Deep Learning through Collaborative Problem Solving

Art Graesser
Figure 3: Index of Changing Work Tasks in the U.S. Economy 1960-2009

Source: Reproduced from Levy and Murnane (2013)
My experiences on expert panels

Organisation for Economic Co-operation and Development (OECD)

- Programme for International Assessment of Adult Competencies (PIAAC, ages 16 to 65, 70 countries)
  Problem Solving in Technology Rich Environments (2011)
  Adaptive Problem Solving (2021)
- Programme for International Student Assessment (PISA, 15 year olds)
  Complex Problem Solving (2012)
  Collaborative Problem Solving (2015) (served as Chair)

National Academy of Sciences, Engineering, and Medicine

How People Learn, volume 2 (2019)

Department of Defense (Army, Navy, Advanced Distributed Learning)

Correlation between labor productivity and the use of reading skills at work

GDP per hour worked (in USD)

Use of reading skills at work

- Australia
- Austria
- Canada
- Czech Republic
- Denmark
- Estonia
- Finland
- Germany
- Ireland
- Italy
- Japan
- Korea
- Netherlands
- Norway
- Poland
- Slovak Republic
- Spain
- Sweden
- United States
- England/N. Ireland (UK)

3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
PISA 2015 Collaborative Problem Solving

Does Gender Matter?

Mean score for different schools and genders.
Activities in school that predict CPS proficiency

Students who attend schools where each of the extracurricular activities are offered perform above students who attend schools where they are not offered.
My attempts to improve deep learning and collaborative problem solving at UM

- Introductory Psychology class of 400
- Research Methods laboratory classes
- Learning community on Instructional Games
- Collaborative projects in the Institute for Intelligent Systems
Integrating:
Theoretical Research, Technology Development, Educational Practice, & Empirical Evaluation

- Interdisciplinary, interinstitutional, international, interactive & interesting
- 33 years running
- Cognitive Science seminar
- 10 departments
- A dozen weekly research meetings
- Externally funded projects
IIS Intelligent Conversational Agents

- AutoTutor (computer literacy)
- AutoTutor (reading comprehension)
- ARIES (scientific reasoning)
- ElectronixTutor
- Guru (biology)
- AutoTutor (with ALEKS algebra)
- HURA Advisor (research ethics)
- Personal Assistant for Lifelong Learning (PAL3)
My Recent Publications on Collaborative Problem Solving


