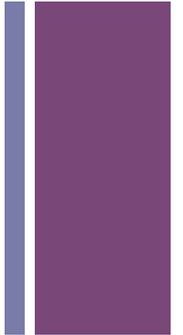


# Discovery Learning

Presented by Xinyun Peng

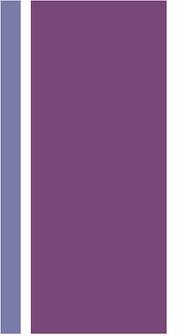
# + Outline



- What is discovery learning?
- The fundamental study of discovery learning
- The debate
- Case study

# + What is discovery learning?

- Inquiry-based
  - Active learning
  - Experimental and analytical skills development
- Constructivist-based
- Effectiveness is open to debate



# + The Fundamental Study of discovery learning

## ■ Jerome Bruner (1961)

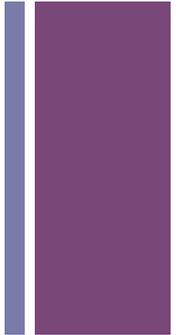
Discovery is not restricted to “the act of finding out something that before was unknown to mankind, but rather include all forms of obtaining knowledge for oneself by the use of one’s own mind...”

“Discovery, like surprise, favors the well prepared mind.”

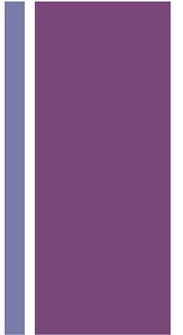
Teachers’ aim is to make students as autonomous and self-propelled thinkers as we can who will go along on their own after formal schooling has ended.

# + The Fundamental Study of discovery learning

- Expository vs. Hypothetical mode of teaching
  - Expository mode: the decision concerning the pace and style of exposition is determined by the teacher; students are listeners.
  - Hypothetical mode: the teacher and the student are in a more cooperative position; students take a part in the formulation.



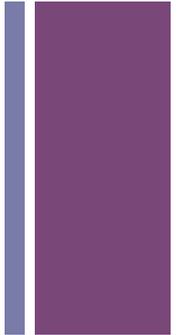
# + Characteristics of Discovery Learning



- Increase intellectual Potency
- Shift from Extrinsic to Intrinsic motives
- Learn the heuristics of Discovering
- Aid memory processing



# The Debate



- Bruner (1961): Students learn concepts better by discovering them on their own.

- Tuovinen and Sweller (1999):

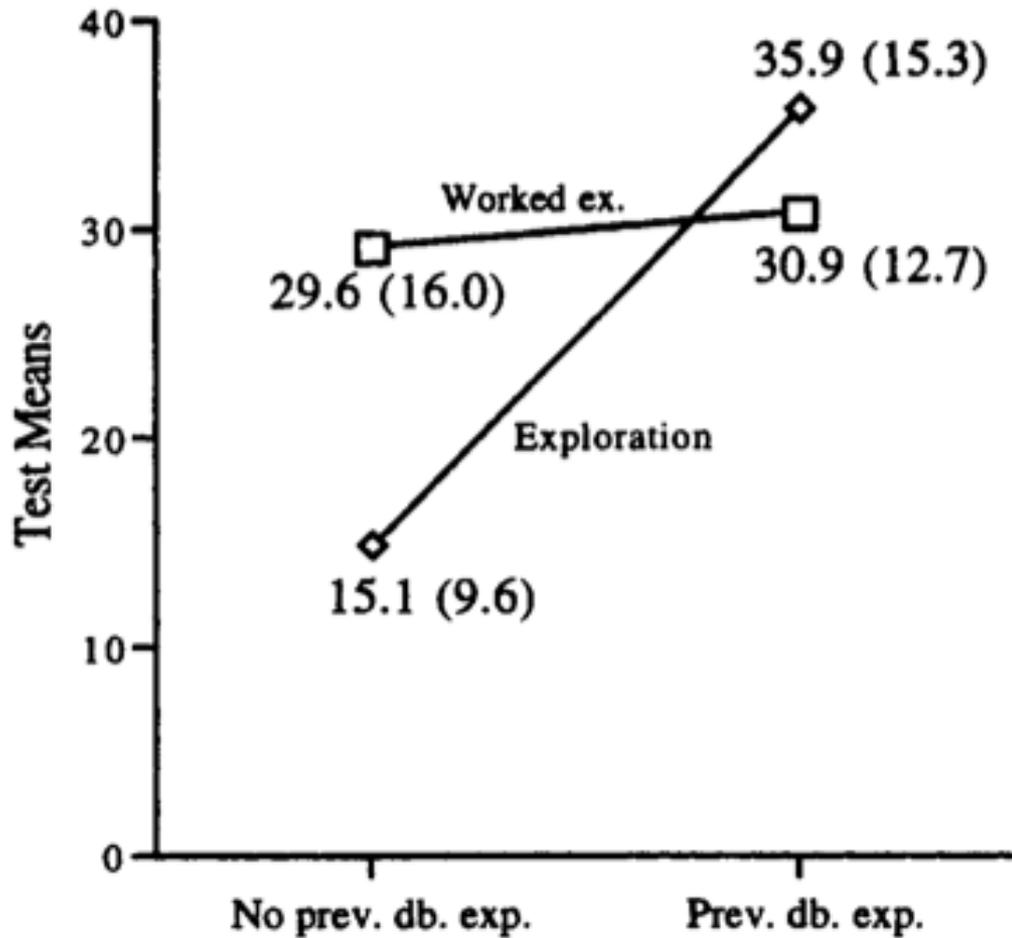
- Exploration practice

- Based on discovery learning principles
- Place a considerable load on working memory
- No significant advantage on learning for learners having prior familiarity with the content

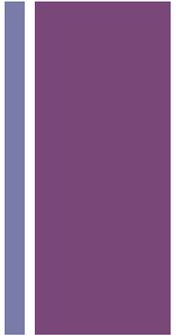
- Worked-examples practice

- Based on cognitive load theory
- Reduce extraneous mental load
- Benefit learners who have no familiarity with the content

# + The Debate



# + The Debate (cont.)



- Kirschner, Sweller and Clark (2006):
  - Discovery learning is less effective than direct instruction; it is often used inappropriately to teach novices.
  - Learners should be given direct instruction prior to discover using what they have learned.
  - Pure discovery instruction may cause misconceptions.
  - Direct instruction leads to better learning.
  - Unguided learning may cause loss of learning to low-aptitude learners.
  - It is a mistake to exclusively focus on application.



# + A Case of Discovery Learning in Virtual Environment

Macintosh World Wolf World virtual tracking-brook.swf

Click on these buttons to take you to another location on our map.

You are at the Bubbling Brook Spot.

Lake Forest Wetland

The ticking is soft. Move the antenna (pointer) to another part of the landscape to see how the ticking becomes stronger. I (Jim) will come along to help you.

Move the antenna (pointer) over the landscape to find the location of the wolf.

Click on the animals to learn more some fun facts!

The radio telemetry equipment will show you how strong your signal is coming in and what direction our wolf is located.

Click on map below to enlarge

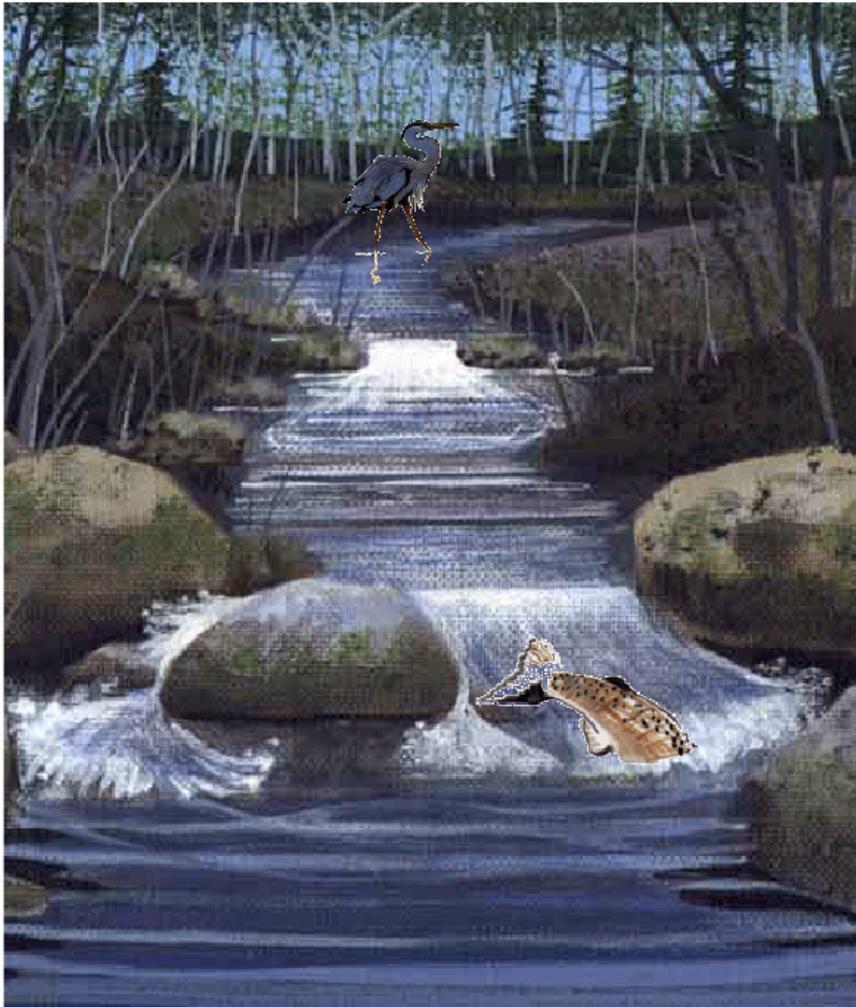
Click on the map to see where you are located in the forest.

The compass will tell you the direction you are pointing the antenna.

# + A Case of Discovery Learning in Virtual Environment

## Virtual Wolf Tracking

Close window to quit tracking



YOU ARE AT THE  
BUBBLING BROOK SPOT.

LAKE

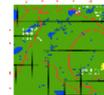
FOREST

WETLAND

That's the strongest ticking!  
According to our compass the  
antenna is pointing NW. On  
your map, starting from  
Bubbling Brook Spot, draw a  
line going NW.

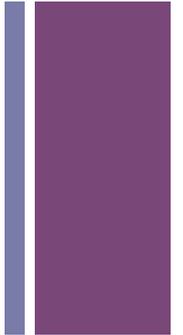


Click on map  
below  
to enlarge





# References



- [http://en.wikipedia.org/wiki/Discovery\\_learning](http://en.wikipedia.org/wiki/Discovery_learning)
- Bruner, J. S. (1961). "The act of discovery". *Harvard Educational Review* **31** (1): 21–32.
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[doi:10.1037/0022-0663.91.2.334](https://doi.org/10.1037/0022-0663.91.2.334)
- Kirschner, P. A., Sweller, J., and Clark, R. E. (2006). "Why minimal guidance during instruction does not work: an analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching". *Educational Psychologist* **41** (2): 75–86. [doi:10.1207/s15326985ep4102\\_1](https://doi.org/10.1207/s15326985ep4102_1)