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Learning to Learn

The Art of Doing Science and Engineering

Session 22: Computer Aided Instruction (CAI)

Topic Outline

- **Background of CAI**
- **Early Examples**
- **Inherent Problems**
- **Positives**
- **Education as a System**

Background

Early on, Computers were mysterious

- Few people were comfortable using them
- Most showed up in universities
- Natural question: using computers to aid teaching?

No royal roads to learning geometry

- Every body has to do it the same
- Similar to running a four minute mile
  - *Coaching & money help, but there is no easy way*

Background

People want to know without the pain of learning

- **Huxley's sleep learning**
  - *Showed it does not work*
- **Dianetics**
  - *Clear your mind of all mistakes, so you never reason falsely*
  - *Still institutes today*
- **Meditation**
  - *Does it lead to success?*
  - *Do our world leaders meditate?*

Hawthorne Effect

Any change improves performance

- People react subconsciously to someone caring by performing better
- Enhanced performance only lasts until the change becomes the norm
- Best way to teach is to change the way you teach constantly

Early CAI

Can we use computers to speed up or make easier or help learning in any way?

- The Grader
  - *Aided teachers in grading programs by comparing expected output to actual output*
  - *Not maintained after three years*
- Common for programs developed to aid professor were not used very long
  - *Subconscious realization that machine learning lacks something*

CAI

Socialization of the human person is left out of computer learning

- Learning to get along with people
- Learning to adjust to different professors
- Education includes human contact

CAI Examples

PLATO

- University of Illinois project to link people up to increase learning
- Claimed 10% increase in learning
- No data to back it up

CAI Examples

Programmed Book

- Next page based on answers to questions
- Good students give wrong answer just to see what the book will say (out of boredom)
- Lots of talk but no evidence it works

CAI Positives

Computers are best for teaching mechanical tasks

- Can concentrate on areas the student is having the most trouble with
  - *Multiplication tables*
- Children may still react better when they here they are wrong from a teacher

CAI Positives

Pilot Trainers

- Run simulations that are too dangerous to practice with real aircraft
- Wide range of experience
- Teaching instinct and conditioned responses versus thinking

Education as a system

What are we trying to do?

- Weight lifting class
  - *Lift 250 lbs to graduate*
  - *Too hard and students get discouraged*
  - *But what if we made the requirement to lift 125 lbs twice (the student still lifts 250 lbs)?*
  - *Do not get the same results*
- Do not make problems easier, just push students to work harder and learn for themselves

Aspects of Education

"That which you learn from others you can use to follow, that which you learn for yourself you can use to lead"

- Rapid learning is an important part of education
- No one has the same definition of an educated person

Transfer of Training

The ability to use old ideas in a new situation is important

- Students must learn to recognize formulas in many different forms
  - INT[dx/x] = log x + c
- Learning not memorizing

Education

Proper education changes through time

- In early England education included learning Latin and Greek
  - *People were able to create empires, so the education worked for the times*
- Our education today is different
- Education in 2020 will probably be different

Conclusion

CAI aids in training but there is no proof it aids in educating

- Training is teaching conditioned responses
- Education is high-level thinking
  - *Sometimes you need to deviate from patterns*
  - *This course is designed to educate*