – [possible model for the possible analysis of curricular material used with students who are d/hh]

• "...categorized each illustration as belonging to one of the following categories:
  – decorative = illustrations that are intended to interest or entertain the reader but that do not enhance the message of the passage, such as a picture of a group of children playing in a park for a lesson on physics principles;
  – representational = illustrations that portray a single element, such as a picture of the space shuttle with a heading, 'The Space Shuttle';
  – organizational = illustrations that depict relations along elements, such as a map or chart showing the main parts of the heart;
  – explanatory = illustrations that explain how a system works, such as the frames explaining how pumps work in Figure 12.2.
Multimedia Principle...(cont.)

- The results were that the overwhelming majority of illustrations served no important instructional purpose; 23 percent were decorational and 62 percent were representational. By contrast, only a small minority of the illustrations enhanced the instructional message; 5 percent were organizational, and 10 percent were explanatory. From this kind of analysis, we can conclude that the potential power of graphics is not being met."

- "Overall, research on illustrations in text yields two important results relevant to the multimedia effect: (a) textbook authors who add illustrations to their text often fail to take full advantage of the potential power of graphics as an aid to understanding, and (b) adding a carefully designed graphic advance organizer to a text passage can greatly enhance student understanding."
Multimedia Principle...(cont.)

• **Implications for Multimedia Instruction** = "The multimedia principle is perhaps the most fundamental principle of multimedia design: Present words and pictures rather than words alone."
Example - Multimedia Principle

Diagram
Personalization

• **Personalization Principle:** "People learn better from multimedia presentations when words are in a conversational style rather than a formal style."

• **Voice Principle:** "People learn better when narration is spoken in a human voice rather than a machine voice."

• **Image Principle:** "People do not necessarily learn better when the speaker's image is added to the screen."
Examples - Personalization

• Use an informal writing style
• Use “human” vs. computer narration
• Do not add individual’s picture.
Goal

• Quality of Learning:
  – Goal is not how much information that is remembered, but how deeply the information is understood, as indicated by the individual’s ability to use it to solve novel problems
Putting the Pieces Together
Current Situation

• What do we know?
  – We know that most students who are d/hh fail to achieve at a level that is consistent with their learning potential.
  – We know that when Mayer’s (2009) “principles of multimedia learning” are used to enhance instruction, that the depth of student learning is consistently and significantly improved.
  – We know that the biggest improvement is realized by students who experience the greatest difficulty learning.
• What do we yet need to learn?
  – We need to learn how to use Mayer’s (2009) “principles of multimedia learning” within the education of students who are d/hh.
  – We need to learn if this use results in an enhanced depth of student learning.
  – We need to learn why such results occur?
  – We need to learn how to convey the resulting knowledge and instructional strategies to both Deaf Education and General Education teachers of students who are d/hh.
• What can you do to help us learn?
  – 1. You can join the “community of learners” who are addressing this topic. This community and a wealth of related information can be found at: http://visuallearningresearch.wiki.educ.msu.edu/
  – 2. You can try to use one or more of Mayer’s (200) principles of multimedia learning within your own teaching, and then share what happened with a colleague.
  – 3. You can become part of the first step in research on this topic by simply sharing with me the names and publishers of the instructional text you most frequently use with your students.
    • Web site “what really works”
    • Ask Deaf colleagues what makes sense...what is best to use
• What instructional text do you most frequently use with your students?
  – No texts provided
• Let me show you just a few examples of the impact of Mayer’s (2009) work upon my own instruction:

– Before:
- After:

**Impact of CA/N:** (Wang, C-T., & Holton, J. (2007)

- **Poor Physical Health...**
  - e.g., chronic fatigue, altered immune function, hypertension, sexually transmitted diseases, obesity

- **Behavior Problems...**
  - e.g., aggression, juvenile delinquency, adult criminality, abusive or violent behavior

- **High-risk Behaviors...**
  - e.g., a higher number of lifetime sexual partners, younger age at first voluntary intercourse, teen pregnancy, alcohol and substance abuse

- **Social Difficulties...**
  - e.g., insecure attachments with caregivers, which may lead to difficulties in developing trusting relationships with peers and adults later in life

- **Poor emotional and mental health...**
  - e.g., depression, anxiety, eating disorders, suicidal thoughts and attempts, post-traumatic stress disorder

- **Cognitive dysfunction...**
  - e.g., deficits in attention, abstract reasoning, language development, and problem-solving skills, which ultimately affect academic achievement and school performance;

**Note:** Information applies to all children, there is insufficient data re. children with disabilities. O.U.R. Children
Before:
• **Possible Causes of CA/N with Children who are d/hh**
  
  – May lack the language skills needed to effectively understand, or convey to others that they have been sexually abused. (Vernon & Miller, 2002)
  
  – Conditioned to comply with authority figures, are naive re. sexual norms, and may misinterpret the attention of the abuser in relation to feels of being loved. (Sullivan, Vernon, & Scanlan, 1987)
  
  – Lack of sufficient school based learning opportunities and instructional materials needed to recognize, avoid, or report instances of abuse and neglect. (Obinna, et al., 2005)
  
  – Perception that children who are d/hh do not need information concerning appropriate and inappropriate sexual behavior. (Obinna, et al., 2005)

O.U.R. Children
Summary

• Wouldn’t be nice for an instructional strategy that has proven to significantly enhance the quality of learning of students who are hearing, to also improve the quality of learning of students who are d/hh?

• Wouldn’t it be remarkable that such an improvement could occur regardless of the student’s communication modality?
Summary & Thanks

• Wouldn’t it be “different” if all we had to do to improve our student’s depth of learning was to “tweak” our use of existing technologies?

• I would suggest that the opportunity is to BIG, and the risks is to little, not to try.

• I thank you for this opportunity to be with you today. I hope we can work together to improve the depth of our student’s learning.
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