Latest Developments in the Learning Sciences within the College of Education at Penn State

Third International Workshop on the Advanced Learning Sciences (IWALS)

Tokyo University of Foreign Studies

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Toward a Working Definition of the Learning Sciences:

A Strong Spirit of Partnership

Efforts to Design Fruitful Collaborations

Seeking the Best of Historically Disparate Fields of Study

Active Partners within the College of Education:

Learning, Design, and Technology (LDT)

Educational Psychology

Science Education

Active Partners in other parts of Penn State:

College of the Liberal Arts -- Department of Psychology

College of Information Sciences and Technology

Institute for CyberScience

Recent Hires in the Learning Sciences within the College of Education:

Dr. Marcela Borge -- Assistant Professor in Learning, Design, and Technology. Her Ph.D. was earned in cognition and development from the University of California at Berkeley.

Dr. Ty Hollett -- Assistant Professor in Learning, Design, and Technology. His Ph.D. was earned in language and literacy culture from Vanderbilt University.

Dr. Gabriela Richard – Assistant Professor in Learning, Design, and Technology. Her Ph.D. was earned in educational communication and technology from New York University.

Creation of a Task Force on the Learning Sciences

Chair: Dr. Richard Duschl -- Waterbury Chaired Professor in Science Education

Members:

Learning, Design, and Technology: Drs. Susan Land and Heather Zimmerman

Educational Psychology: Drs. Peggy Van Meter and Rayne Sperling

Science Education: Dr. Scott McDonald

Department Heads: Drs. Ali Carr-Chellman, Kathy Bieschke, and Carla Zembal-Saul

Recommendations of the Task Force:

- Establish a Dual-Title Doctoral Degree in the Learning Sciences at Penn State;
- Apply for membership in NAPLeS (Network of Academic Programs in Learning Sciences); and
- Create an online Cyberlearning Master's Degree Program delivered by the World Campus

Making Connections with Other Parts of Penn State:

- Institute for CyberScience:
  - Possibility of Co-funded Faculty Positions
  - Uses of Big Data
- Connections with Penn State's Strategic Plan:
  - Transforming Education
  - Building Our Digital Future

Making Global Connections:

- National Taiwan Normal University (NTNU):
  Center for the Advanced Learning Sciences
- Tokyo University of Foreign Studies
- South China Normal University
- Others . . . .

Penn State Plans for Enhanced Strategic Partnerships

Global Engagement Network (GEN)

Thematic Network focused on the Learning Sciences with emphasis on:

STEM Education and

Language Acquisition

Update on College of Education Projects Presented at the Second IWALS

Dr. Karen Murphy – Language Acquisition – Quality Talk

Dr. Carla Zembal-Saul -- STEM Education

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Recontextualizing Quality Talk for Second Language Learners:

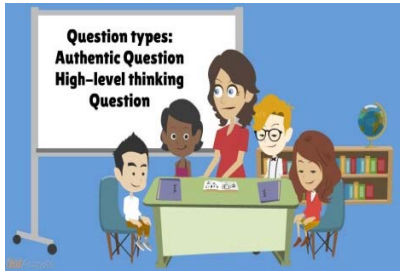
Promoting English Language Learning in a Taiwanese Context

Quality Talk

What is Quality Talk?

- Quality Talk is an approach to conducting discussions that promotes students' high-level comprehension of text, where high-level comprehension refers to critical-analytic thinking and epistemic cognition about, around, and with text.
- The approach is premised on the belief that talk is a tool for thinking and that certain kinds of talk can contribute to high-level comprehension.

Quality Talk Intervention



- We: give initial and ongoing professional development
- Teachers: code their video discussions and meet with coaches
- Students: receive instruction on QT discourse indicators
  (e.g., questioning, elaborated explanations, and exploratory talk)

Evidence of success in the U.S.

- After participation in Quality Talk discussions, native English speakers evidenced:
  - Significant improvement on individual **high-level comprehension assessments** in language arts classrooms;
  - Significant **fluency gains** with rates of improvement greater than the national U.S. average; and,
  - Transfer effects via improved **persuasive and expository writing** as well as increased argument generation in social studies and science classes.

How QT can contribute to English learning in a Taiwanese context?

- QT can provide opportunities for Taiwanese students to participate in more engaging discussions in English by teaching them how to ask questions linked to deeper learning and better explain their responses.
- QT can also help enhance Taiwanese students' English proficiency and comprehension by letting them co-construct meaning with their peers.

Purpose of Study

- Purpose:
  - To examine the feasibility, usability, and effects of Quality Talk in Taiwanese classrooms.
- Multi-Phase Plan:
  I. Conduct review of relevant literature exploring classroom discussion as an instructional tool for second language acquisition and proficiency;
  II. Iteratively refine and pilot the teacher professional development and intervention materials; and,
  III. Conduct quasi-experiment of QT in Taiwanese classrooms.

Phase I
Literature Review

- Guiding Questions:

a) what are the theoretical underpinnings of employing small-group discussion as an effective approach to promote second language learning; and,

b) what is the empirical evidence that has demonstrated effectiveness of using small-group discussion to improve second language proficiency

Literature Review: Progress

- Literature review gathered related research from various databases (i.e., ERIC, PsycINFO, Web of Science, and CNKI).
  - 56 journal articles related to discussions in second language learning classrooms
  - 15 articles or book chapters related to theories of second language learning
- All gathered literature has been reviewed and focal pieces have been identified.
- A matrix was created for the review of empirical studies, and notes were taken for theory-related literature.

Literature Review: Initial Findings

- Only a few studies have examined the effect of particular discussion approaches (e.g., Collaborative Reasoning) on students' second language learning.
- These studies have found that small-group discussions are effective in terms of enhancing students' second language comprehension, writing, and oral language development (e.g., Zhang, Anderson, & Nguyen-Jahiel, 2013).

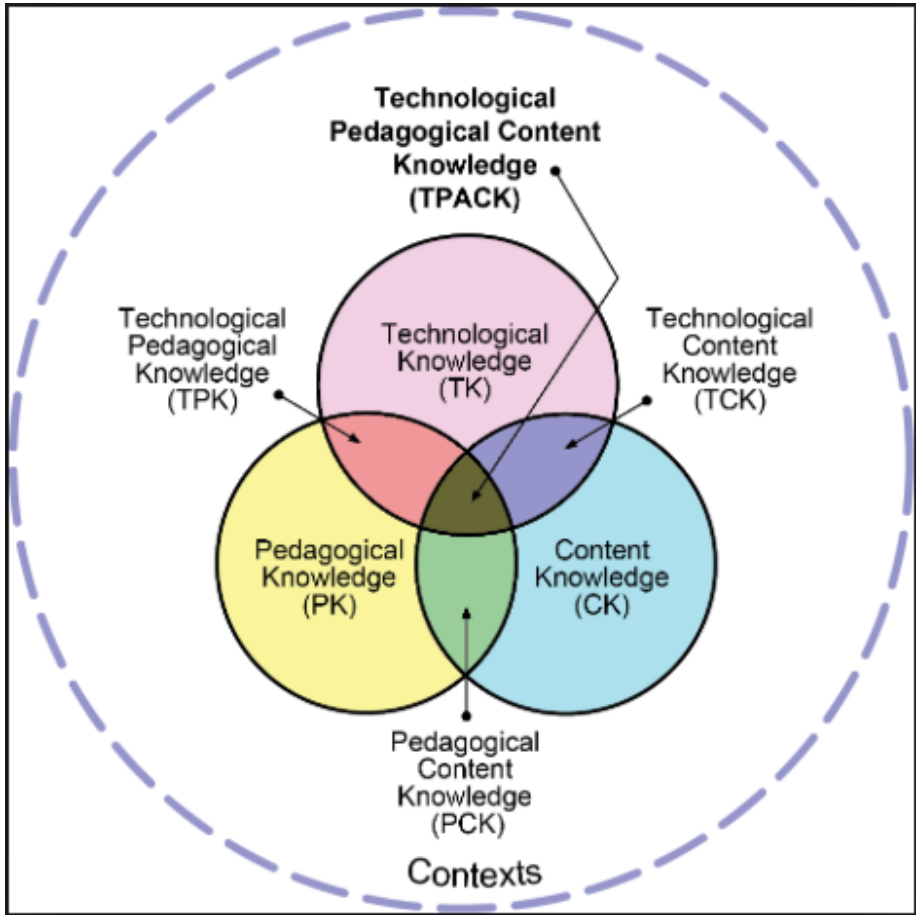
Phase II
Recontextualization

- The Quality Talk mini-lessons and Quality Talk professional development materials will be modified in several ways including:
  a) based on the findings from the literature review;
  b) tailored to the needs of second language learners, and,
  c) into Taiwanese, using culturally relevant examples.

Emerging Collaborations in Science Education

- The TPACK Project
- The 3-D Initiative
- A shared interest in preservice teacher education

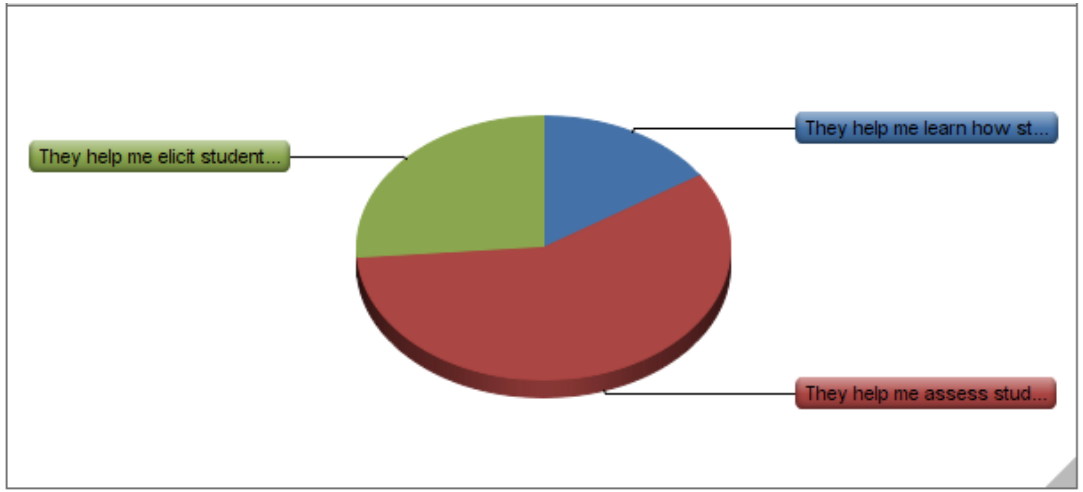
TPACK Project



TPACK Project

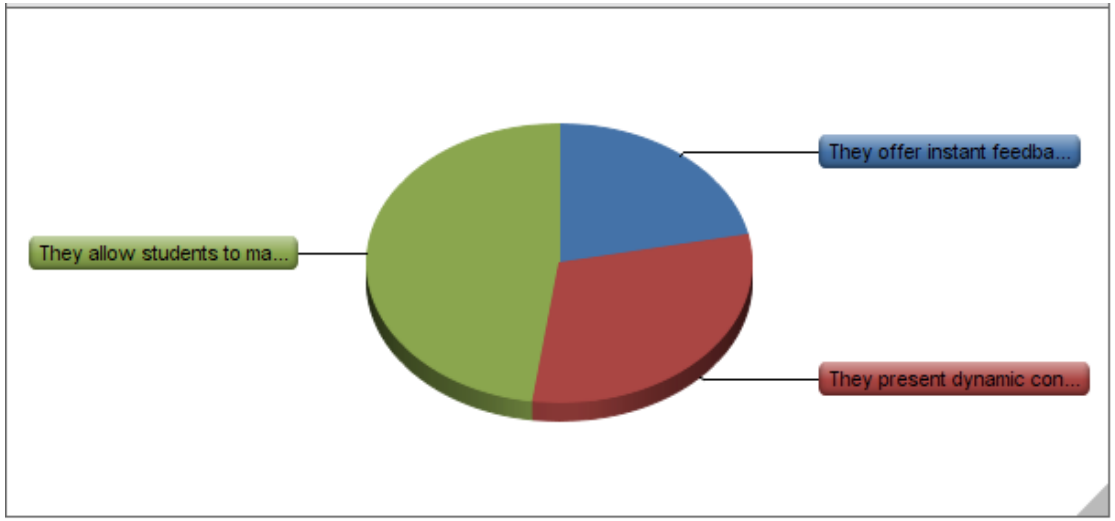
- Part of a project by NTNU's Graduate Institute of Science "to develop and provide innovative instructional materials and tools for science education."
- Survey of pedagogical uses of digital technologies, specifically related to the teaching of science
  - Administered to inservice and preservice teachers in Taipei and PSU science teacher education students and PK-4 professional development schools interns.

How do you think your use of videos/animation in the classroom helps you to better understand your students' learning?



#	Answer		Response	%
1	They help me learn how students feel about the use of videos /animation in instruction.		6	16%
2	They help me assess students' content comprehension through dynamic presentations.		22	58%
3	They help me elicit students' prior knowledge and/or misconceptions.		10	26%
	Total		38	100%

What are the distinctive features of technology-supported tests, as compared to conventional assessments? Check the ONE response you find most difficult to achieve without technology.

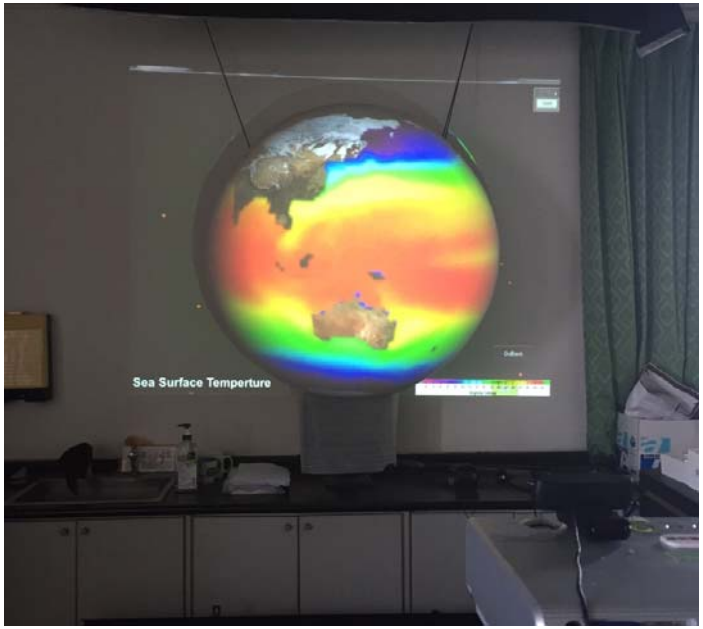


#	Answer		Response	%
1	They offer instant feedback and preliminary score analyses.		5	22%
2	They present dynamic content through multimedia.		7	30%
3	They allow students to manipulate simulations and present their thinking processes.		11	48%
	Total		23	100%

TPACK Project

- Preliminary Results
  - Knowing about technology integration is easier than integrating technology in the classroom.
  - Reflection in action and “design thinking” are critical components for long-term TPACK practical change.
  - To integrate technology proficiently, teachers need a supportive environment that frees them from fear of curriculum and performance pressure, gives access to current and relevant technologies, and provides time to learn about technology’s usefulness in the classroom.
- Next Steps
  - Observations (actions)
  - Follow-Up Interviews (beliefs + actions)

3D Initiative: 3D Tools for Science Learning



- 3D tools for science learning are designed, developed, and utilized by teachers and teacher educators
  - 3D projection software for anatomy and geology
  - QR code textbook supplements

Preservice Teacher Education

- Hung Yiwen teaches secondary earth sciences at Affiliated Senior High School of National Taiwan Normal University.
  - Mentor Teacher
  - Leader in NTNU Teacher Certification Program at NTNU
- Shared interest in researching partnerships between university faculty, mentor teachers, and student teachers.

Thank You