Knowledge building

Ola Erstad, Institute of educational research

ICT in Norwegian education

- Action plans
  - 1996-1999: Implementing technology
  - 2000-2003: School reform with ICT
  - 2004-2008: 'Program for digital literacy'

- But where is the knowledge building using digital tools?

The Knowledge Society Challenge

- The productive manipulation of symbols (Reich 1992)
- Beyond the basic literacies
- A higher level of achievement than figures in standards and tests

Knowledge Society:
Bringing Ideas Into the World

- **Pierre Lévy**
  Emergence in cyberspace: A new 'knowledge space' linked to the evolution of new knowledge
- **Paul Romer**
  Health and wealth of nations: Economic viability tied to the generation of new knowledge
- **Peter Drucker**
  Social transformations: "Education will become the center of the knowledge society"

Beyond Learning to Knowledge Building

- **Beyond an effort to keep abreast of advancing knowledge to contributing to its advancement**
- **Beyond cultural replication and lifelong learning to lifelong innovation**

Knowledge Building

Producing knowledge of value to a community, and continually improving it

The Learning Sciences:
Uncovering the Hidden Processes of Knowledge Building

- **Deep understanding and knowledge creation show striking parallels across disciplines, ages, and sectors**
- **Individuals and teams must take charge of knowledge work at the highest levels**

Knowledge building:

- **Starts with the natural tendency to play with ideas**
- **Extends to the unnatural tendency to deliberately improve them**

CSILE/Knowledge Forum®

A Knowledge Building Environment for embedding the process of innovation into the everyday lives of knowledge workers

- **Elementary to tertiary education**
- **Health care and community organizations**
- **Businesses**

Technology Innovation

Knowledge Forum

advanced Information technology

knowledge-based societies and economies

Knowledge Building

Social Innovation

Project-Based Learning: Current Research Findings

- Fact Finding
- Topical Information Search/Copy Delete
- Division of Labor
- ICT Capabilities

Projects: A Knowledge Building Perspective

- Research Deepens the Problem (rather than expanding Fact Finding)
- Idea generation (rather than Topical Information Search/Copy Delete)
- Collective Responsibility for Knowledge Advancement (rather than Division of Labor)
- ICT Capabilities Relevant to Real-World Knowledge Work

Core elements

- Building on a sociocultural framework on learning
- Students ideas and knowledge building is at the centre, not the teacher, the curriculum or the text book.
- Collective responsibility and collaborative learning
- What makes students build knowledge?
- Using digital tools to build new learning environments. ’Scaffolding’ for higher order learning

Different conceptions of knowledge

- Knowledge acquisition perspective
- Participation perspective
- Knowledge creation perspective

Students as ’experts’

- Relates to knowledge about ’expert teams’ (health, pilots, sport) ’epistemic cultures’
- Relates to knowledge about how researchers work
- Students’ ideas are at the centre
- That students ’theories’ about certain subject domains are limited and restricted
- ’Progressive inquiry’

Design principles

1) REAL IDEAS, AUTHENTIC PROBLEMS

2) IMPROVABLE IDEAS

3) IDEA DIVERSITY

4) EPISTEMIC AGENCY

5) COMMUNITY KNOWLEDGE, COLLECTIVE RESPONSIBILITY

6) DEMOCRATIZING KNOWLEDGE

Design principles

7) SYMMETRIC KNOWLEDGE ADVANCEMENT

8) PERVASIVE KNOWLEDGE BUILDING

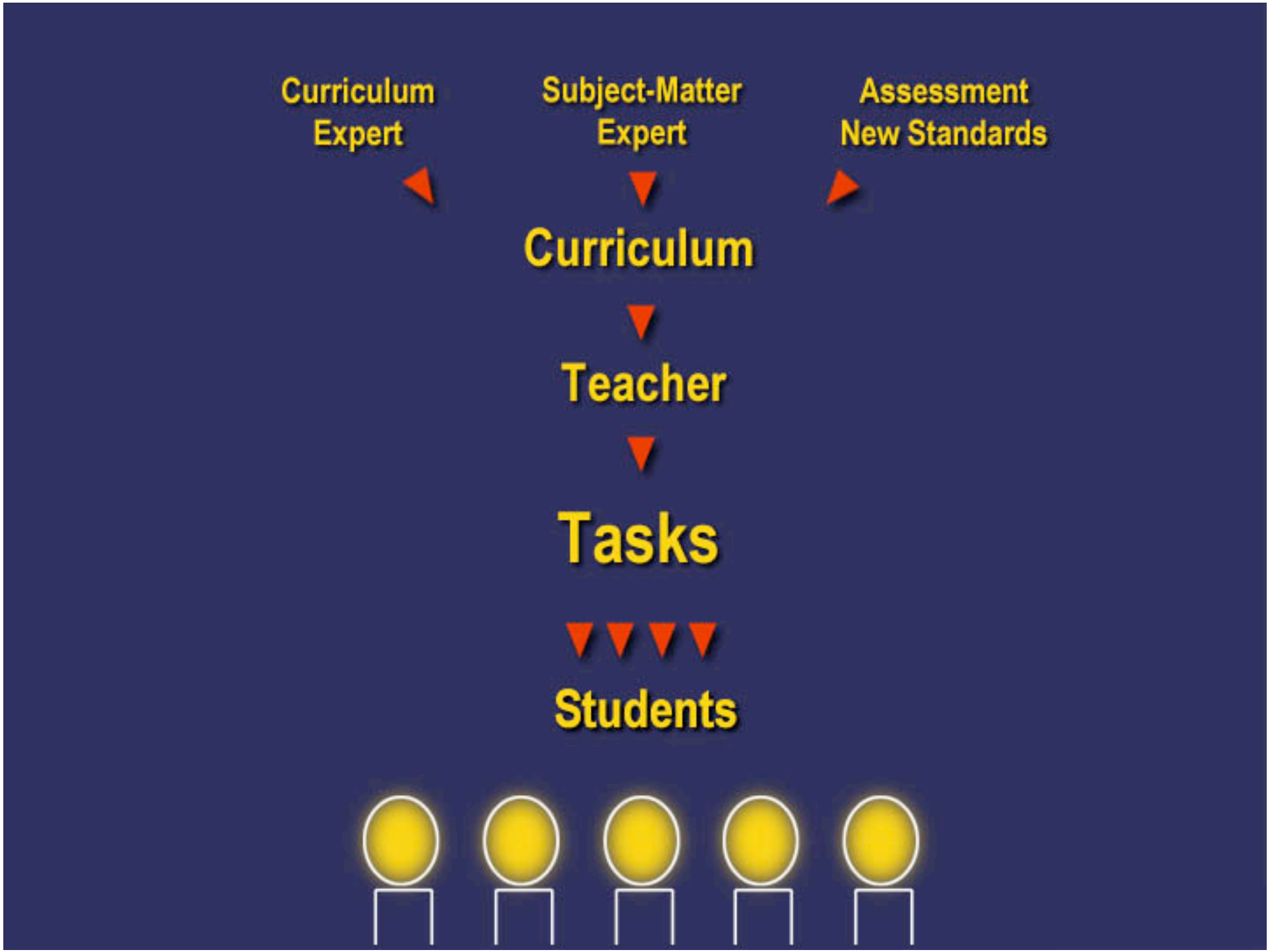
9) CONSTRUCTIVE USES OF AUTHORITATIVE SOURCES

10) KNOWLEDGE BUILDING DISCOURSE

11) EMBEDDED, CONCURRENT AND TRANSFORMATIVE ASSESSMENT

12) RISE ABOVE

- www.ikit.org
- CSILE (Computer Supported Innovative Learning Environment)
- Knowledge Forum
- Used in different countries around the world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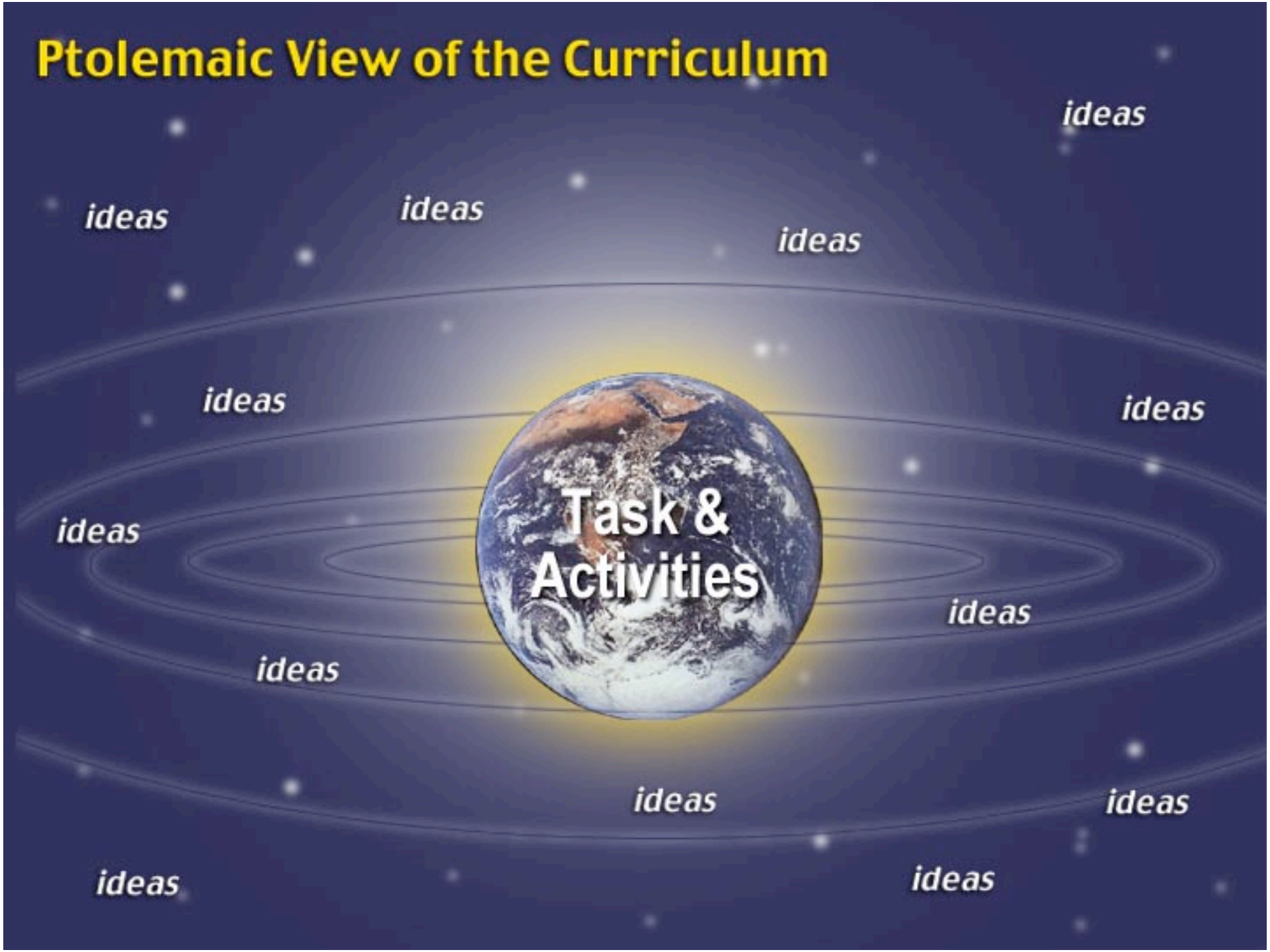
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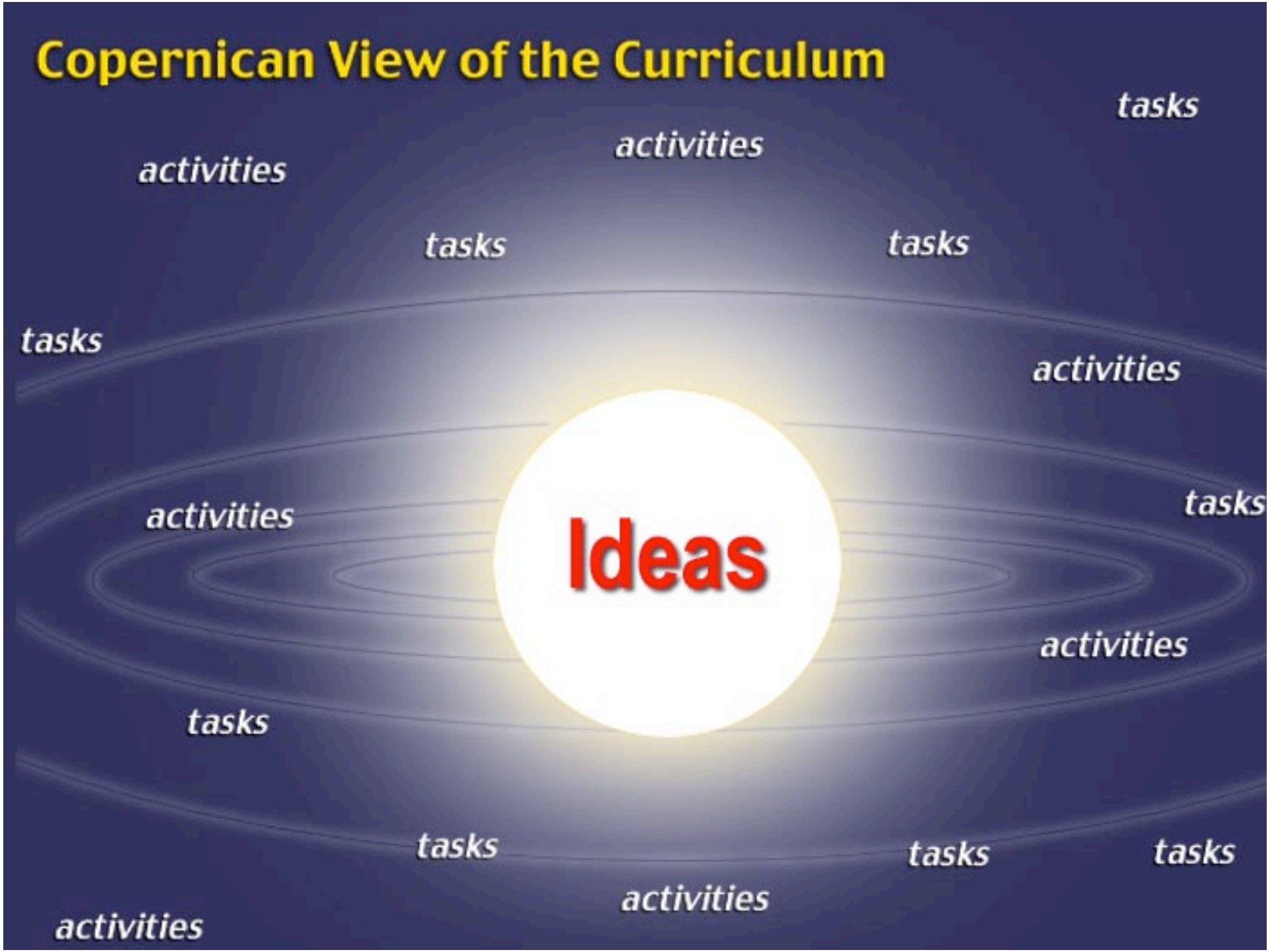
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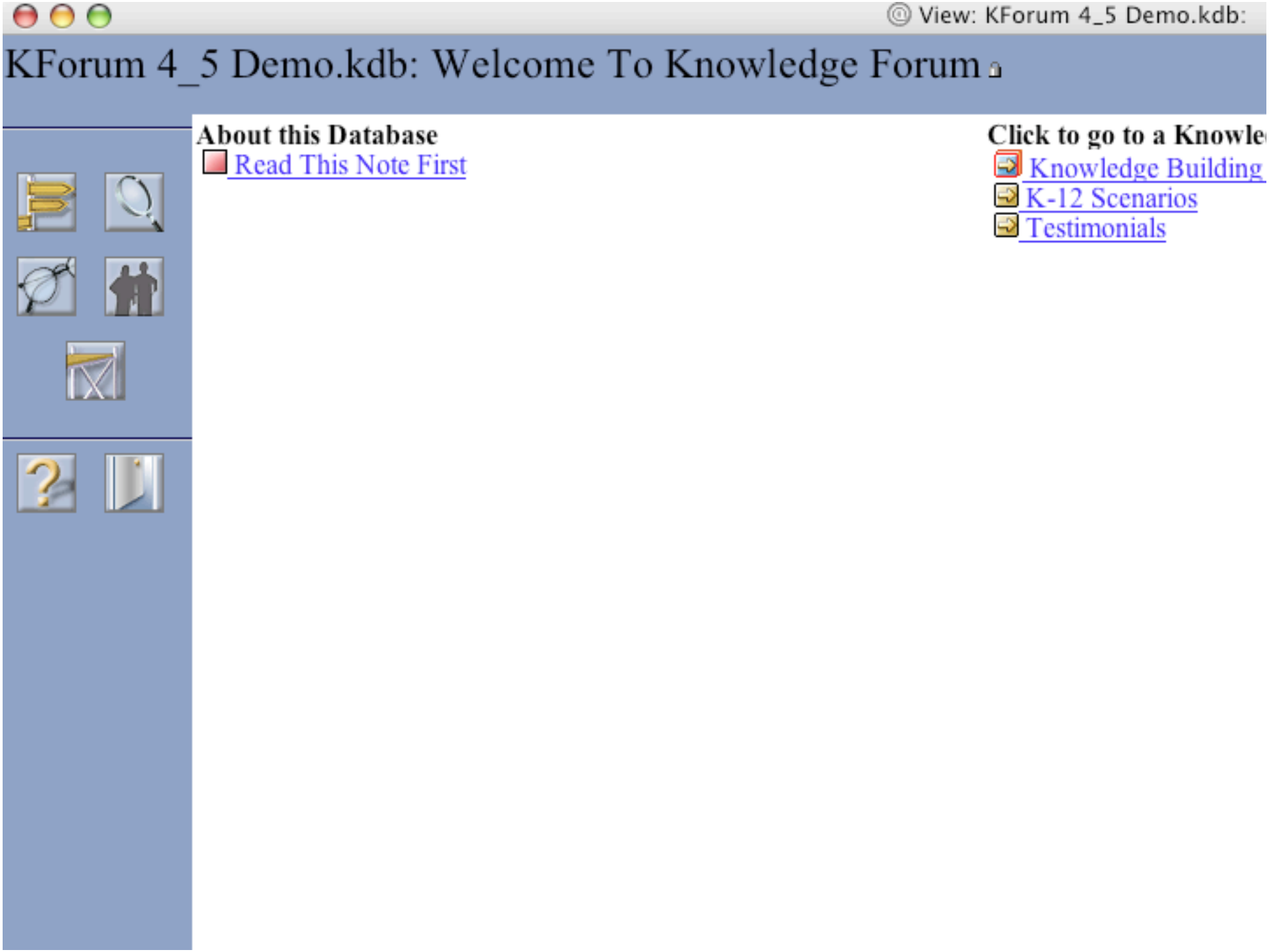
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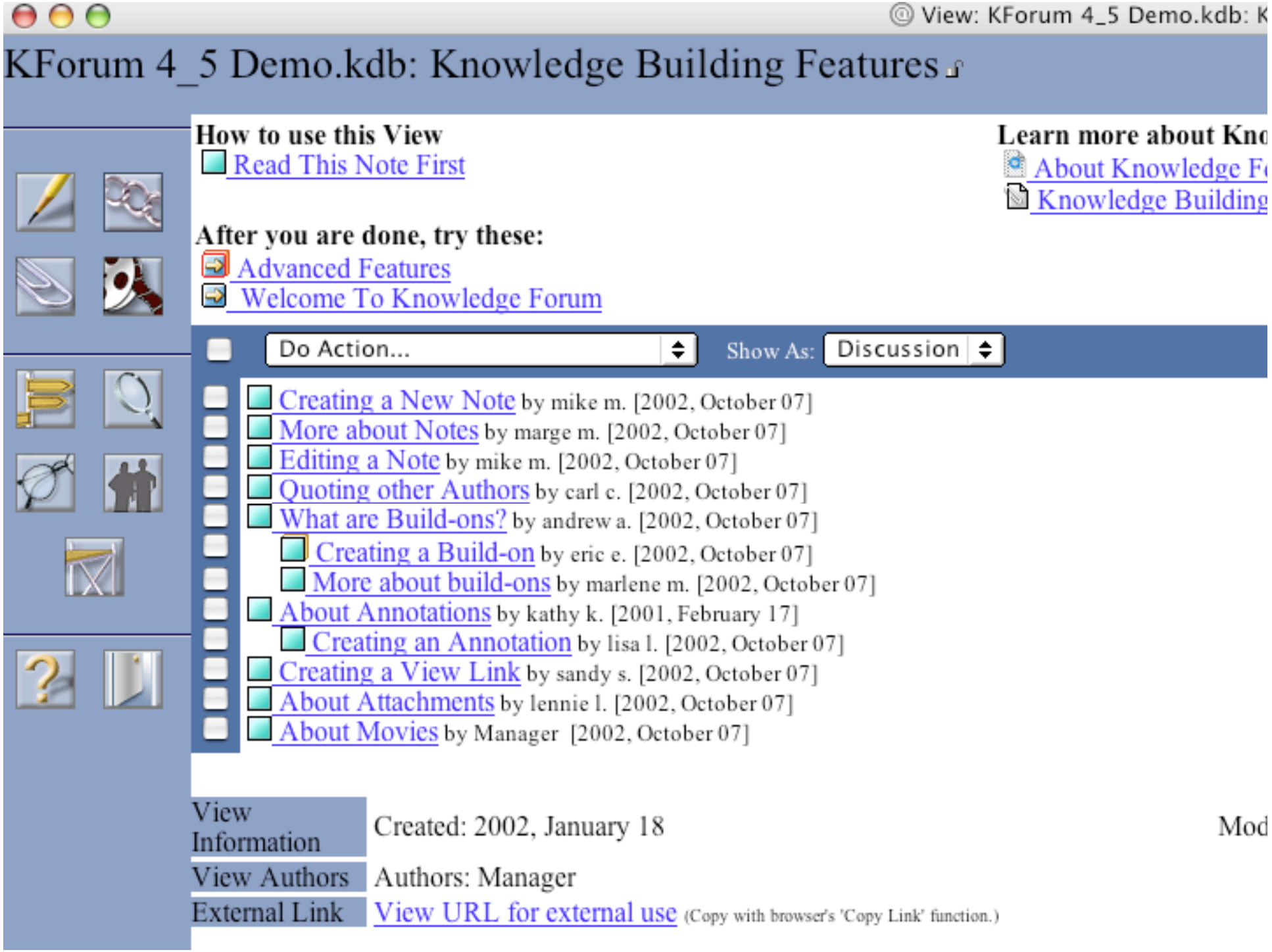
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Advanced Features
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More about Notes by marge m. [2002, October 07]
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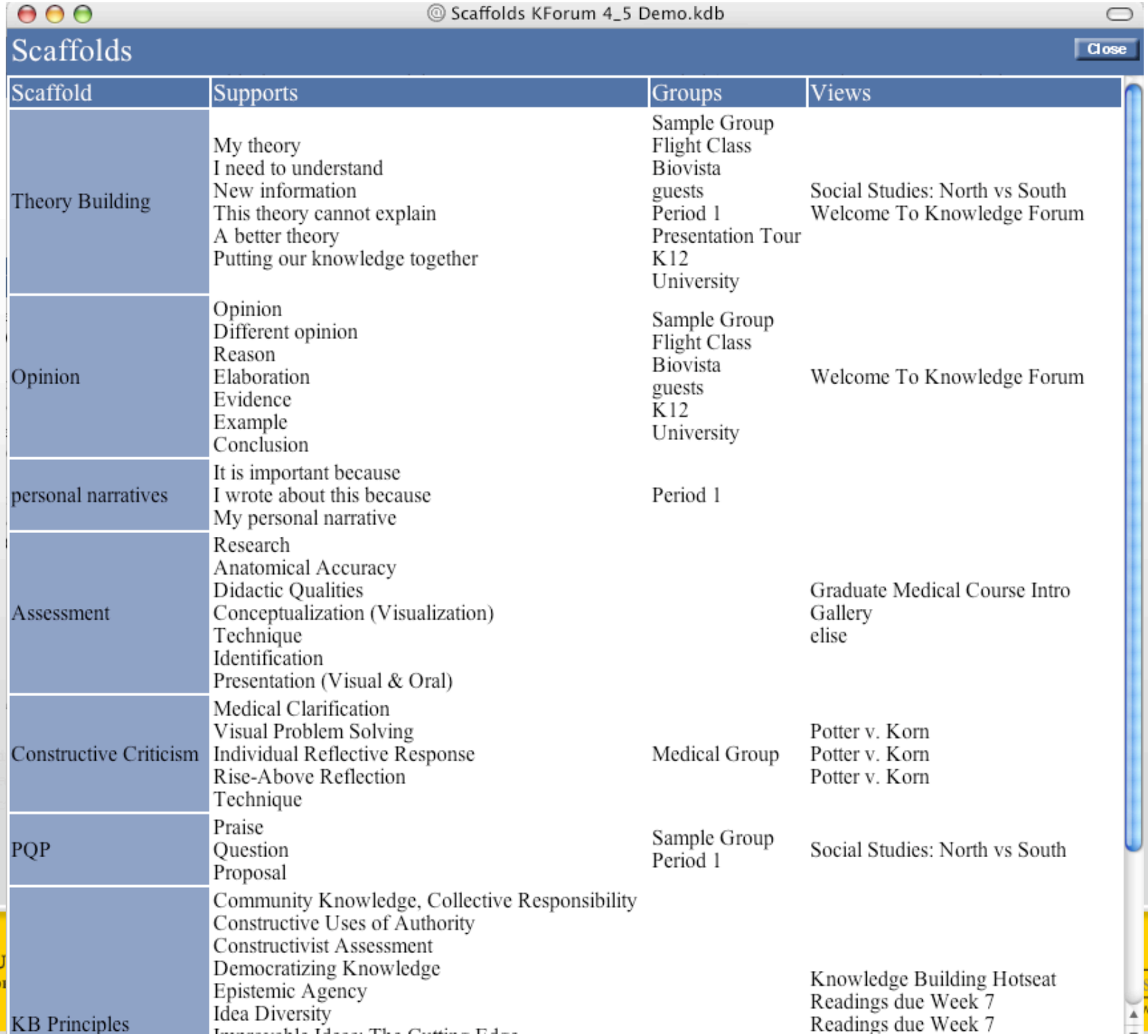
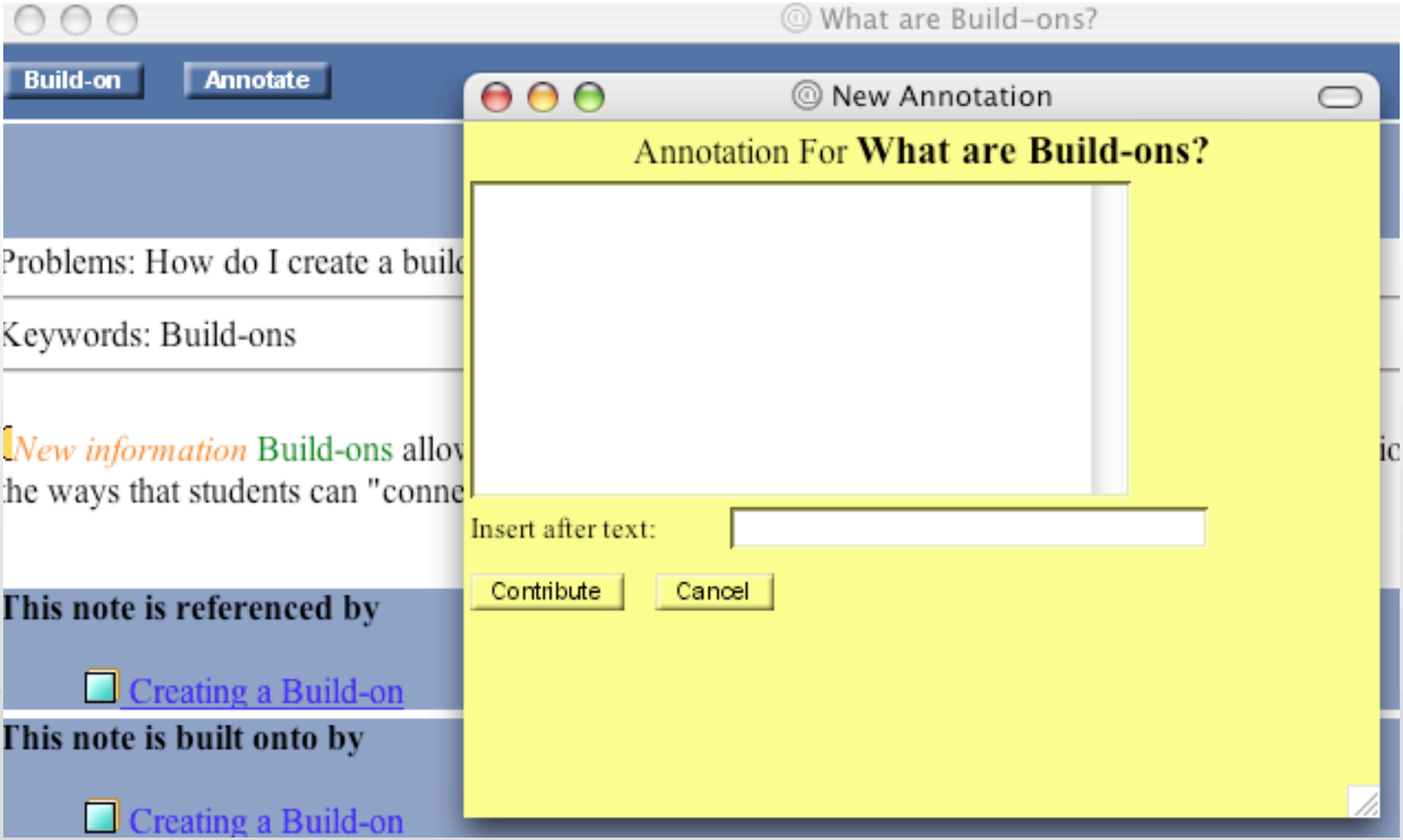


Scaffold	Supports	Groups	Views
Theory Building	My theory I need to understand New information This theory cannot explain A better theory Putting our knowledge together	Sample Group Flight Class Biovista guests Period 1 Presentation Tour K12 University	Social Studies: North vs South Welcome To Knowledge Forum
Opinion	Opinion Different opinion Reason Elaboration Evidence Example Conclusion	Sample Group Flight Class Biovista guests K12 University	Welcome To Knowledge Forum
personal narratives	It is important because I wrote about this because My personal narrative	Period 1	
Assessment	Research Anatomical Accuracy Didactic Qualities Conceptualization (Visualization) Technique Identification Presentation (Visual & Oral)		Graduate Medical Course Intro Gallery elise
Constructive Criticism	Medical Clarification Visual Problem Solving Individual Reflective Response Rise-Above Reflection Technique	Medical Group	Potter v. Korn Potter v. Korn Potter v. Korn
PQP	Praise Question Proposal	Sample Group Period 1	Social Studies: North vs South
KB Principles	Community Knowledge, Collective Responsibility Constructive Uses of Authority Constructivist Assessment Democratizing Knowledge Epistemic Agency Idea Diversity		Knowledge Building Hotseat Readings due Week 7 Readings due Week 7

What are Build-ons?
Build-on
Annotate
What are Build-ons?
by andrew a.
Last modified: 2002, October 07 (07:20:25) by Manager
Problems: How do I create a build-on note?
Keywords: Build-ons
New information Build-ons allow the user to build on to someone's ideas and extend them or question them. Build-ons are one
he ways that students can "connect" their ideas.
This note is referenced by
Creating a Build-on
This note is built onto by
Creating a Build-on
More about build-ons
Views for this note
Knowledge Building Features by Manager [2002, June 13]
Read and modify information for this note
This note has been read 31 times by 7 different people.
This note has been modified 4 times by 3 different people.
More...
Note URL for external use (Copy with browser's 'Copy Link' function.)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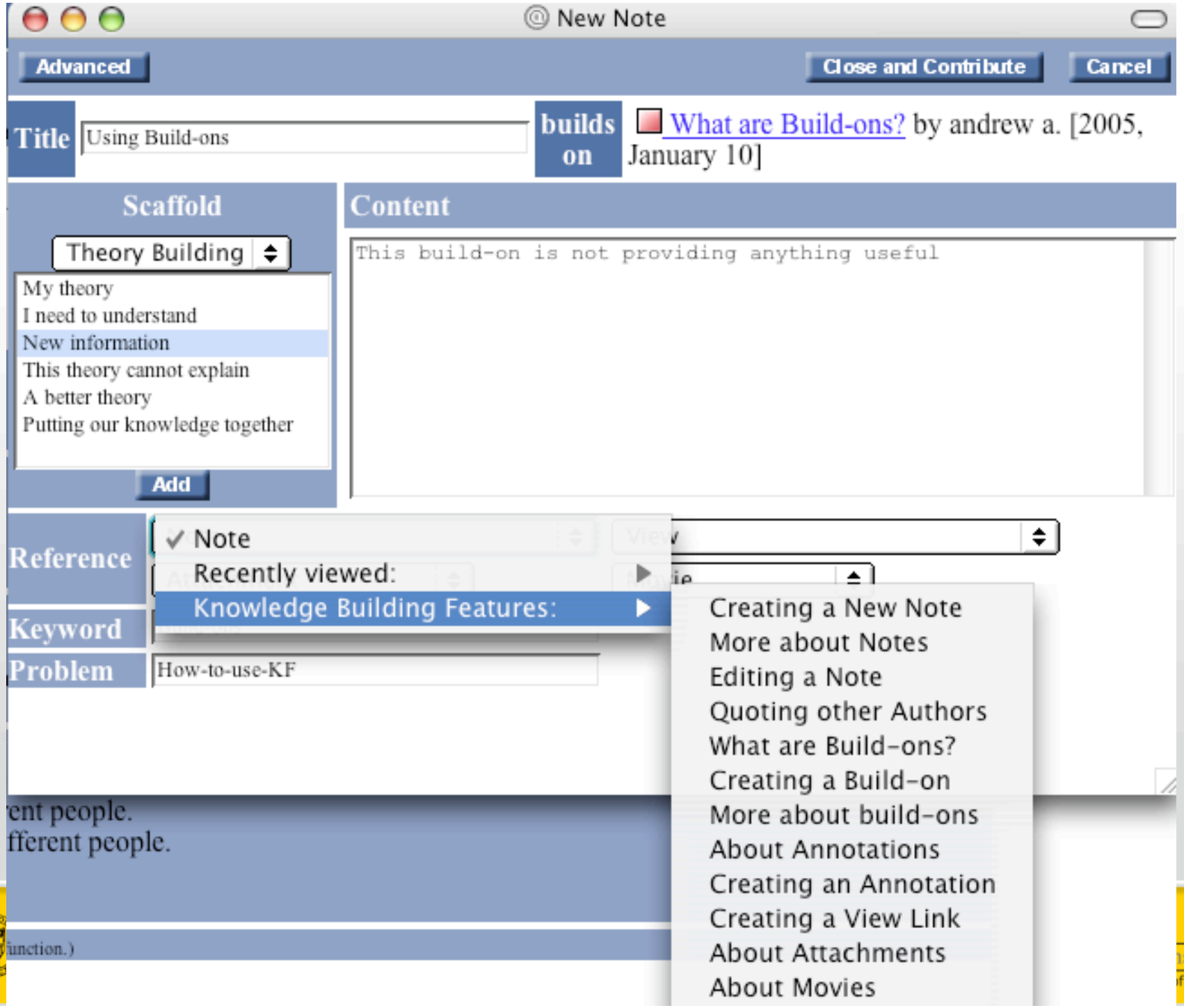
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My theory
I need to understand
New information
This theory cannot explain
A better theory
Putting our knowledge together
Add
Content
This build-on is not providing anything useful
Reference
Keyword
Problem
How-to-use-KF
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Knowledge Building Features:
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More about Notes
Editing a Note
Quoting other Authors
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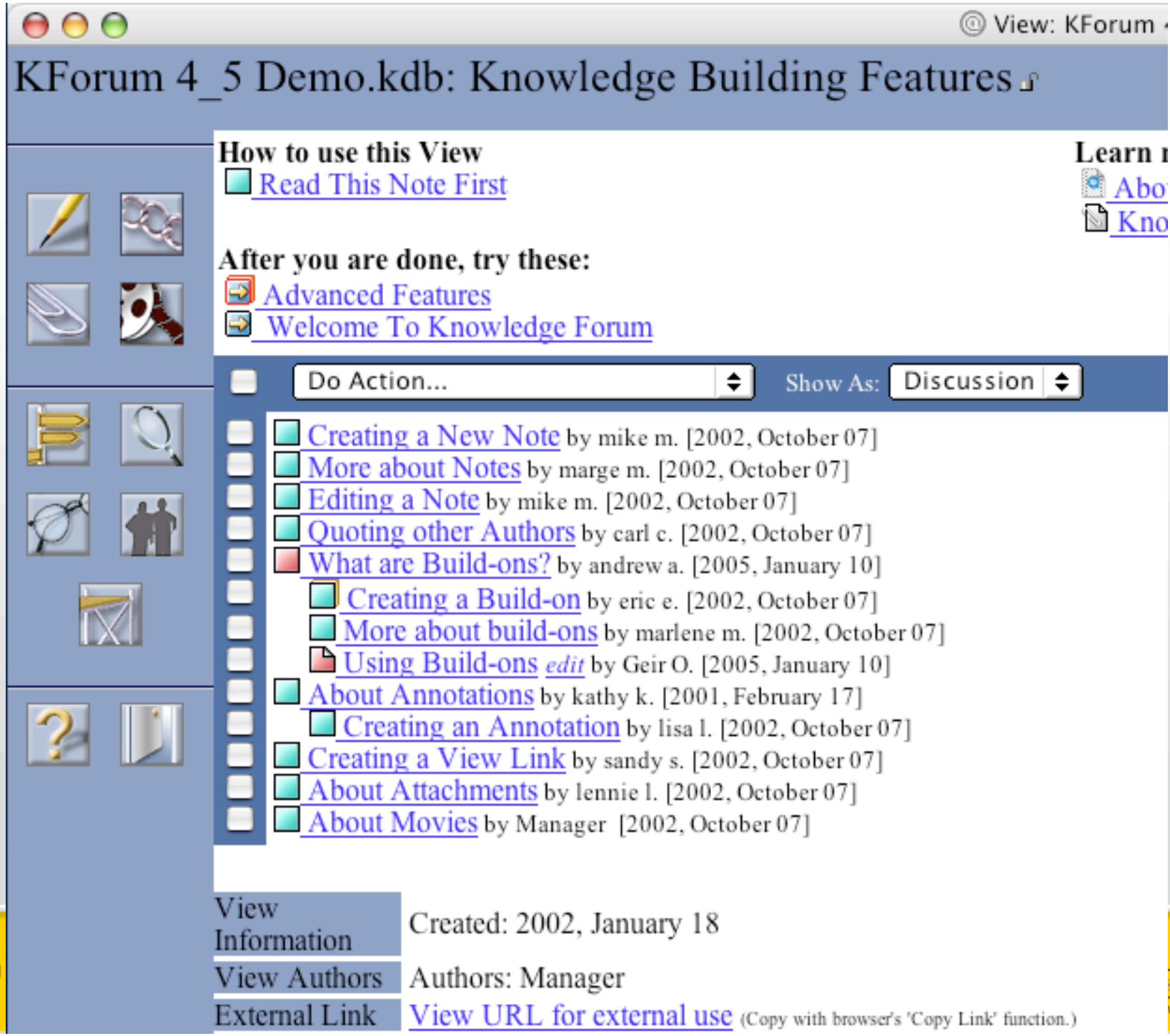
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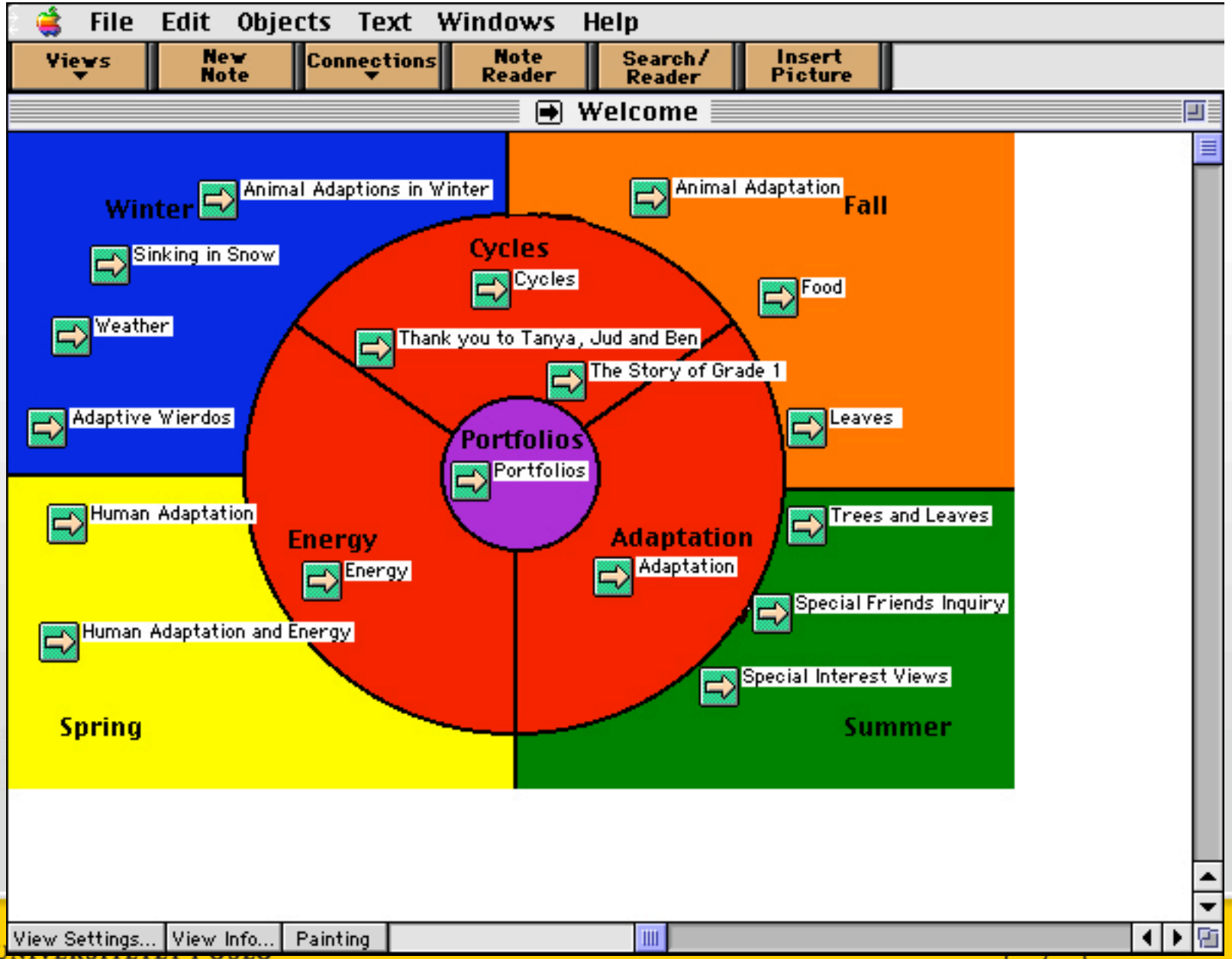
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Winter
Animal Adaptions in Winter
Sinking in Snow
Weather
Adaptive Wierdos
Fall
Animal Adaptation
Food
Leaves
Cycles
Cycles
Thank you to Tanya, Jud and Ben
The Story of Grade 1
Portfolios
Portfolios
Energy
Energy
Adaptation
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Spring
Human Adaptation
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Summer
Trees and Leaves
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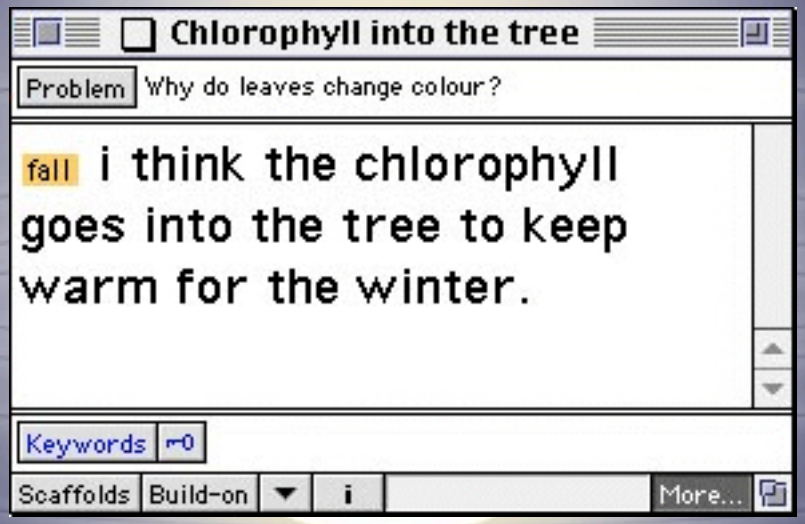

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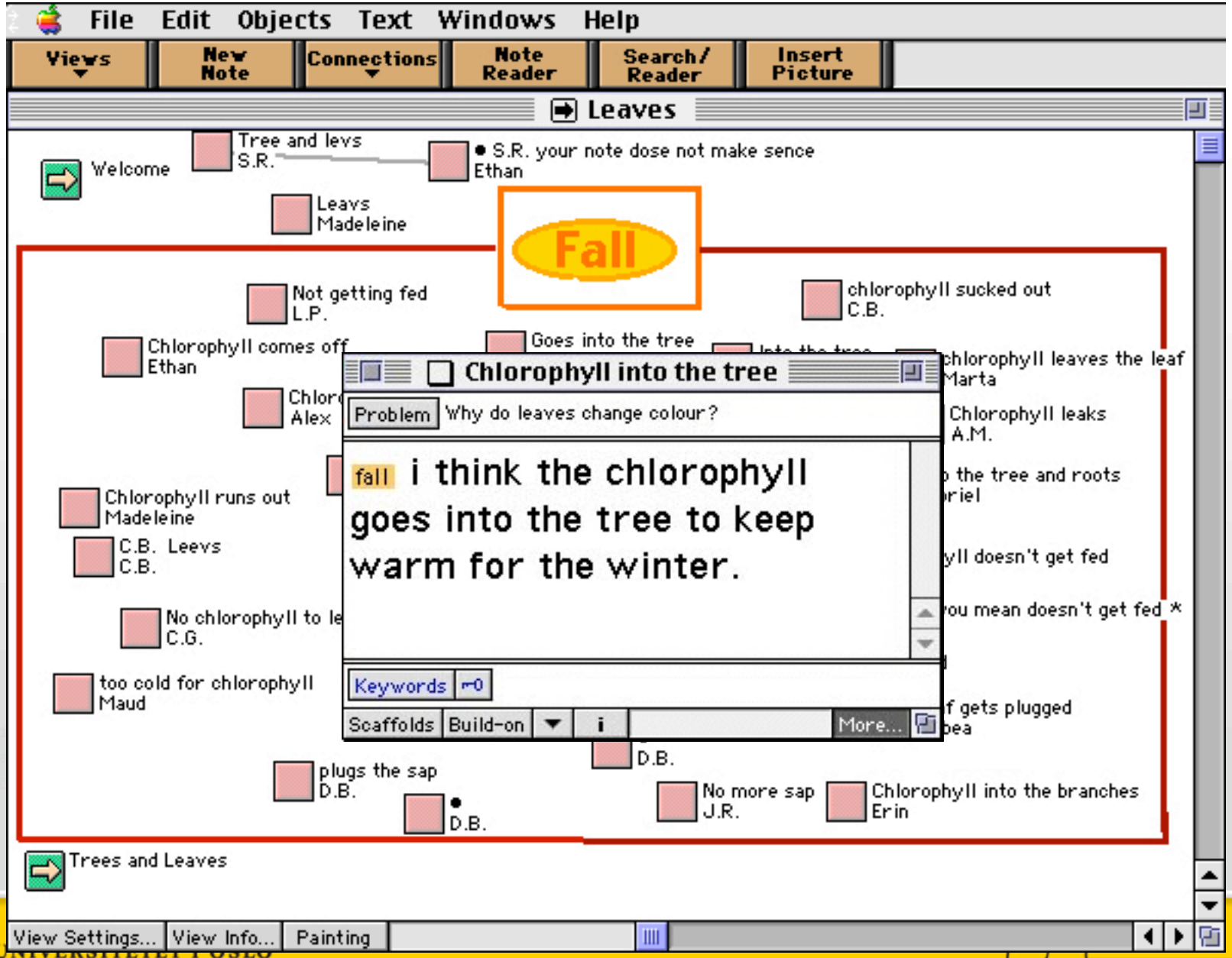
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S.R. your note dose not make sence
Ethan
Leavs
Madeleine
Fall
Not getting fed
L.P.
chlorophyll sucked out
C.B.
Chlorophyll comes off
Ethan
Goes into the tree
Chlorophyll into the tree
Problem
Why do leaves change colour?
fall i think the chlorophyll goes into the tree to keep warm for the winter.
Keywords
Scaffolds
Build-on
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More...
chlorophyll leaves the leaf
Marta
Chlorophyll leaks
A.M.
Chlorophyll runs out
Madeleine
C.B. Leevs
C.B.
No chlorophyll to le
C.G.
too cold for chlorophyll
Maud
D.B.
plugs the sap
D.B.
D.B.
No more sap
J.R.
Chlorophyll into the branches
Erin
Trees and Leaves
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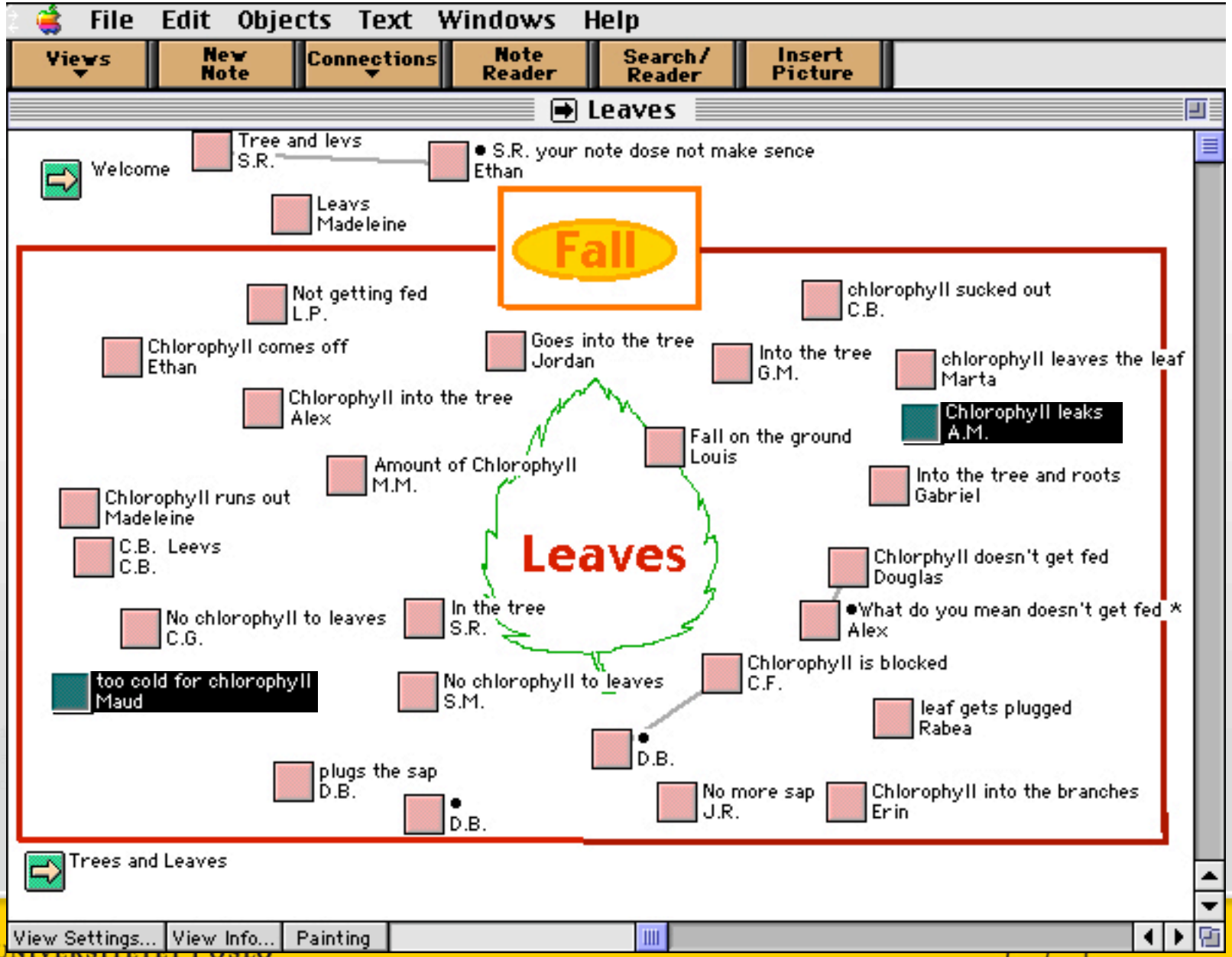
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Welcome
Tree and levs S.R.
S.R. your note dose not make sence Ethan
Leavs Madeleine
Fall
Not getting fed L.P.
chlorophyll sucked out C.B.
Chlorophyll comes off Ethan
Goes into the tree Jordan
Into the tree G.M.
chlorophyll leaves the leaf Marta
Chlorophyll into the tree Alex
Chlorophyll leaks A.M.
Fall on the ground Louis
Amount of Chlorophyll M.M.
Into the tree and roots Gabriel
Chlorophyll runs out Madeleine
Leaves
C.B. Leevs C.B.
Chlorphyll doesn't get fed Douglas
No chlorophyll to leaves C.G.
In the tree S.R.
What do you mean doesn't get fed * Alex
too cold for chlorophyll Maud
No chlorophyll to leaves S.M.
Chlorophyll is blocked C.F.
leaf gets plugged Rabea
D.B.
plugs the sap D.B.
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No more sap J.R.
Chlorophyll into the branches Erin
Trees and Leaves
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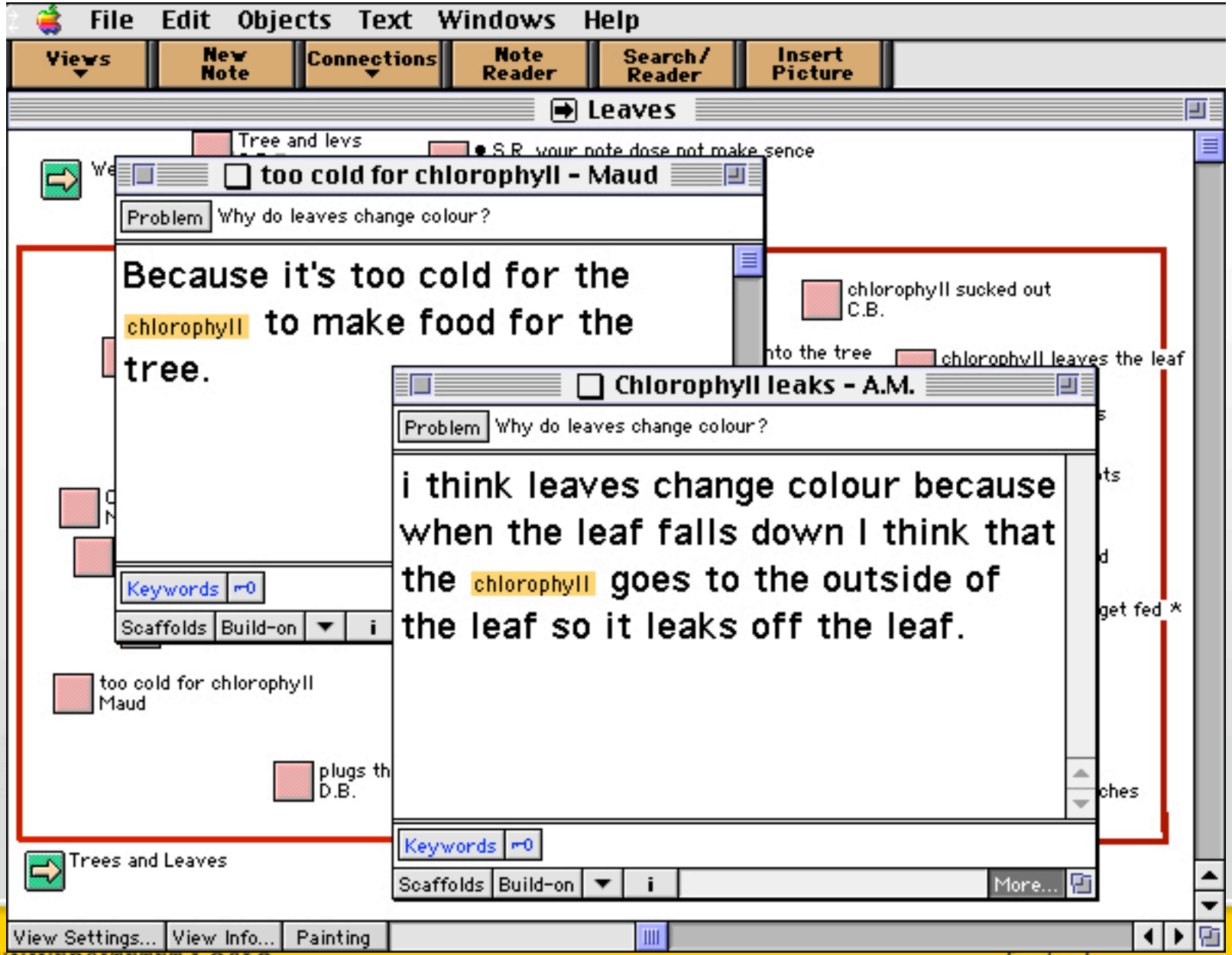
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Leaves
Tree and levs
too cold for chlorophyll - Maud
Problem
Why do leaves change colour?
Because it's too cold for the chlorophyll to make food for the tree.
Keywords
Scaffolds
Build-on
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chlorophyll sucked out C.B.
chlorophyll leaves the leaf
Chlorophyll leaks - A.M.
Problem
Why do leaves change colour?
i think leaves change colour because when the leaf falls down I think that the chlorophyll goes to the outside of the leaf so it leaks off the leaf.
Keywords
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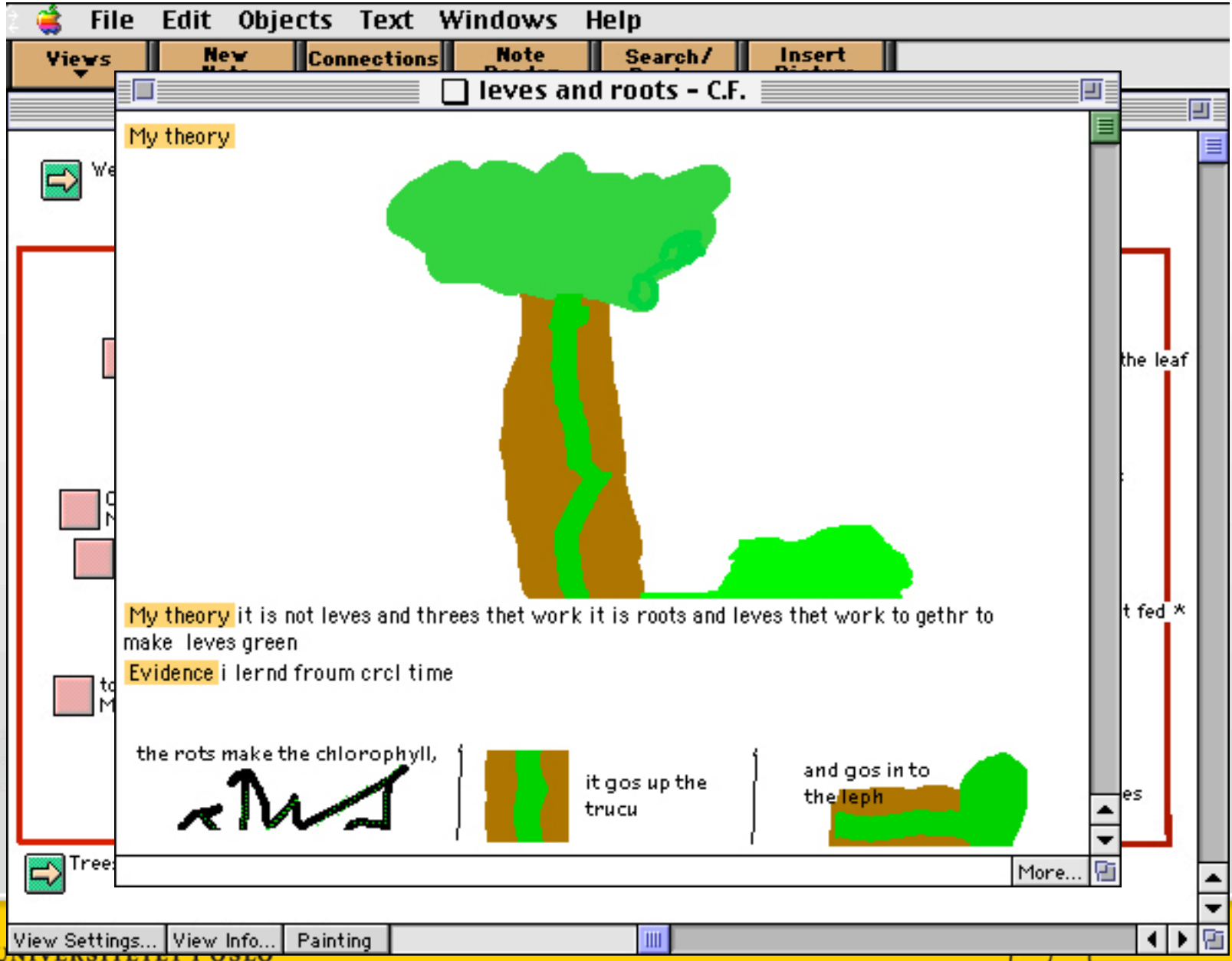
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My theory
My theory it is not leves and threes thet work it is roots and leves thet work to gethr to make leves green
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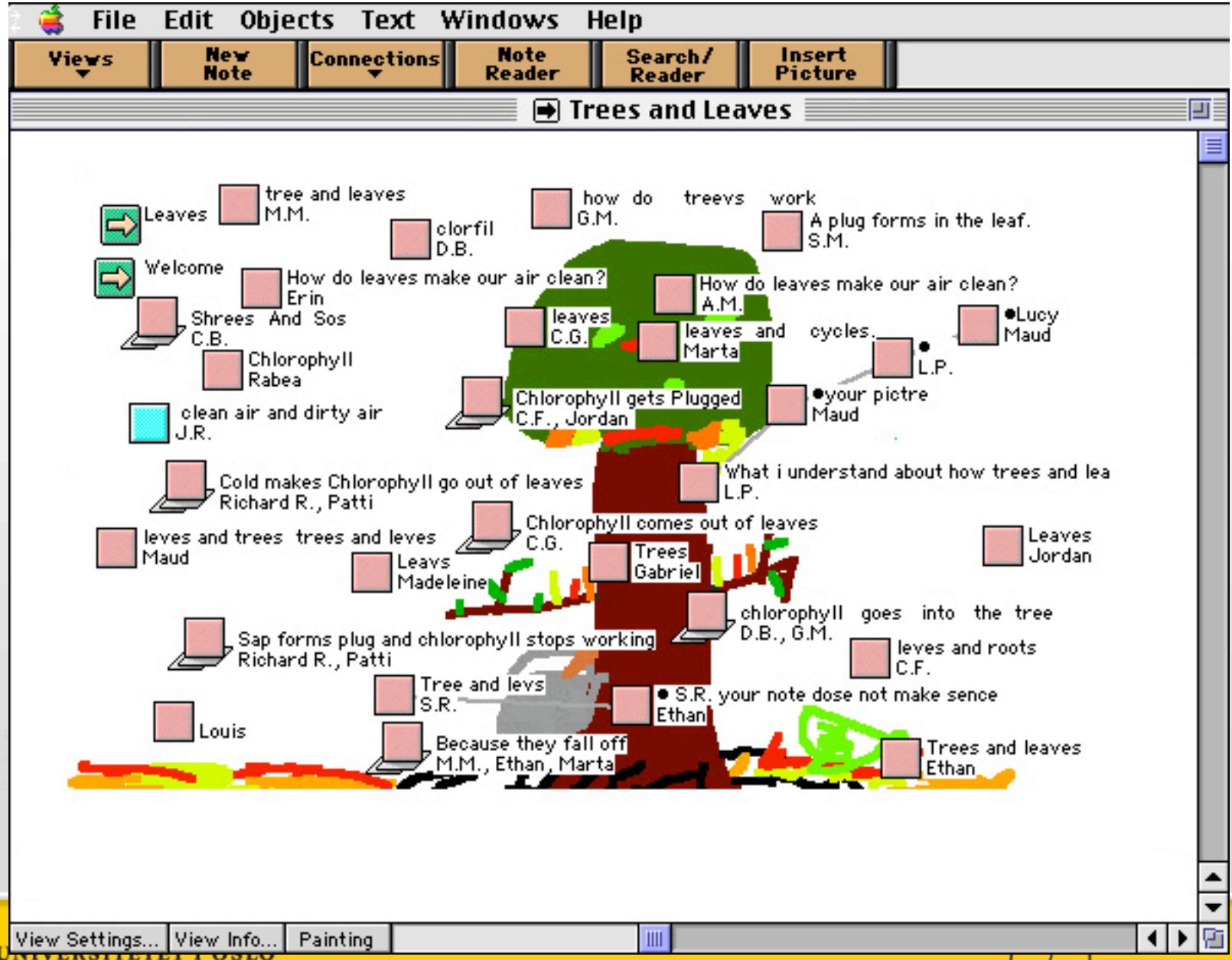
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A plug forms in the leaf. S.M.
Welcome
How do leaves make our air clean? Erin
Shrees And Sos C.B.
Chlorophyll Rabea
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How do leaves make our air clean? A.M.
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leaves and cycles. Marta
Lucy Maud
L.P.
Chlorophyll gets Plugged C.F., Jordan
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What i understand about how trees and lea L.P.
Cold makes Chlorophyll go out of leaves Richard R., Patti
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Chlorophyll comes out of leaves C.G.
Leavs Madeleine
Trees Gabriel
Leaves Jordan
chlorophyll goes into the tree D.B., G.M.
Sap forms plug and chlorophyll stops working Richard R., Patti
leves and roots C.F.
Tree and levs S.R.
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Louis
Because they fall off M.M., Ethan, Marta
Trees and leaves Ethan
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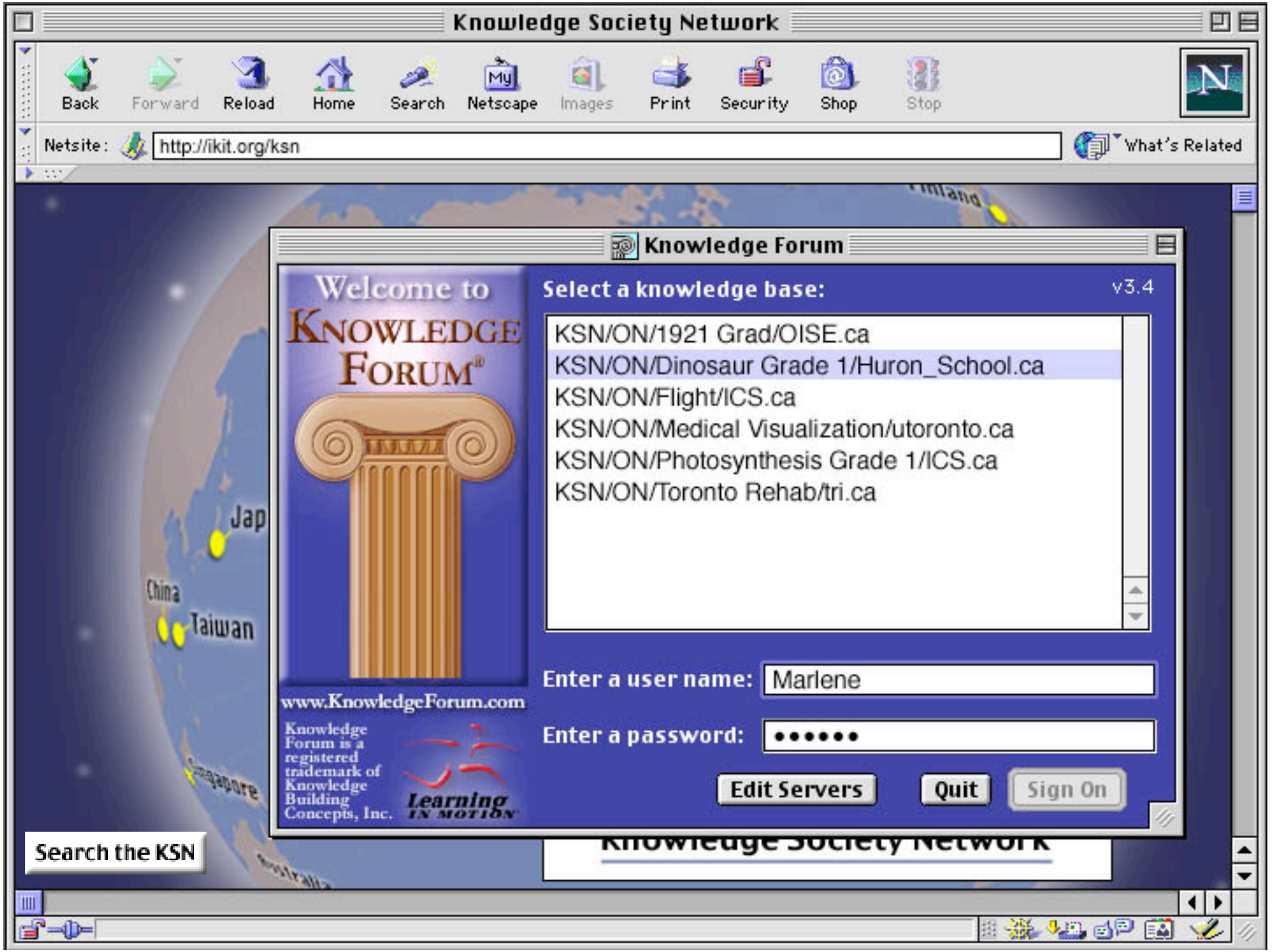
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Forward
Reload
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Netscape
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Shop
Stop
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What's Related
Knowledge Forum
Welcome to
KNOWLEDGE FORUM®
www.KnowledgeForum.com
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Learning IN MOTION
Select a knowledge base:
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KSN/ON/Dinosaur Grade 1/Huron_School.ca
KSN/ON/Flight/ICS.ca
KSN/ON/Medical Visualization/utoronto.ca
KSN/ON/Photosynthesis Grade 1/ICS.ca
KSN/ON/Toronto Rehab/tri.ca
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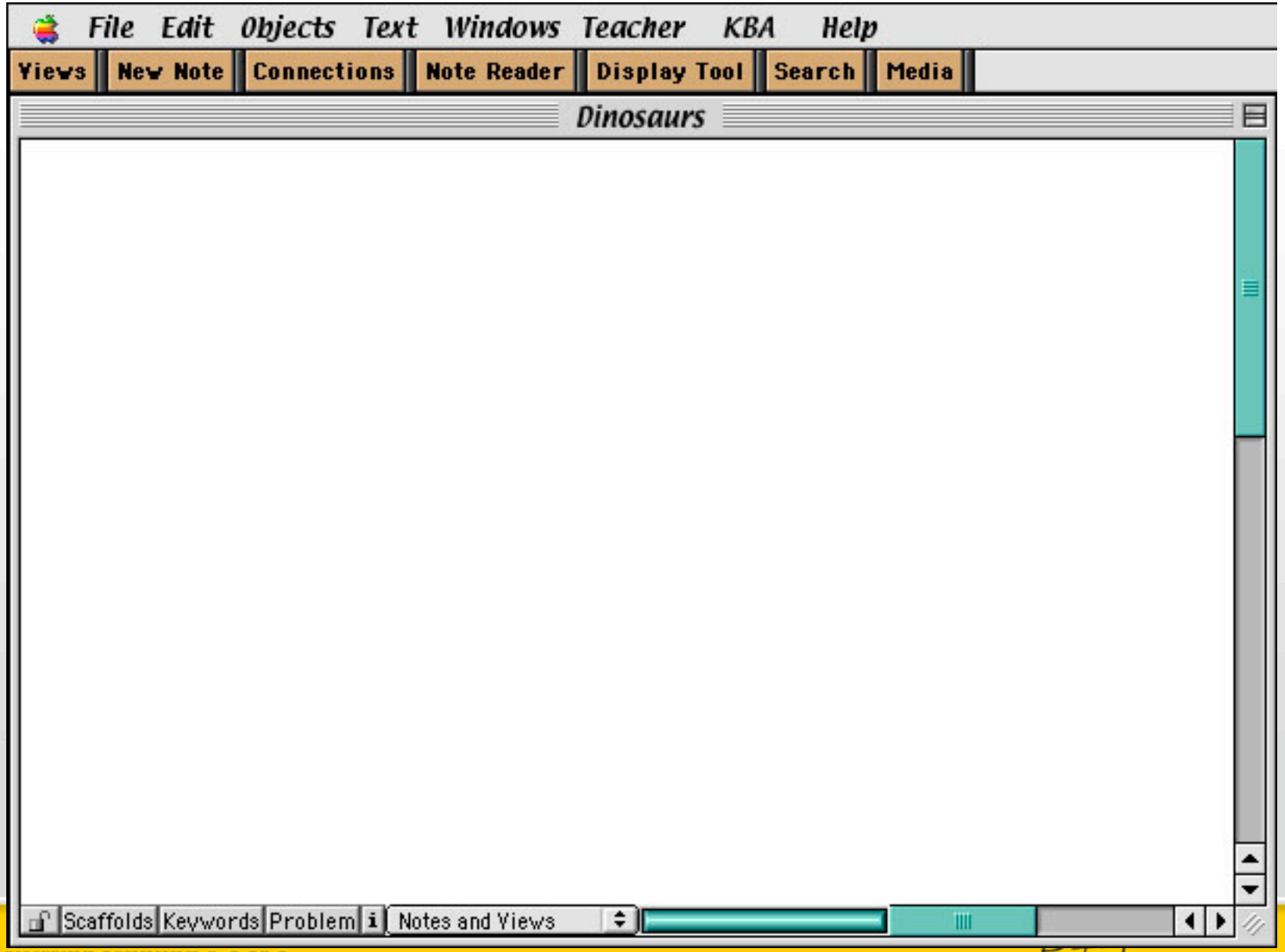
Search the KSN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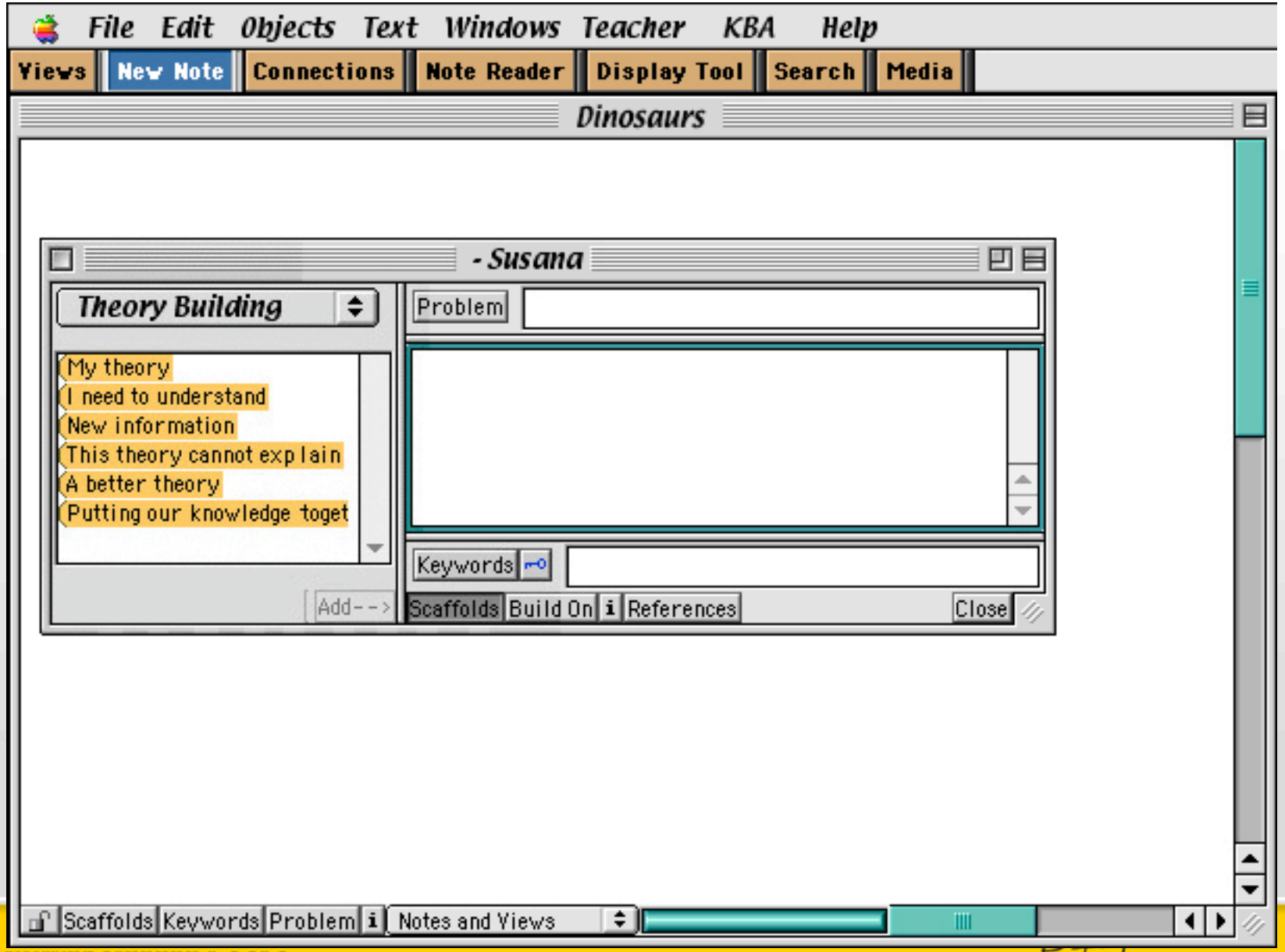
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Media
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- Susana
Theory Building
My theory
I need to understand
New information
This theory cannot explain
A better theory
Putting our knowledge toget
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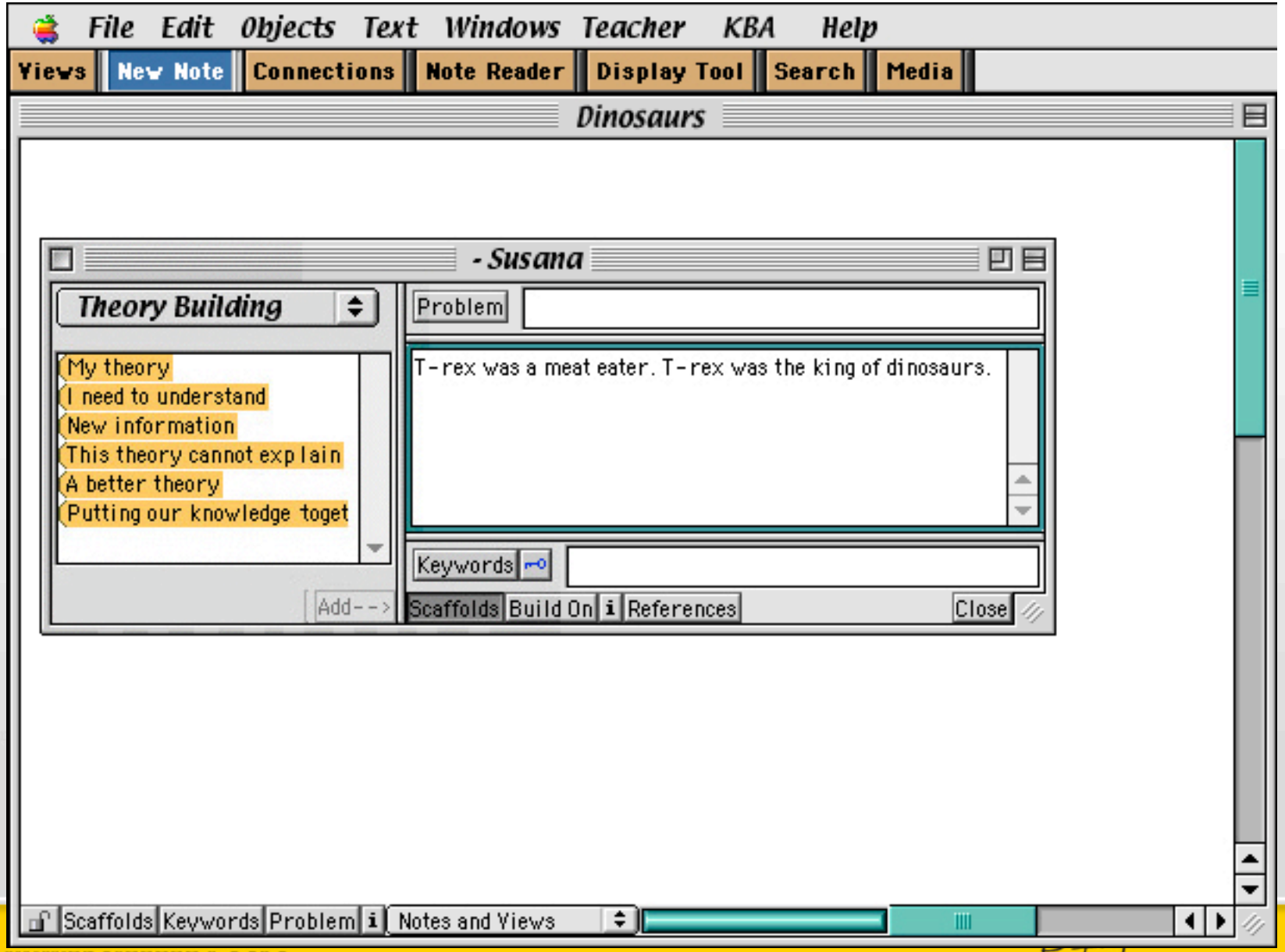
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Display Tool
Search
Media
Dinosaurs
- Susana
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My theory
I need to understand
New information
This theory cannot explain
A better theory
Putting our knowledge toget
Add-->
Problem
T-rex was a meat eater. T-rex was the king of dinosaurs.
Keywords
Scaffolds
Build On
i
References
Close
Scaffolds
Keywords
Problem
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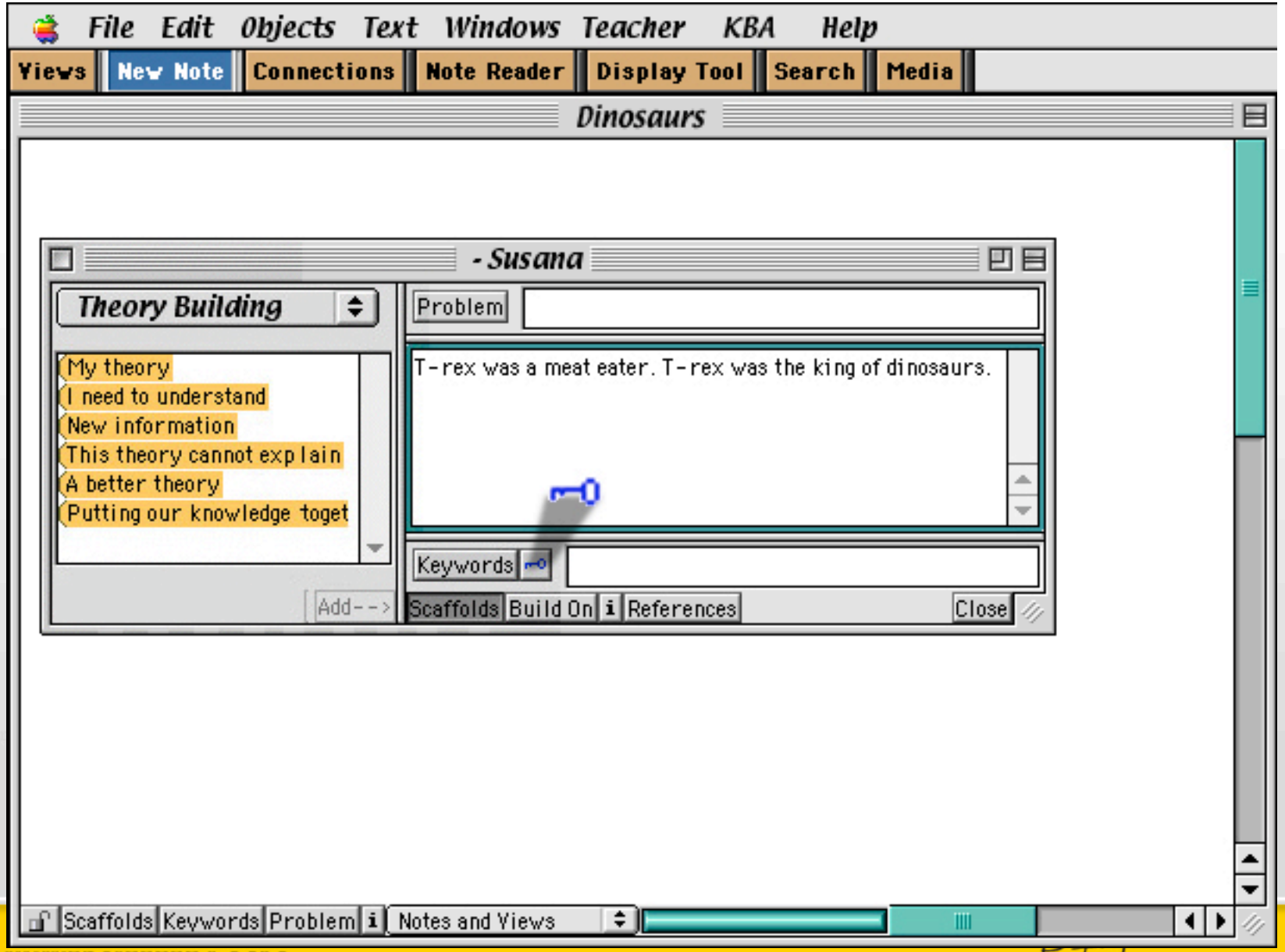
Notes and Views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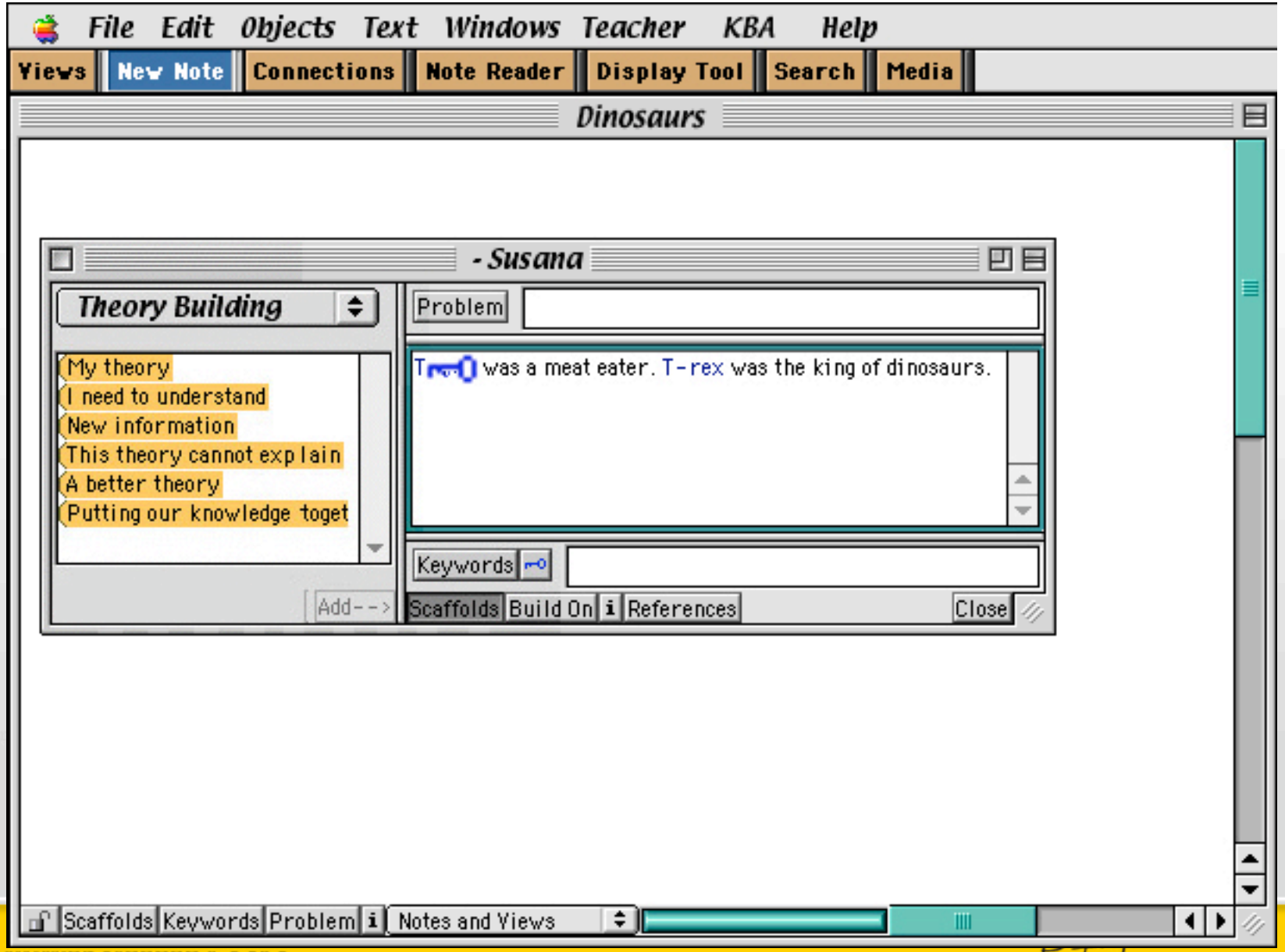
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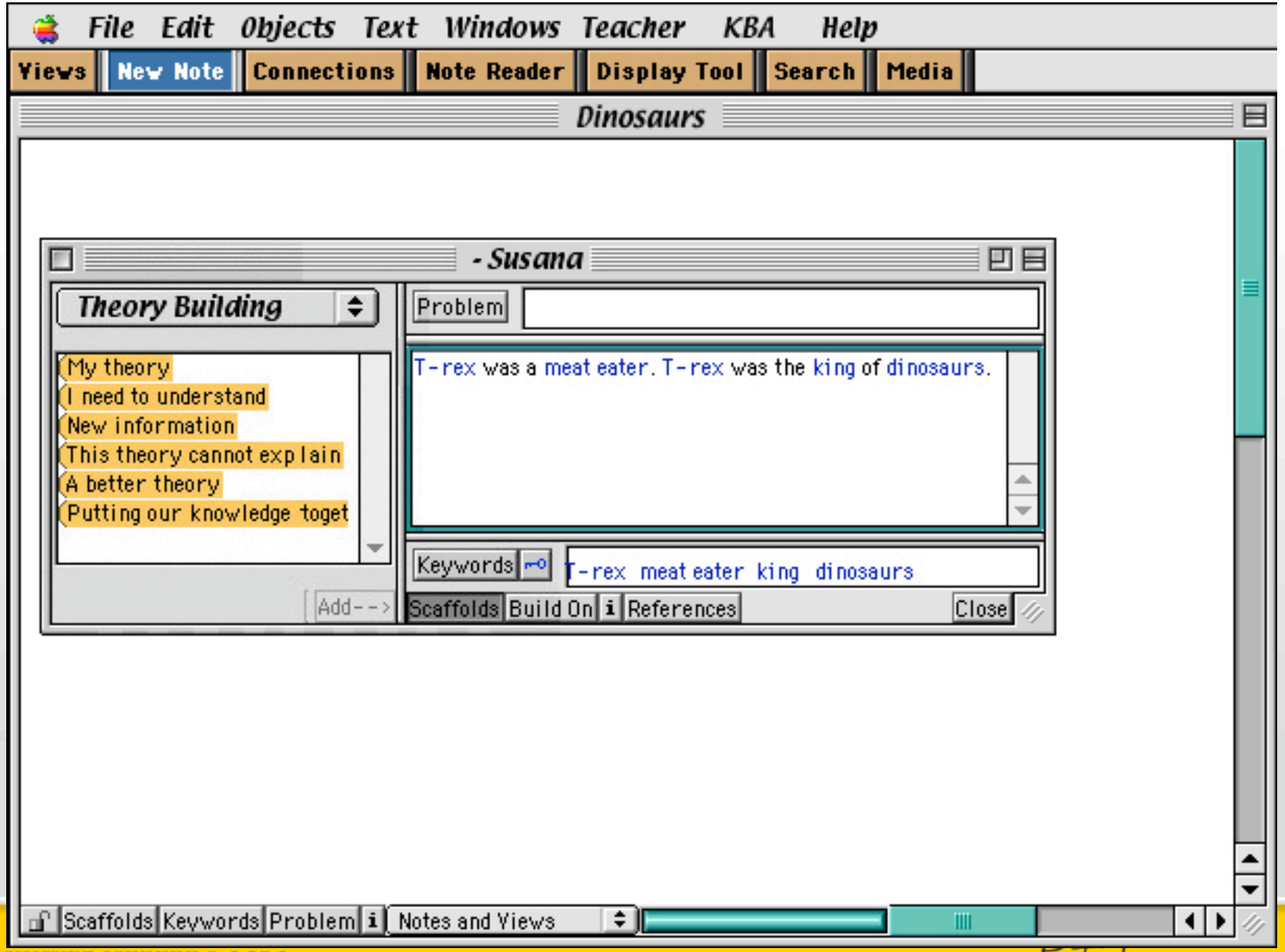
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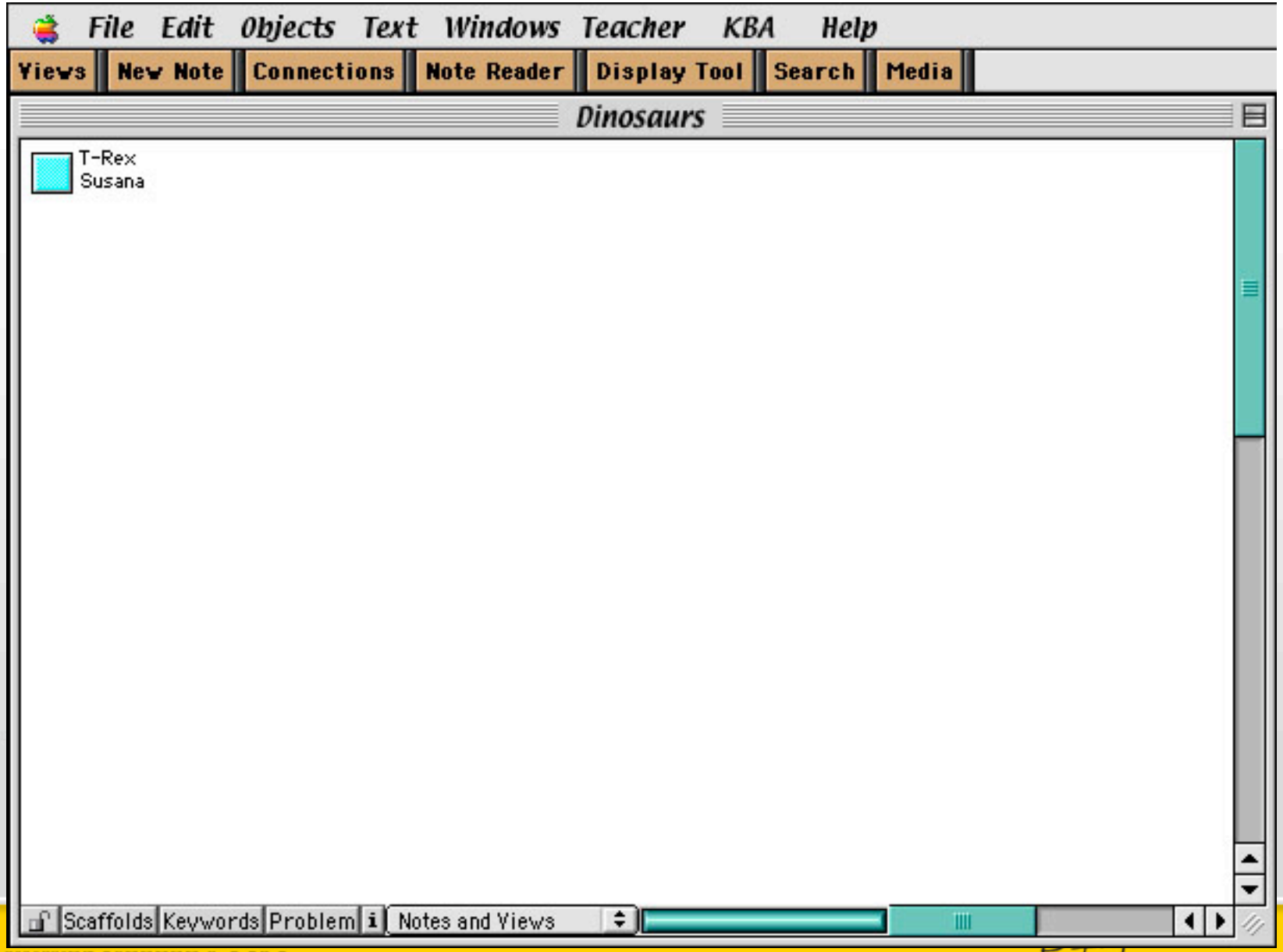
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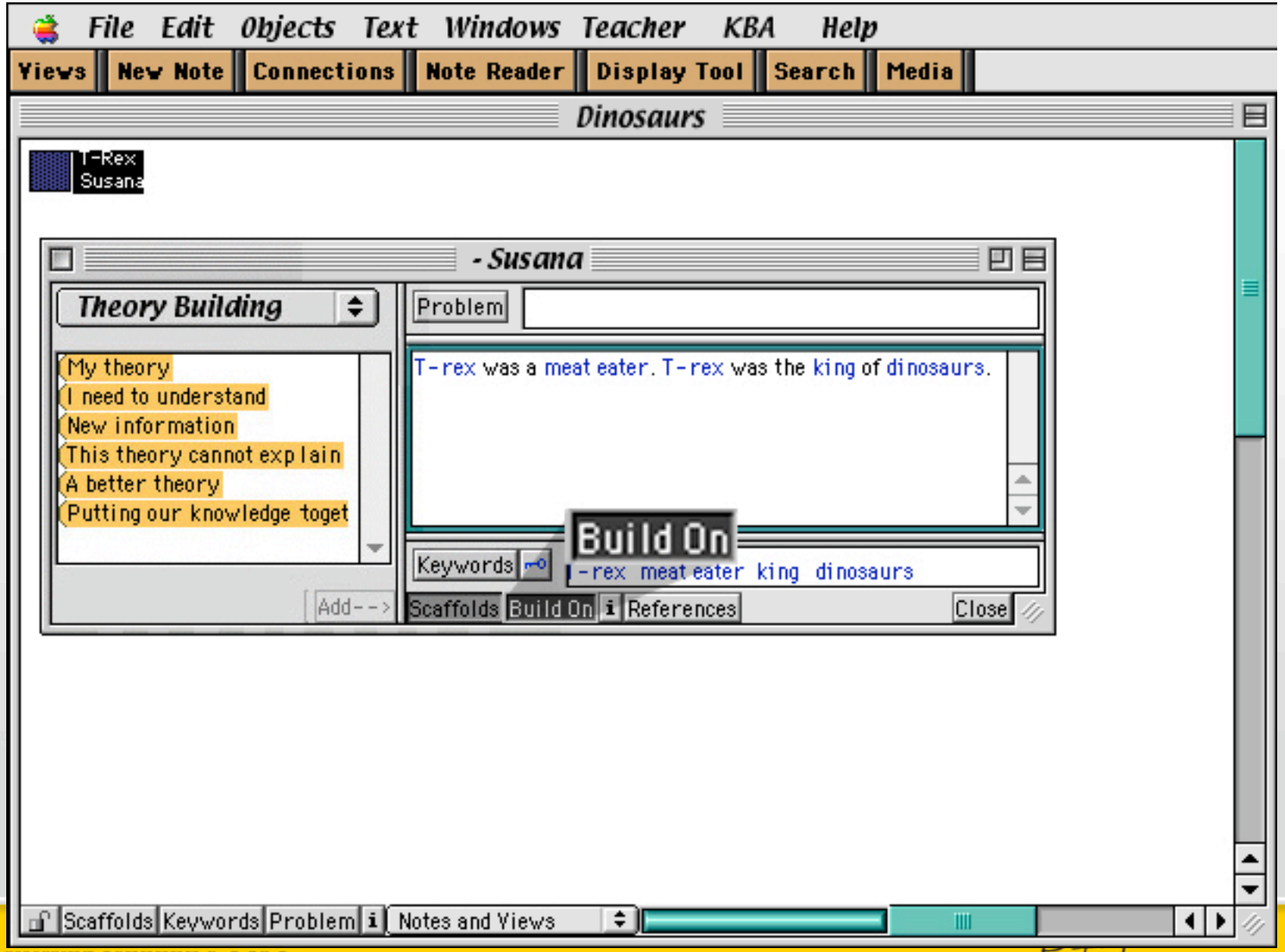
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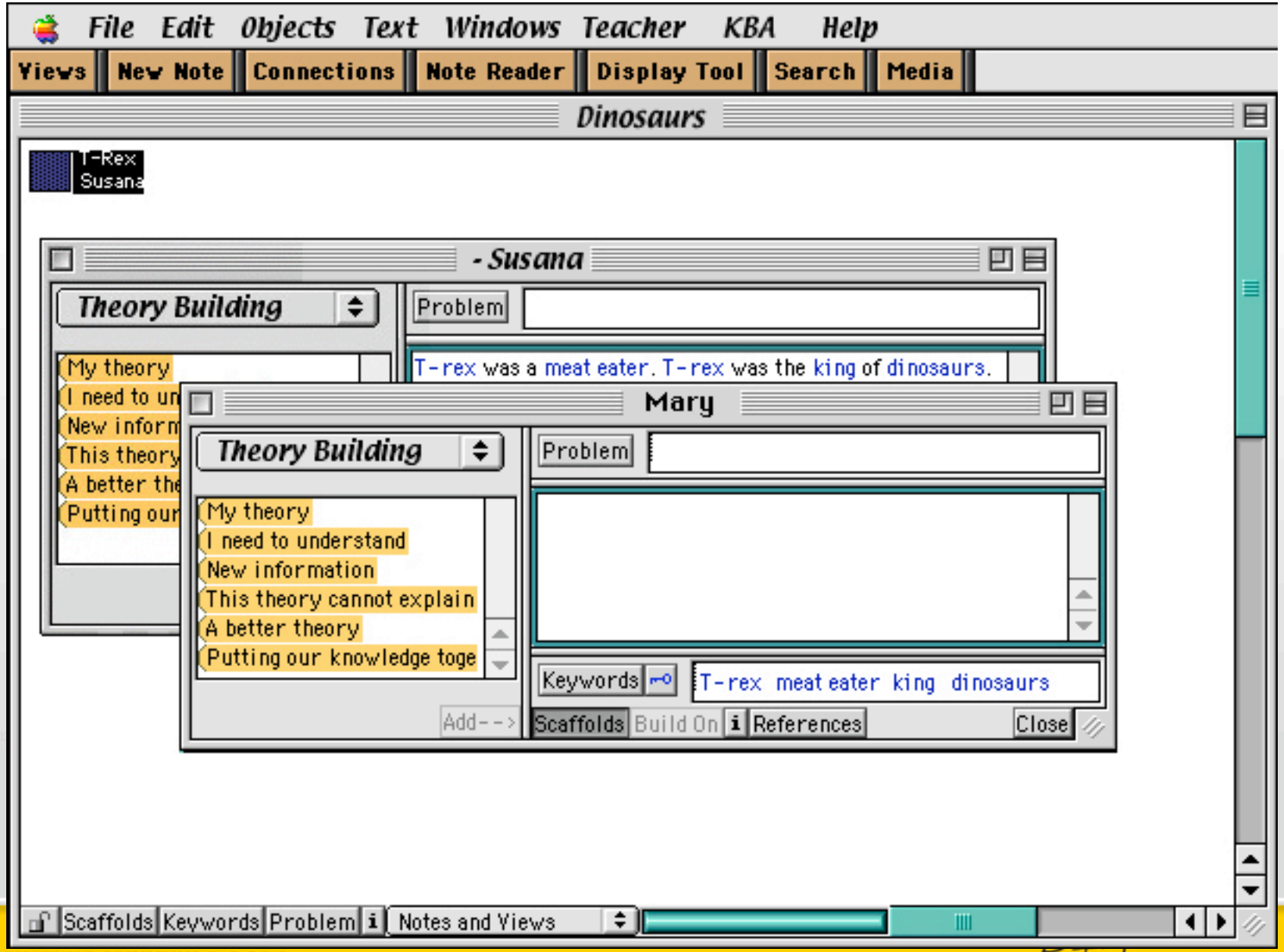
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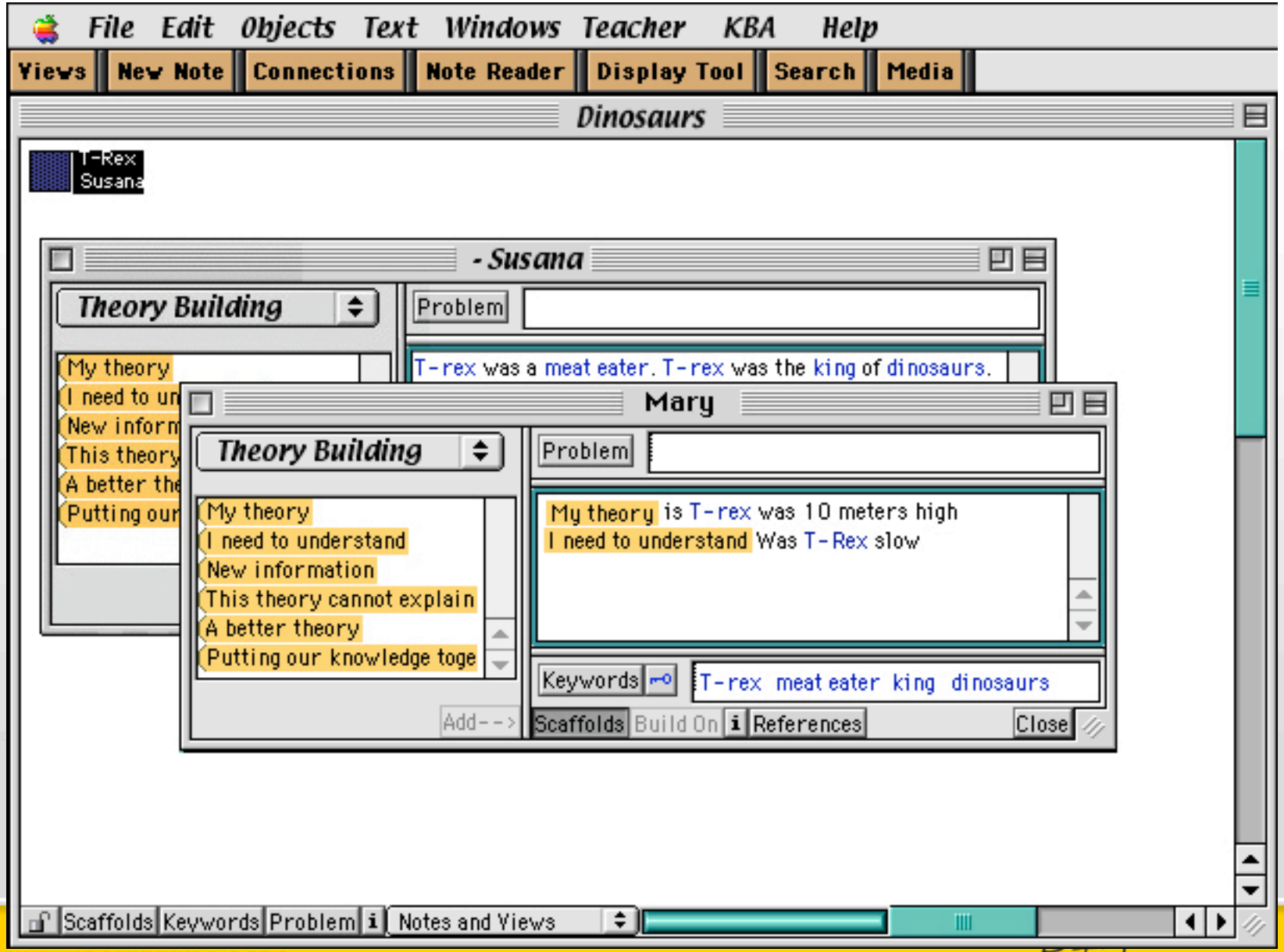
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I need to understand Was T-Rex slow
Keywords
T-rex meat eater king dinosaurs
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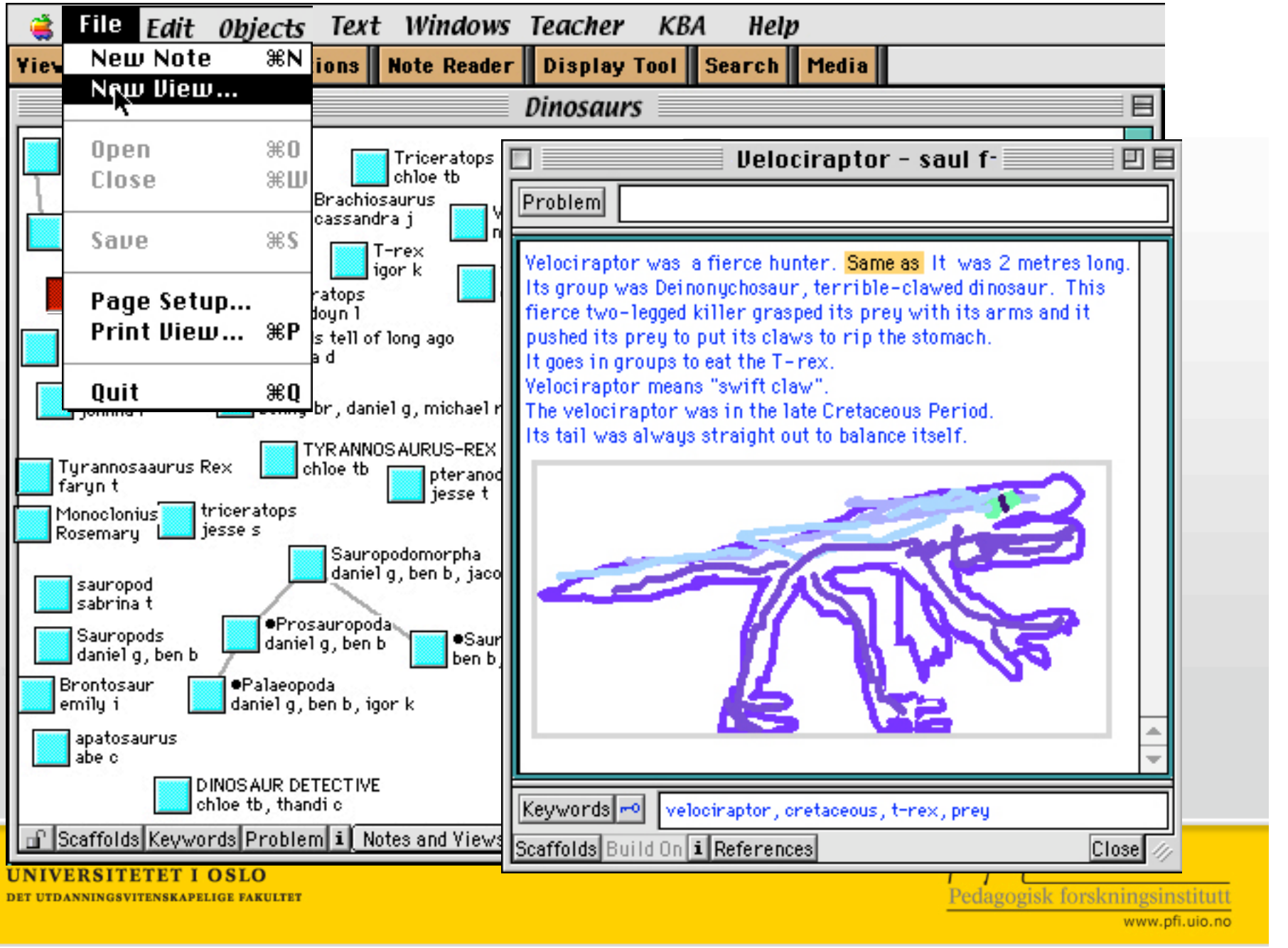
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Tyrannosaaurus Rex faryn t
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Palaeopoda daniel g, ben b, igor k
Brontosaur emily i
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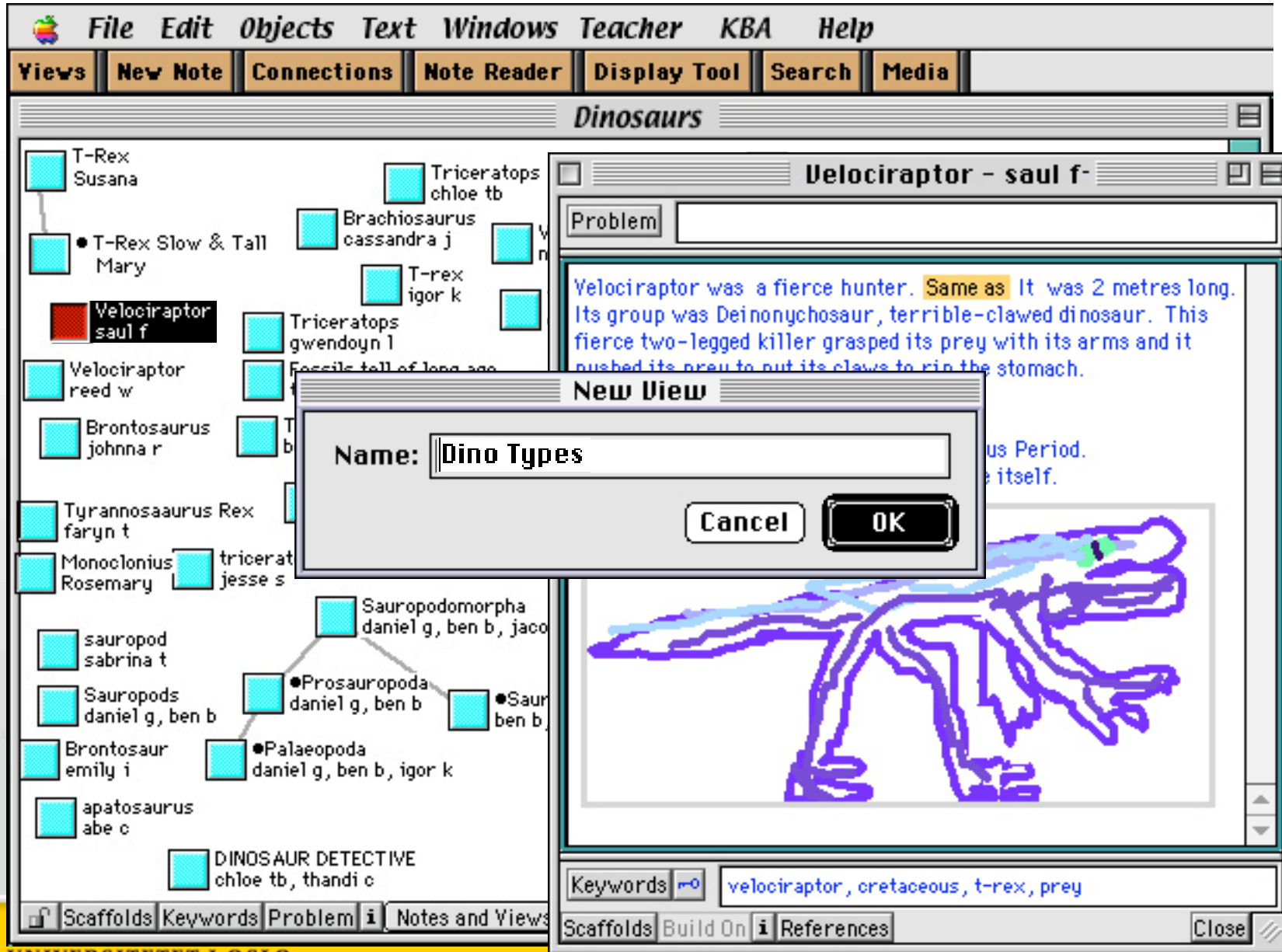
Scaffolds Keywords Problem i Notes and Views
Velociraptor - saul f-
Problem
Velociraptor was a fierce hunter. Same as It was 2 metres long.
Its group was Deinonychosaur, terrible-clawed dinosaur. This
fierce two-legged killer grasped its prey with its arms and it
pushed its prey to put its claws to rip the stomach.
It goes in groups to eat the T-rex.
Velociraptor means "swift claw".
The velociraptor was in the late Cretaceous Period.
Its tail was always straight out to balance itself.
Keywords
velociraptor, cretaceous, t-rex, prey
Scaffolds Build On i References Close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T-rex igor k
Velociraptor saul f
Triceratops gwendoyn l
Velociraptor reed w
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Tyrannosaaurus Rex faryn t
Monoclonius Rosemary
tricerat jesse s
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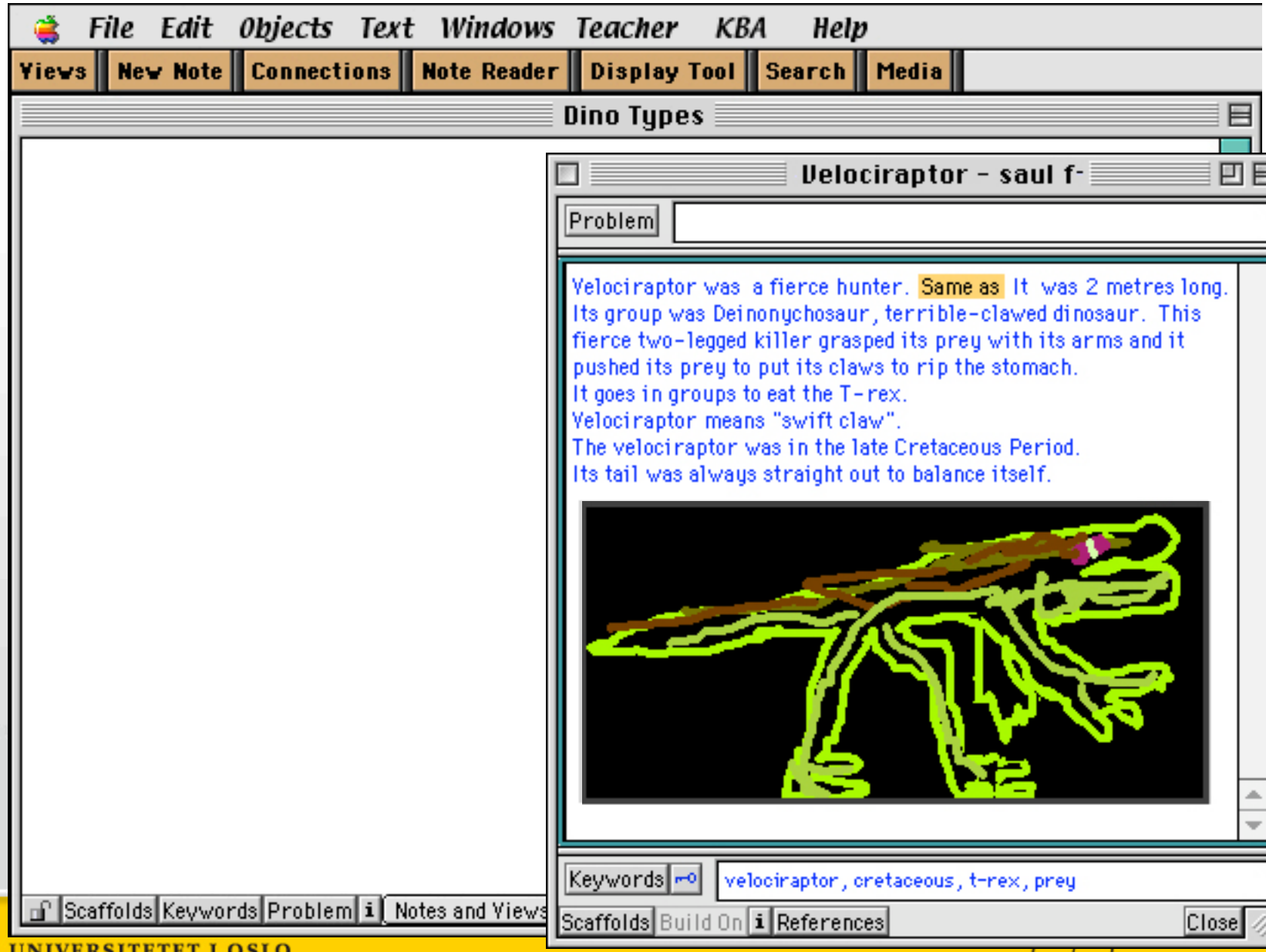
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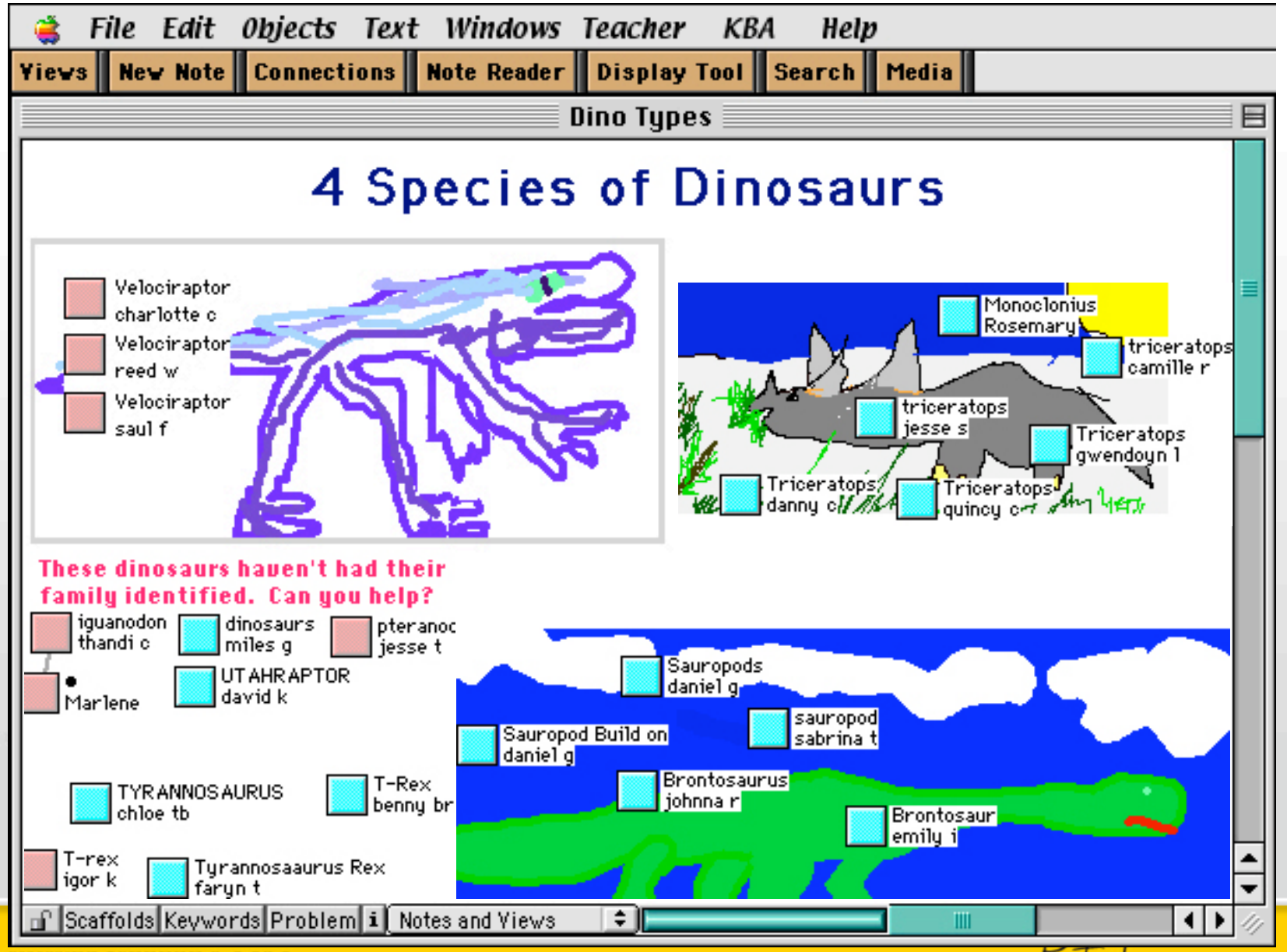
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Dino Types
4 Species of Dinosaurs
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Velociraptor reed w
Velociraptor saul f
Monoclonius Rosemary
triceratops camille r
triceratops jesse s
Triceratops gwendoyn l
Triceratops danny c
Triceratops quincy c
These dinosaurs haven't had their family identified. Can you help?
iguanodon thandi c
dinosaurs miles g
pteranoc jesse t
Marlene
UTAHRAPTOR david k
TYRANNOSAURUS chloe tb
T-Rex benny br
T-rex igor k
Tyrannosaaurus Rex faryn t
Sauropods daniel g
sauropod sabrina t
Sauropod Build on daniel g
Brontosaurus johnna r
Brontosaur emily i
Scaffolds
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1996/1997- Grade 4 students at ICS had already made this discovery!

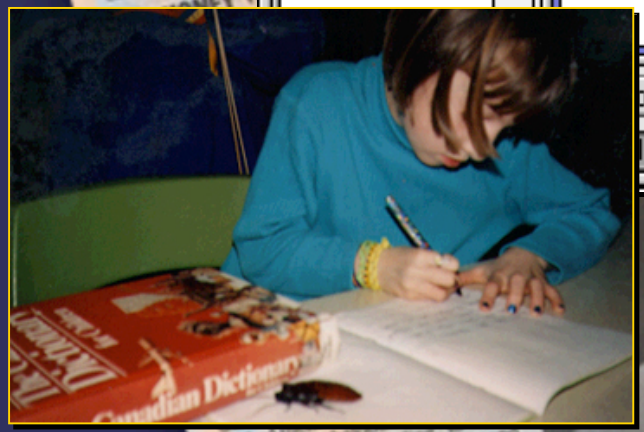
Experiments on roaches - Ben

Problem: roach learning

New information Last week we did an experiment with our cockroaches based on Dr. Bell's information that roaches right themselves if they are turned over. We tested each of our 12 roaches and recorded the time it took for them to flip over. Today I noticed that the more the roaches are handled, the less quickly they right themselves.

My theory the roaches have learned to wait for us to flip them back over.

I need to understand Can a roach learn?



Research Results

- Standardized test scores in reading comprehension, vocabulary, and spelling
- Ability to read difficult texts
- Quality of questions and comments
- Depth of explanation
- Graphical literacy
- Conceptual change
- Math problem solving
- Portfolio commentaries
- Collaborative processes
- Inquiry processes

Elementary Students Explain Constructivism

"...I think that I can tell if I've learned something when I'm able to form substantial theories that seem to fit in with the information that I've already got; so it's not necessarily that I have everything, that I have all the information, but that I'm able to piece things in that make sense and then to form theories on the questions that would all fit together..."