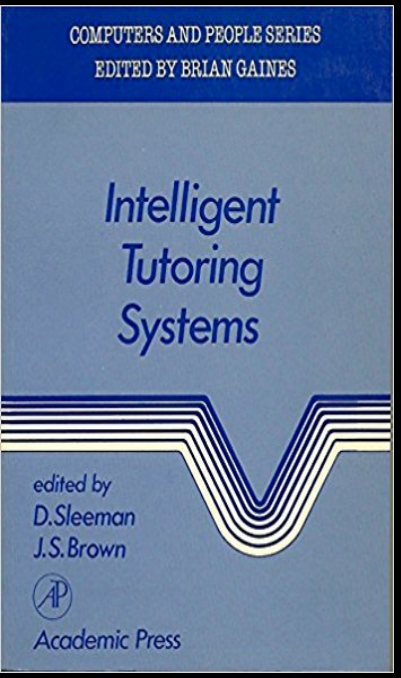
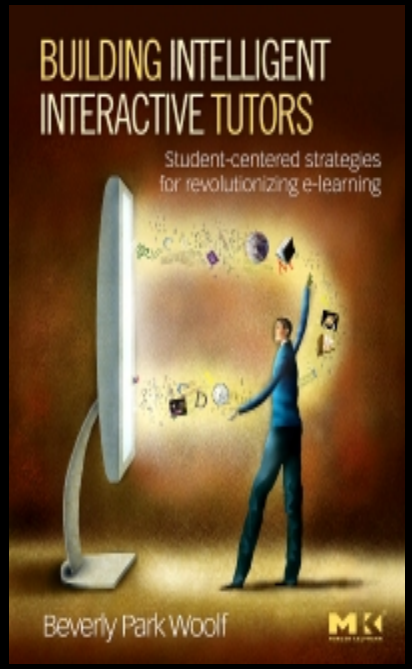
Learning with Cyber-Tutors

Art Graesser

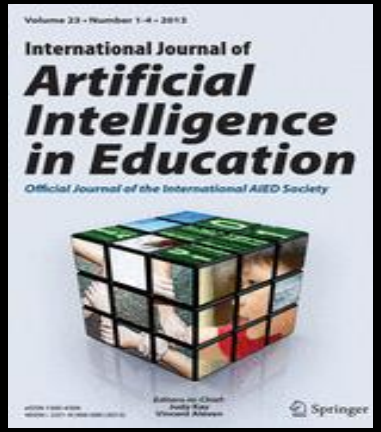
Digital Tutor History In a Snapshot

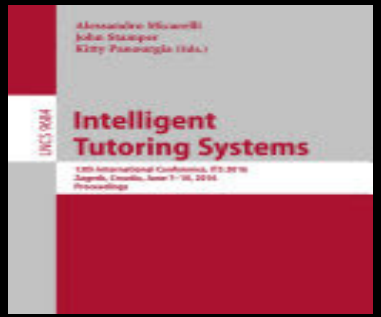


Sleeman & Brown (1982)



Woolf (2009)



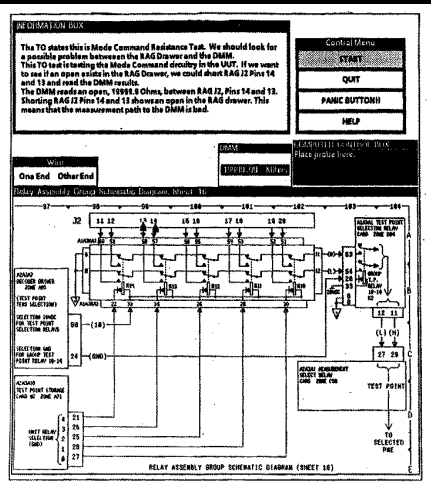


Conferences, proceedings, journals (1988 to present)

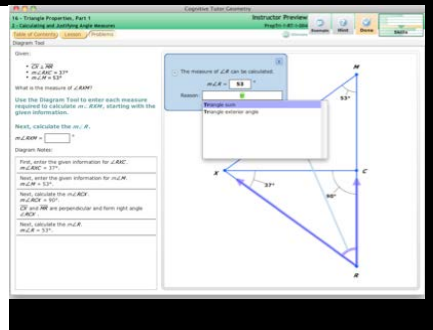
5 volume series, edited by Sottilare, Graesser, Hu , & others (2013-2018)

Army Research Lab

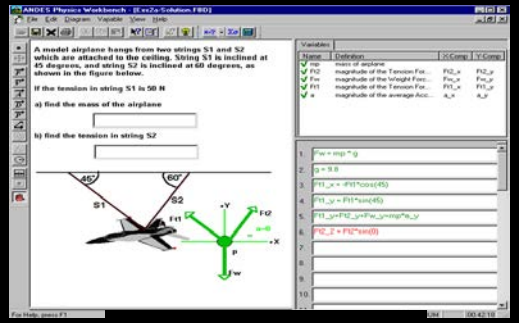
Intelligent Tutoring Systems that Improve Learning



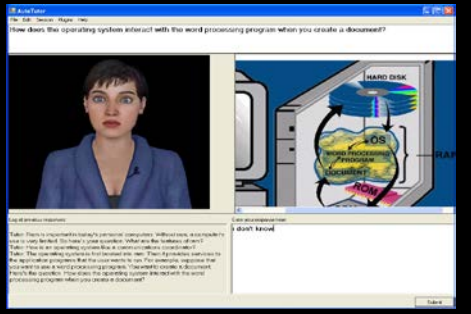
Sherlock



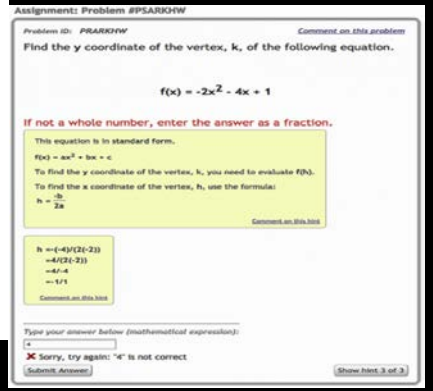
Cognitive Tutor



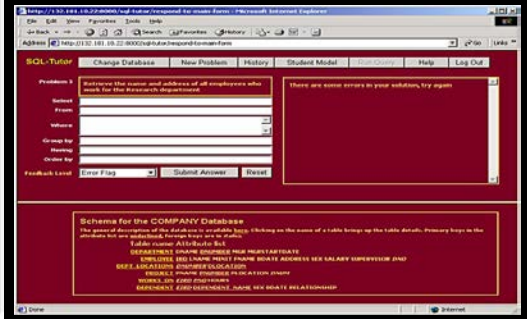
Andes



AutoTutor



ASSISTments



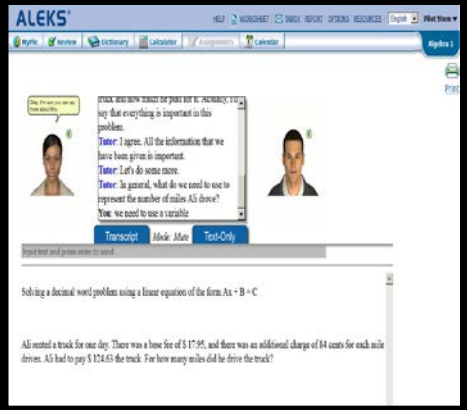
SQL Tutor

Digital Tutor

Adaptive Intelligent Conversational Agents

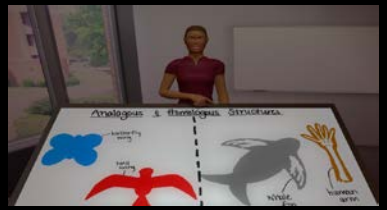
STEVE

AutoTutor Trialogs



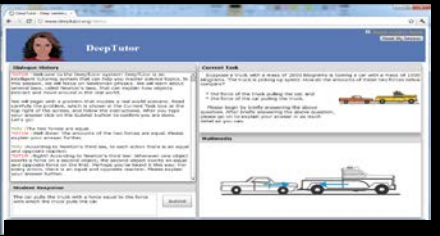
AutoTutor Trialogs with ALEKS algebra (ONR STEM Challenge)

Tactical Language and Culture System

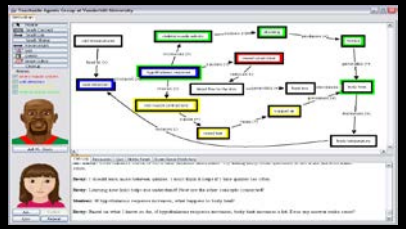


Guru (biology)

iSTART (reading)



DeepTutor (physics)



Betty's Brain

Herman-the-Bug

Mission Rehearsal

Generalized Intelligent Framework for Tutoring

Army Research Lab and University of Memphis

www.gifttutoring.org

Sottilare, R., Graesser, A., Hu, X., & XXXX (2013-2018). *Design Recommendations for Intelligent Tutoring Systems*.

- **Learner modeling (2013)**
- **Instructional strategies (2014)**
- **Authoring Tools (2015)**
- **Domain knowledge (2016)**
- **Assessment (2017)**
- **Teams (2018)**

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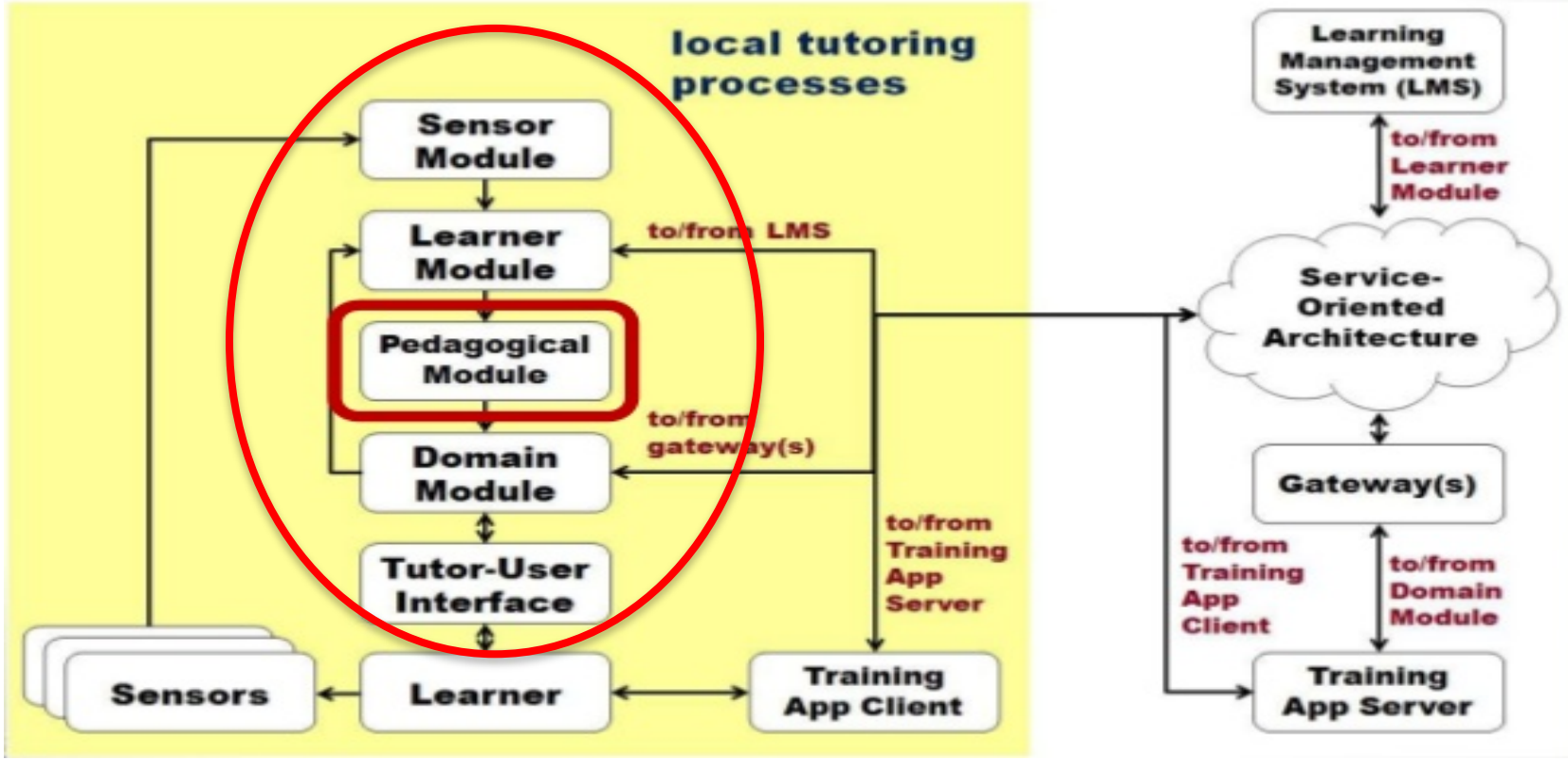
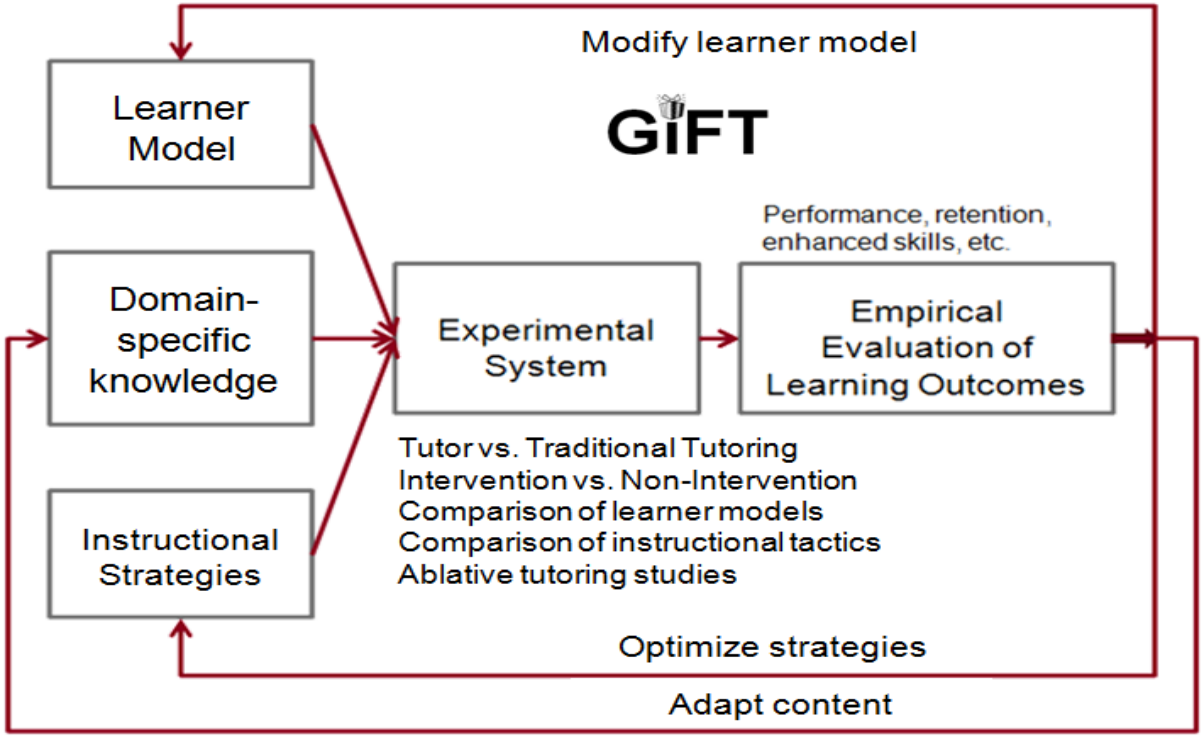
Generalized Intelligent Framework for Tutoring (GIFT)



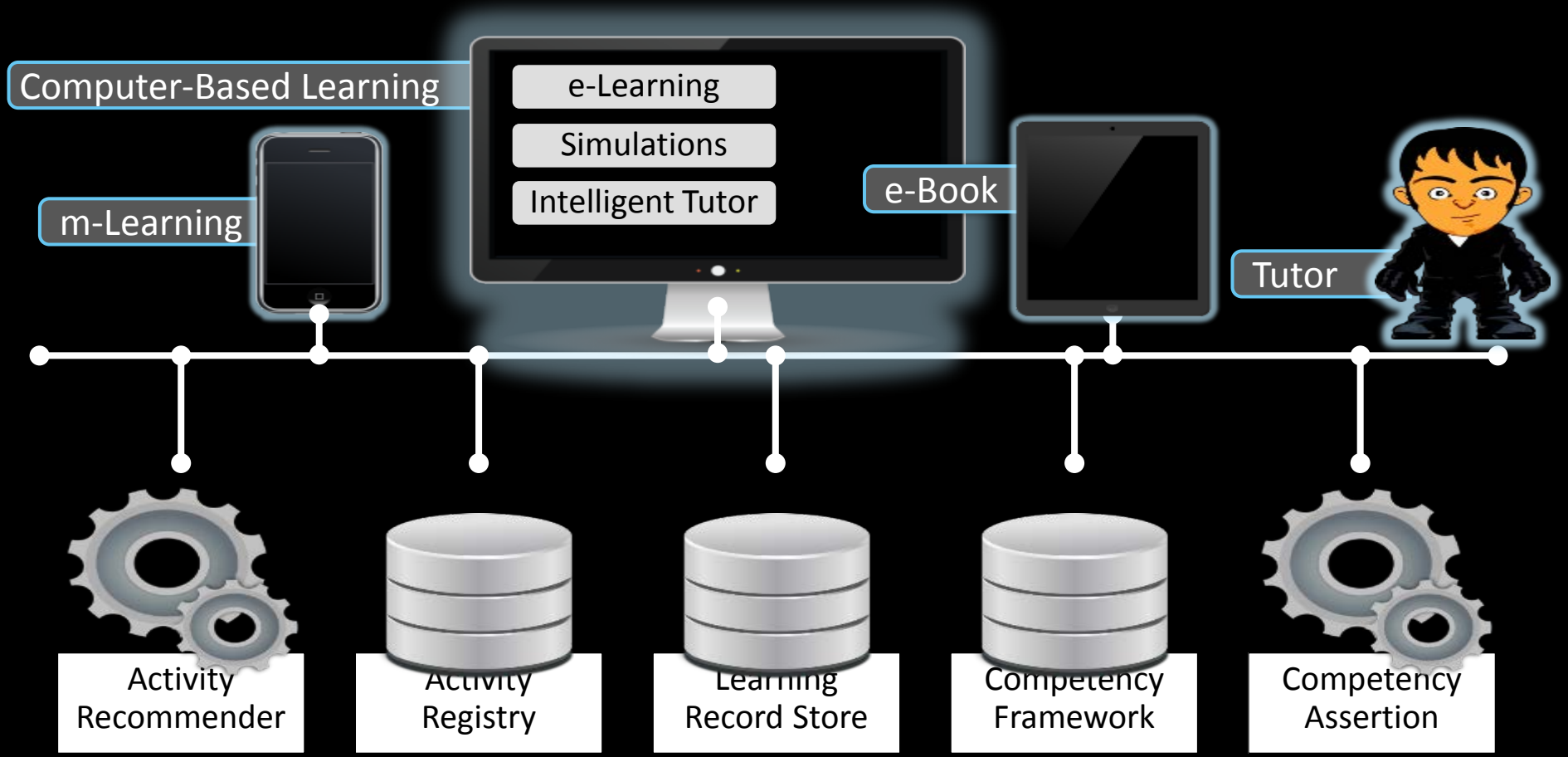
Digital Tutor Learns with Experience



- **Content created with authoring tools**
- **Content modified with experience, data, and machine learning**

Sae Schatz

The Total Learning Architecture is a collection of specifications for accessing and making use of learning-related data.


Computer-Based Learning
e-Learning
Simulations
Intelligent Tutor
m-Learning
e-Book
Tutor
Activity Recommender
Activity Registry
Learning Record Store
Competency Framework
Competency Assertion

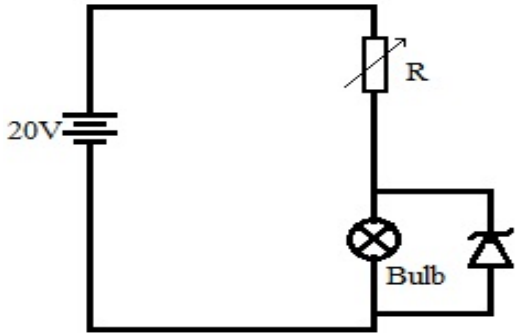
ElectronixTutor

- **Train sailors out of boot camp on electronic circuits**
- **Integrate multiple resources developed by partners in the ONR STEM Challenge:**
  - University of Memphis
  - Arizona State University
  - Worcester Polytechnic Institute
  - BBN/Raytheon
  - University of Southern California
  - Other resources

Office of Navel Research Program Officers

Ray Perez

Commander Brent Olde



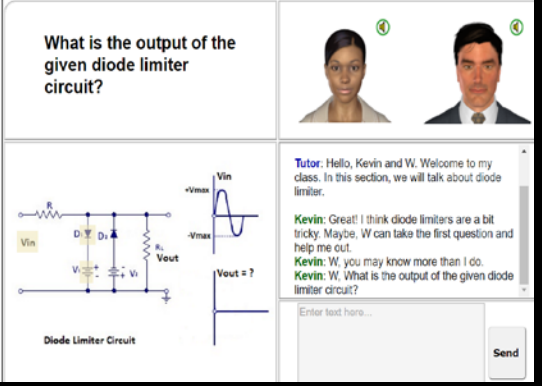
USC Institute for Creative Technologies

Raytheon BBN Technologies

WPI

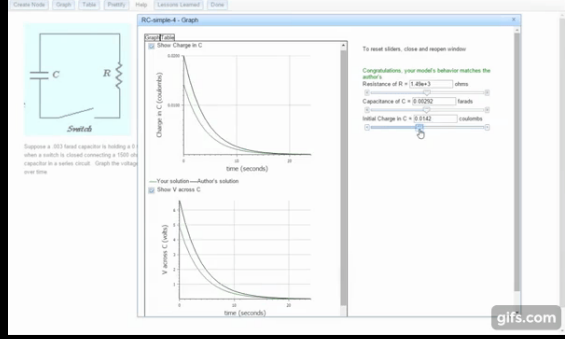
ARIZONA STATE UNIVERSITY 1885

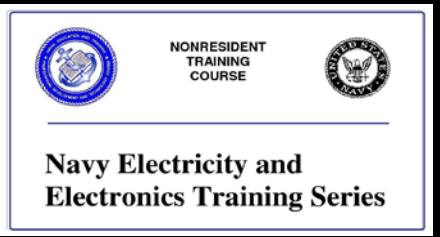
THE UNIVERSITY OF MEMPHIS



AutoTutor
Trialogs,
Memphis

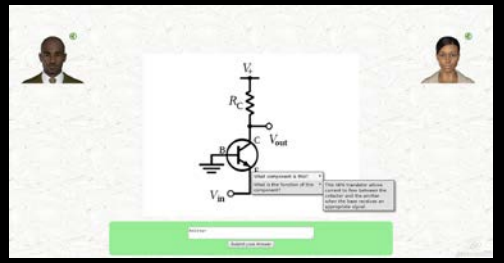
Dragoon
mental models
Arizona State

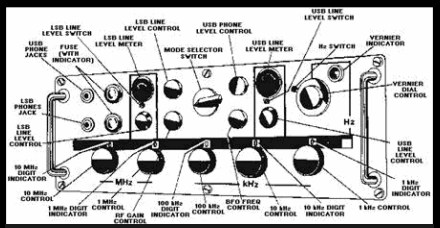


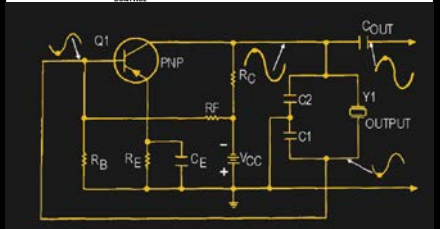


NEETS
Training documents,
Navy

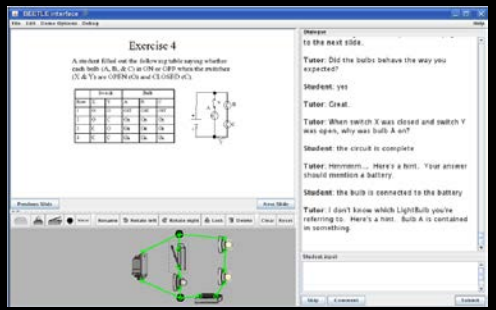
Point & Query,
Memphis



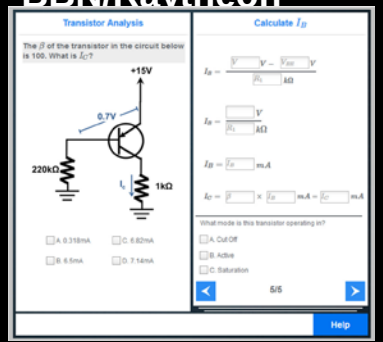




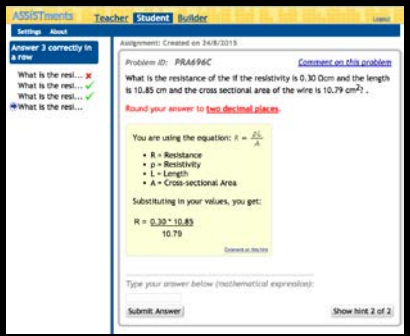
BEETLE
simple circuits
Edinburgh, Navy



LearnForm
Circuit problems,
BBN/Raytheon



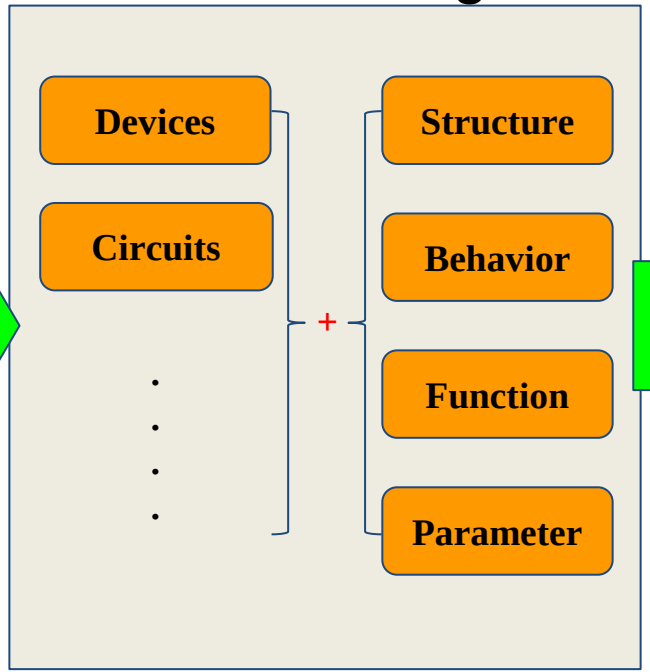
ASSISTments
skill builders, WPI



15 Topics

Topic #	Topic Name
1	Ohm's Law & Kirchhoff's Law
2	Series VS Parallel Circuit
3	Series + Parallel Combination
4	Filter
5	PN Junction
6	Rectifier
7	Power supply
8	Diode Limiter & Clamper
9	Zener Diode & Regulator
10	Transistors
11	CE Amplifiers
12	CC Amplifiers
13	CB Amplifiers
14	Multistage Amplifiers
15	PushPull Amplifiers

Knowledge Component (KC) Labeling



KC list (Partial)

Clamper Structure
Clamper Function
Resistor Structure
CE Transistor Fixed Bias Function
CE Transistor Fixed Bias Structure
CB Transistor Amplifier AC Behavior
CB Transistor Amplifier DC Behavior
CB Transistor Amplifier Function
CC Transistor Amplifier Function
CC Transistor Amplifier AC Behavior
CC Transistor Amplifier DC Behavior
CC Transistor Amplifier Parameter
CC Transistor Amplifier Structure
CE Push Pull Amplifier AC Behavior
CE Push Pull Amplifier DC Behavior
CE Push Pull Amplifier Function

ElectronixTutor

ET Student

Course Home | Search courses

Dashboard | Customise this page

Today's Topic

Transistor

ET Student

Recommendations

Diode Physics Conversation - Reasoning

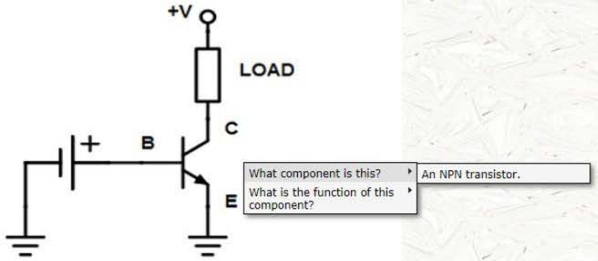
CE Transistor Amplifier Conversation - Reasoning

CE Transistor Amplifier Conversation - Reasoning

ET Student

Topics to Explore

- Course
  - ElectronixTutor
    - Ohm's & Kirchhoff's Law
    - Series Circuits
    - Parallel Circuits
    - Series/Parallel Circuits



Ben: Carl, what is the function of the battery?

Ben: That is correct! Let's get started. Check out the N-P-N transistor circuit.

Angela: I think the common emitter amplifier has an emitter in common between the input and the output.

Ben: Carl, our next question is about common emitter amplifiers.

In cut-off mode, the transistor works as an open switch when both emitter and collector junctions are reverse biased. In saturation mode, the transistor works as a closed switch when both emitter and collector junctions are forward biased. In active mode, the transistor works as an amplifier when the emitter junction is forward biased and the collector junction is reverse biased.

Submit

Students

Recommendation

Learning Record Store

Repeat Topic

Topic Performance

Knowledge Component Performance

Unmotivated Bottom Dweller

Motivated Bottom Dweller

Focus on Low KCs

Pushing Envelope

Reading

Circuit Basics

Electronic Laws

Knowledge Check

Circuit Reasoning

Deep Reasoning

Simulation and Modeling

Conflict Resolution

Item Sorting based on difficulty level

Personal Assistant for Life Long Learning (PAL3)

PAL3 is a computerized personal assistant to a learner to:

- **Keep a life-long learning record of performance & goals**
- **Prevent skill decay across transitions**
- **Estimate learner progress and mastery**
- **Adaptively sequence different learning resources**

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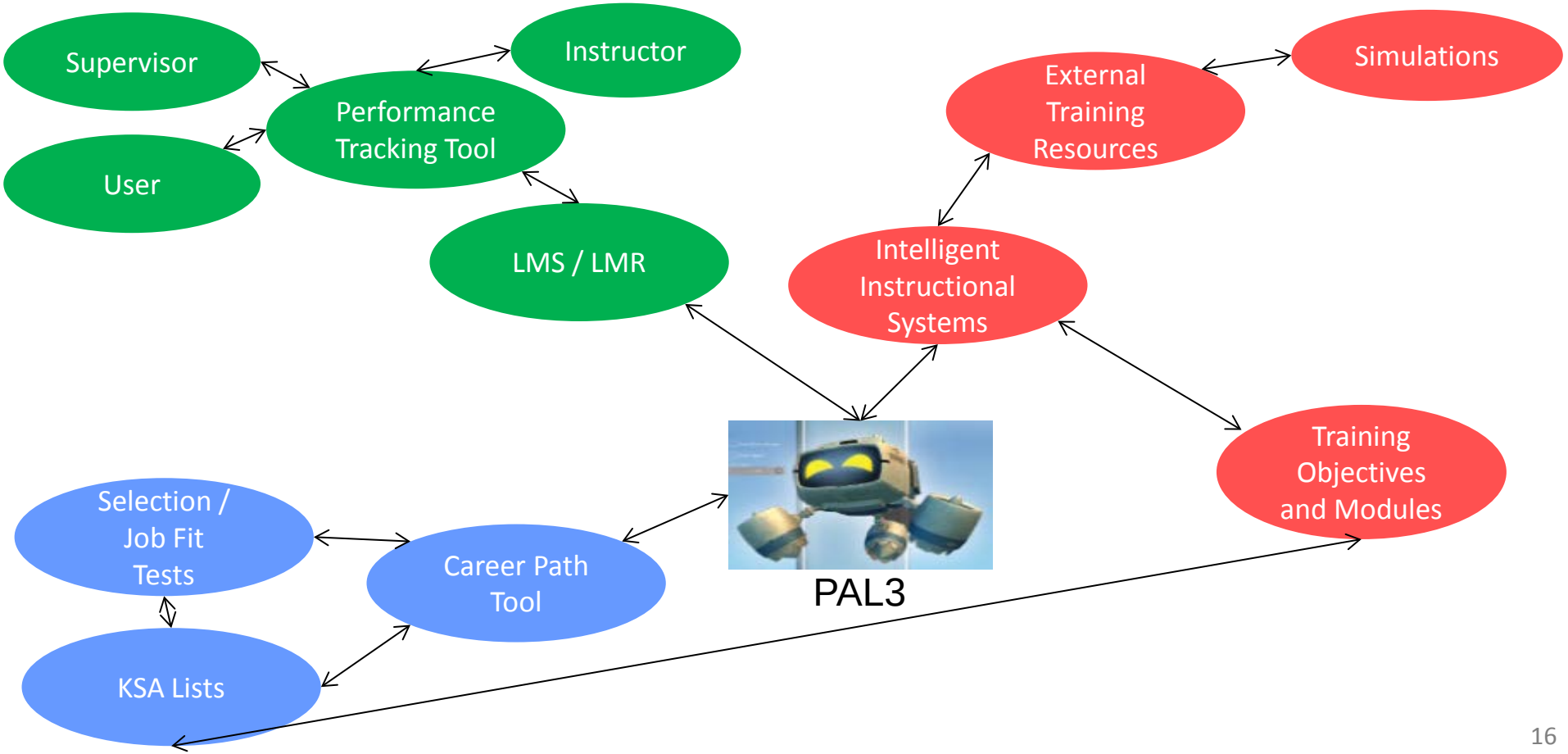
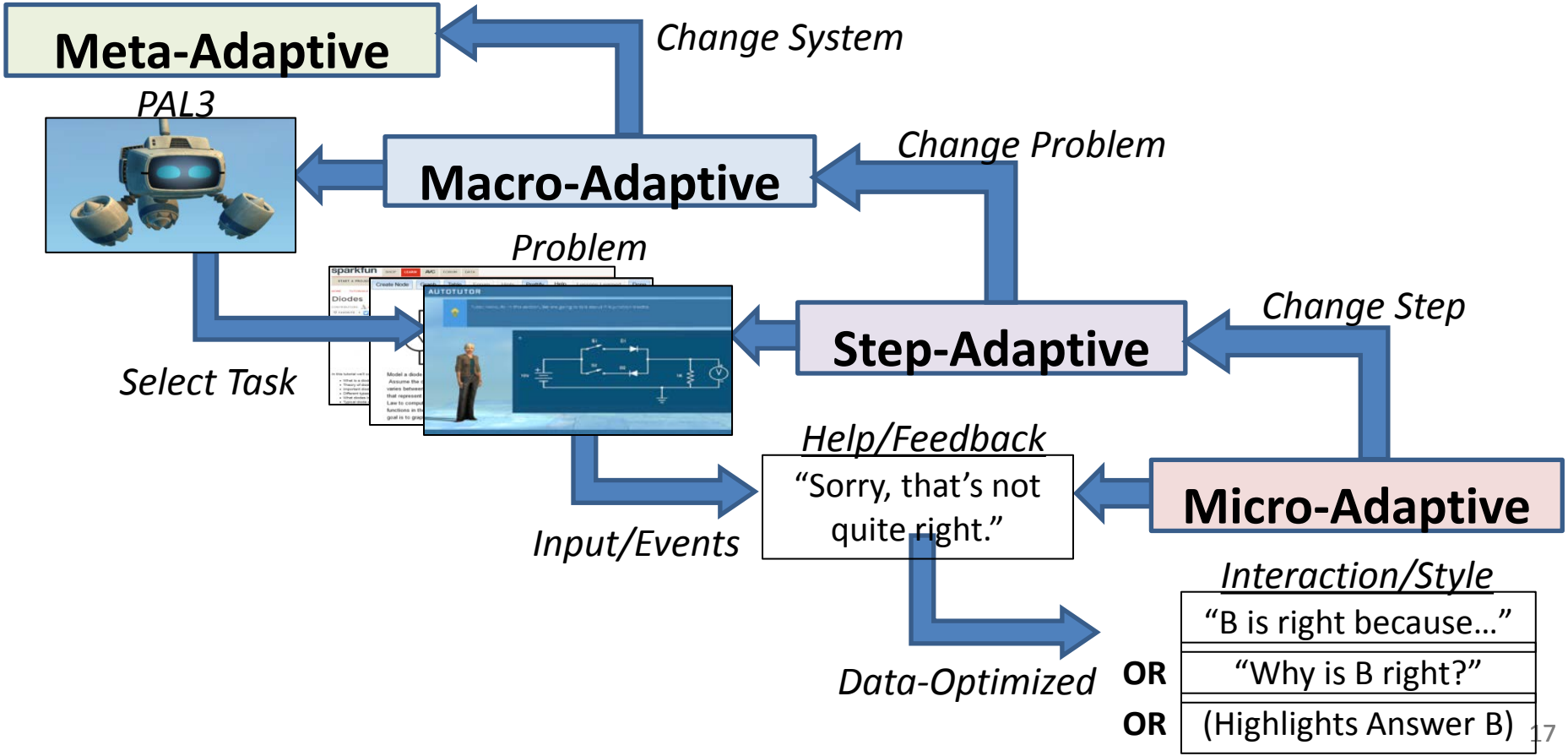
Learning Continuum and Performance Aid (LCaPA:2018)

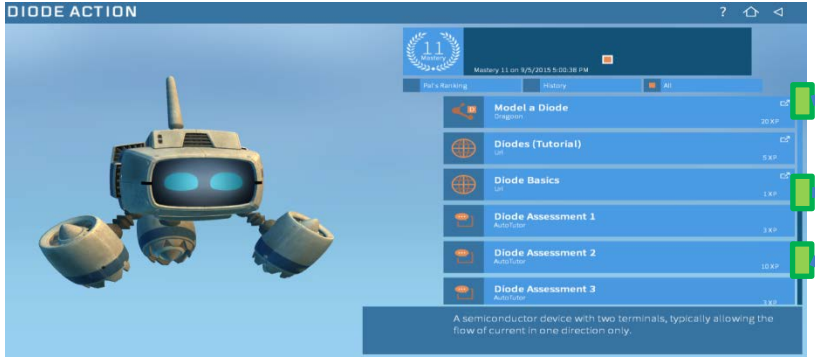


PAL3 – Four Loop Adaptivity

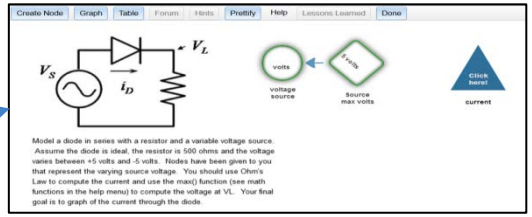


PAL3 Features

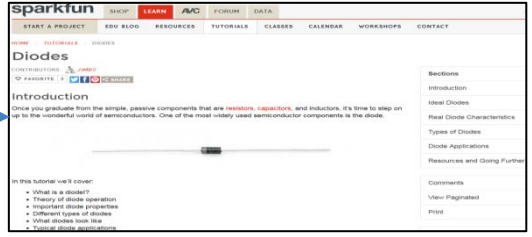
Personalized Recommendations



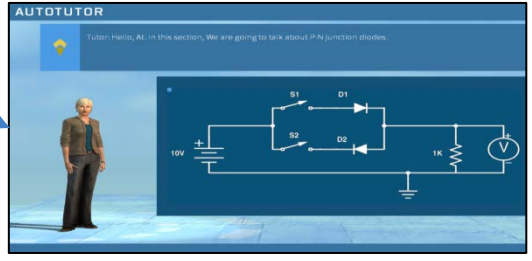
Guided Models & Simulations



Existing HTML Links & Videos



Interactive Computer Tutoring



Competitive Leaderboards

Achievements to Encourage Effort

Critical Next Steps

- **Investments in research & development**
- **Rapid content development**
- **Data science**
- **Recommender systems**

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Thank you!

graesser@memphis.edu