

The Novella

Ill-Structured Problems

Constructivism

Problem-Based Learning

Anna R. Bergstrom

Chemical Education Group Meeting

27. February 2001



The Novella

The fundamental purpose of the Novella is to transform the passive student from a sponge soaking up facts, into a problem-solving learner working with others in a multidisciplinary team to solve the problem.



The Novella

The Novella will help students to weave the collection of facts into a more complete, comprehensive picture of chemistry as the central science.



III-Structured Problems

- * simulate professional (authentic) problem solving skills
 - unique
 - uncertain
 - conflicting information
- * lack a clear definition of the problem, steps and procedures for identifying and accomplishing the solution(s)
- * information availability is progressive
 - as information becomes more available, the the path to the solution may become clearer



III-Structured Problems and the Novella

simulate professional (authentic)
problem solving skills

the student is placed in the position of a forensic
scientist who must solve a crime

computer mediated

unique
uncertain
conflicting information



III-Structured Problems and the Novella

lack a clear definition of the problem, steps and procedures for identifying and accomplishing the solution(s)

students must rely on
information, skills and techniques
learning in lecture (perhaps lab)

students are not given clear, step
by step directions



III-Structured Problems and the Novella

information availability is progressive

as information becomes more available, the
the path to the solution may become
clearer

computer mediated

the director, through the use of
e-mail and a web site can transmit
information to the student



Constructivism

- * students construct their knowledge based on previous experiences and collected knowledge
- * the role of science teaching is to align the beliefs of the students with the beliefs of the scientific community

Colburn, 2000



Constructivism

- * understanding is in our interactions with the environment
 - a professional-like setting
 - a vignette
- * a cognitive conflict or puzzlement stimulus for learning
 - may serve as an organizational tool
- * knowledge evolves through social negotiation and evaluation of viability of individual understandings
 - communication with the director

Savery and Duffy, 1995



Constructivism and the Novella

understanding is in our interactions with the
environment

a professional-like setting
a vignette

computer mediated



Constructivism and the Novella

a cognitive conflict or puzzlement
stimulus for learning
may serve as an organizational tool

The puzzlement of constructivism provides
a problematic stimulus. This can help to
motivate and organize the student.

Dewey, 1938



Constructivism and the Novella

knowledge evolves through social
negotiation and evaluation of viability of
individual understandings

communication with the director

computer mediated

the director, through the use of
e-mail and a web site can transmit
information to the student



Problem-Based Learning

establishes an “environment of comprehensive learning”

Shadday, 1999



Problem-Based Learning

5 Stages

- * introduction
- * inquiry
- * self-directed study
- * self evaluation
- * evaluation and sharing of information

Ram, 1999



Problem-Based Learning and the Novella

Introduction

establish the problem

establish the environment

computer mediated



Problem-Based Learning and the Novella

Inquiry

collect data

collect tools and resources

computer mediated



Problem-Based Learning and the Novella

Self-directed study

students weave their collection
of facts into a plausible solution



Problem-Based Learning and the Novella

Self evaluation

Evaluation and sharing of
information

students submit their solution
to the director who responds

computer mediated

students collaborate with their
classmates



Areas for further research and study

- * **computer mediated communication**
 - e-mail based
 - web based
- * **assessment**
 - homework traditional views
 - new views
 - examinations
- * **interactivity**