

# Bridging the Divide: Educational Psychology's Role

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# Educational Psychology's Role

- Educational Psychologists embrace the challenges inherent in bridging the divide between psychology and education.
- Consistent with other disciplines in the Learning sciences or Science of learning, the challenges mentioned in this report resonate with concerns in our field.

# Educational Psychology's Role

- Therefore, I commend the efforts of the task force and welcome the attention this and other reports can direct toward the preparation of learners and teachers for success in STEM content areas.

# Educational Psychology's Role

- Further, consistent with those discussed in the text and in Table 1 of the document (e.g., *Taking Science to School*), this report makes a significant contribution as we seek solutions and implement change in STEM arenas.
- The particular emphasis in the report on future research directions is especially helpful for emerging scholars and those interested in addressing new research agendas.

# Overview

- There are several phases of very challenging work necessary to successfully share what we currently understand, and what we need to understand, with those on the front lines in learning environments.
- Unfortunately, although we are making progress, there is substantial work that remains across these phases.

# Overview

- In reaction to the report, I draw attention to the nature of the multi-phase work ahead of us in the STEM arena.
  - Two examples of the types of research necessary as part of our quest follow.
- My comments also provide some reflections on historical and current relationships among assessment, learning, and instruction.

# Phases of Research

- One example of recent research that demonstrates an important step is Swanson and colleagues (2008) intensive study of predictive variables in young learners' problem solving.
  - He carefully examined critical variables in a study of children in schools.
  - Translation of such work is necessary to eventually inform effective instructional practice in mathematics.

# Phases of Research

- The type of research represented by this piece is critical, but it represents one end of the spectrum—one close to the (psychology) bank...and many steps away from practice.
- Further, there are planks missing in our bridge, and without additional concentrated research, there are many opportunities for mis-steps between such work and the other (practice)bank.

# Phases of Research

- For another example of critically needed work, closer to the practice bank, I turn to early childhood standards.
- Mathematics, and Science as well, are recognized as often-overlooked areas of importance in early childhood education.

# Phases of Research

- In an effort to combat the traditional neglect of these domains, current early childhood curriculum standards include new clearly articulated emphases on Mathematics and Science learning.

# Phases of Research

- These new standards generally contain both content and processes.
- However, there is a grave lack of research to support the proposed recommended pedagogical practices.

# Early Childhood Standards

## *Indicator*

- Recognize and solve problems through observation, active exploration, trial and error, and interactions and discussions with peers and adults.
- Classify, compare and contrast objects, events, and experiences.

## *The learner will:*

- Solve an increasing number of problems independently in play and living situations.
- Demonstrate ability to classify, compare, and contrast.
- Use an increasing number of details and more realistic representations.

# Phases of Research

## *Instructional recommendations*

- Read stories which include problem solving, helping others, and multiple problem solving skills.
- Teach cause and effect/reasoning vocabulary (if, when, after, before, next, what if, then, and/or).
- Use open-ended questions to encourage classification, sorting, comparisons, problem solving.

# Phases of Research

- While these recommended instructional practices may make intuitive sense, there is little empirical research to support these recommendations.
- We need such research.

# Phases of Research

- Psychology, including educational psychology, must play an important role in the development and assessment of instructional interventions in early childhood mathematics and science...  
  
...Not just to close the gaps for those students lacking prior home experiences, but for all learners.

# Science

- As noted in the report and in several other publications, both breadth and depth concerns are pervasive challenges in systematic science learning and instruction.
- The areas identified in the report are ripe for intensive investigation in classroom settings.

# Science

- While Educational Psychologists have contributed to the initial studies conducted in these areas, much is yet to be done.
  - Knowledge about the natural world
  - Understanding of process of knowledge generation
  - Social and participatory nature of science

# Science

- One recommendation I forward is for Educational Psychology to continue to focus on the roles of knowledge and beliefs, as well as how argument and structured discourse, can facilitate science knowledge acquisition and reasoning.

# Science

- Overcoming misconceptions
- The salience of beliefs in their interaction with knowledge (content, conceptual, process)
- Identification of and application of compensatory skills and strategies with which to arm children as they face life-long learning in science

# Scientific Inquiry

- One important aspect of this report is the integration of attention to the areas identified by IES.
- Additional systematic research in these areas has great potential to yield important instructional applications.

# Scientific Inquiry

- Among others these areas include:
  - Worked examples
  - Representation integration
  - Abstract and concrete representations
  - Quizzing
  - Explanatory questions

# Scientific Inquiry

- Of particular emphasis in our directed research in this area should be the interaction between learning and instruction.
  - The systematic instructional practice necessary to assure successful independent learner application.
  - How technology can play a role in such research and practice.

# Social and Motivational Issues

- Educational Psychologists have tackled these issues from several theoretical frameworks.
- In addition to those cited, there are other recent studies that directly address social and motivational issues in STEM learning.

# Social and Motivational Issues

- Integrated theories of social and motivational issues accessible to practitioners can make exceptional gains in constructing effective learning environments.
- Our previous fact-finding, correlational research in these areas must now inform our actions as design, develop, and assess interventions in actual learning settings.

# Assessment

- There are several research groups contributing to healthy discussion regarding the desired nature of models of educational assessments (e.g., Pelligreno and others, Mисlevy and others).

# Assessment

- From these discussions we can draw several critical conclusions:
  - Decisions about what to assess are complex.
  - Creating effective assessments is challenging.
  - Agreement regarding underlying assessment models is lacking.

# Assessment

However, my purpose here is a little different...

- As we know, increased use of assessment is not indicative of increased learning and many questions remain.
- Educational Psychologists are uniquely poised to address these questions.

# Assessment

- One area in need of additional particular attention is the variance among international, national, state, and local assessments.
  - Nature of the items in format, content, and load.
  - Perhaps a multidisciplinary panel, such as those recommended by the report, can systematically continue this work.

# Assessment

- A second area in need of particular attention is directed reflection and research regarding what we should be measuring.
  - As noted in the report, assessment should not only address basic content knowledge but also a focus on variables, such as underlying cognitive processing, necessary for learners' success.

# Assessment

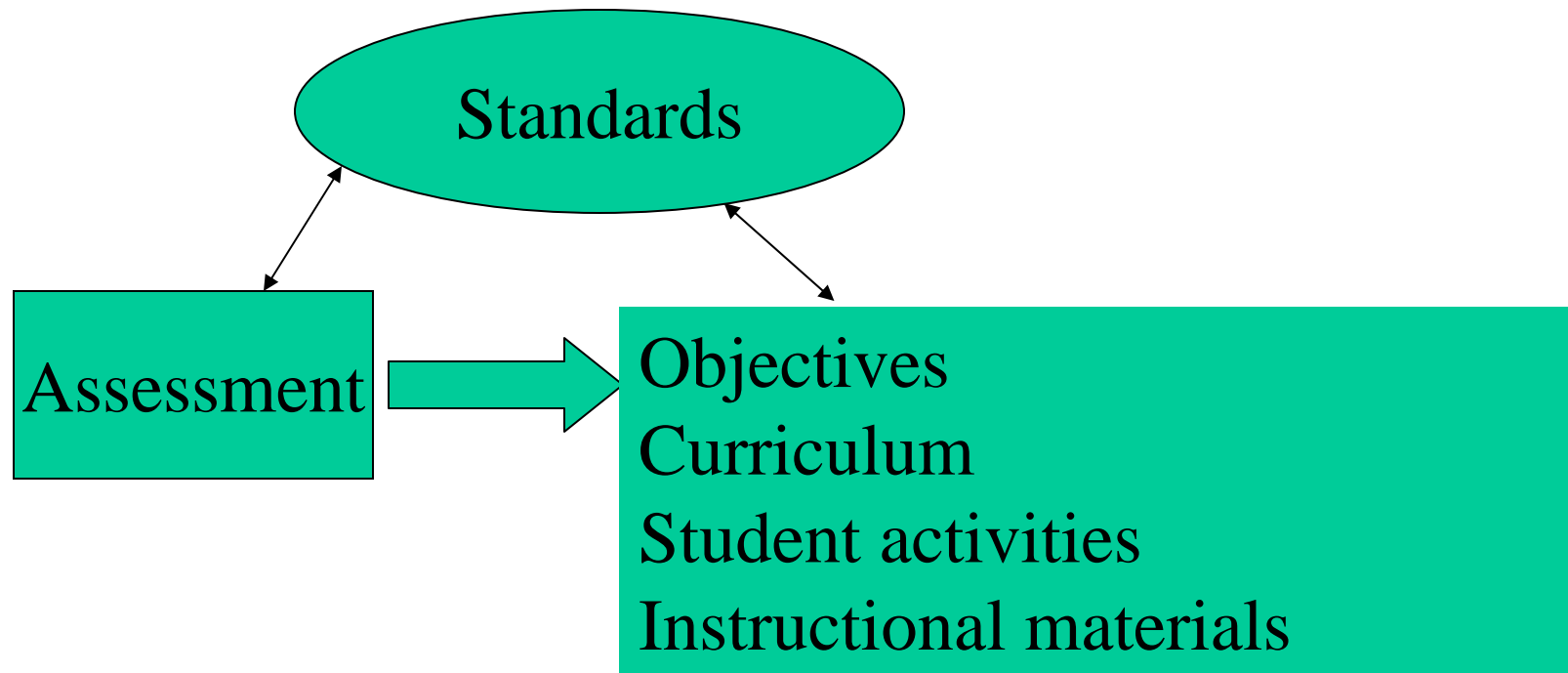
- Such considerations may help to combat my current concerns with the relationships among assessment, learning, and instruction.

# Traditional Approach to Effective Instruction



- Finite content
- Concrete objectives— do or know
- Handful of methods
- Structured assessment formats
- Analytic tools limited

## Current State of Affairs



- My belief is that such an environment leads to isolated disparate content understanding. **The Eye of the Gathering Storm.**

# Conclusions

- The report suggests several sound recommendations to support next steps in our quest for psychology to assist with challenges in STEM learning environments.
- Multidisciplinary collaborations, such as those represented by the task force, can make great strides in connecting communities and developing next steps.

# Conclusions

- Educational Psychology is well-poised and willing to contribute as we build and cross the bridge.

