Application of Data-Logging Technology in Secondary School Science Classrooms: A case Study

BY

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Issues to be addressed in this study

1. What teaching strategy can be adopted when data logging is used as a tool to demonstrate experiments?

2. Can the adoption of the teaching strategy and the integration of data logging result in:
   (a) promoting high order thinking
   (b) rectifying misconception
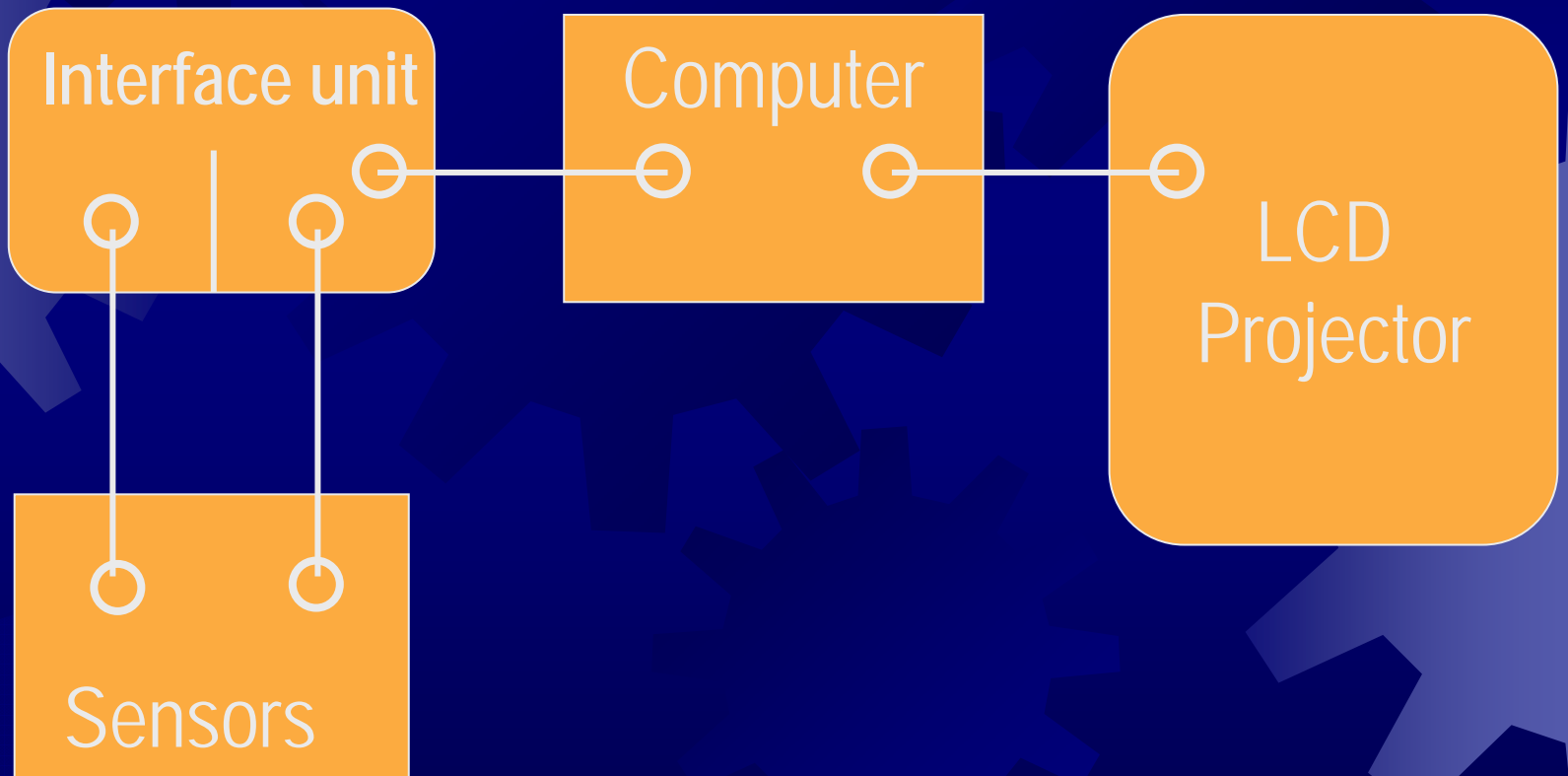
Issues to be addressed in this study

3. What are the pattern of interaction between teacher, students and technology?

4. What challenges may emerge upon the implementation of data logging in science teaching and learning?

The Conceptual framework of the Research Process

Pedagogical approaches $\quad+\quad$ Data Logging

High order thinking $\longrightarrow$ Conceptual change

Effective learning
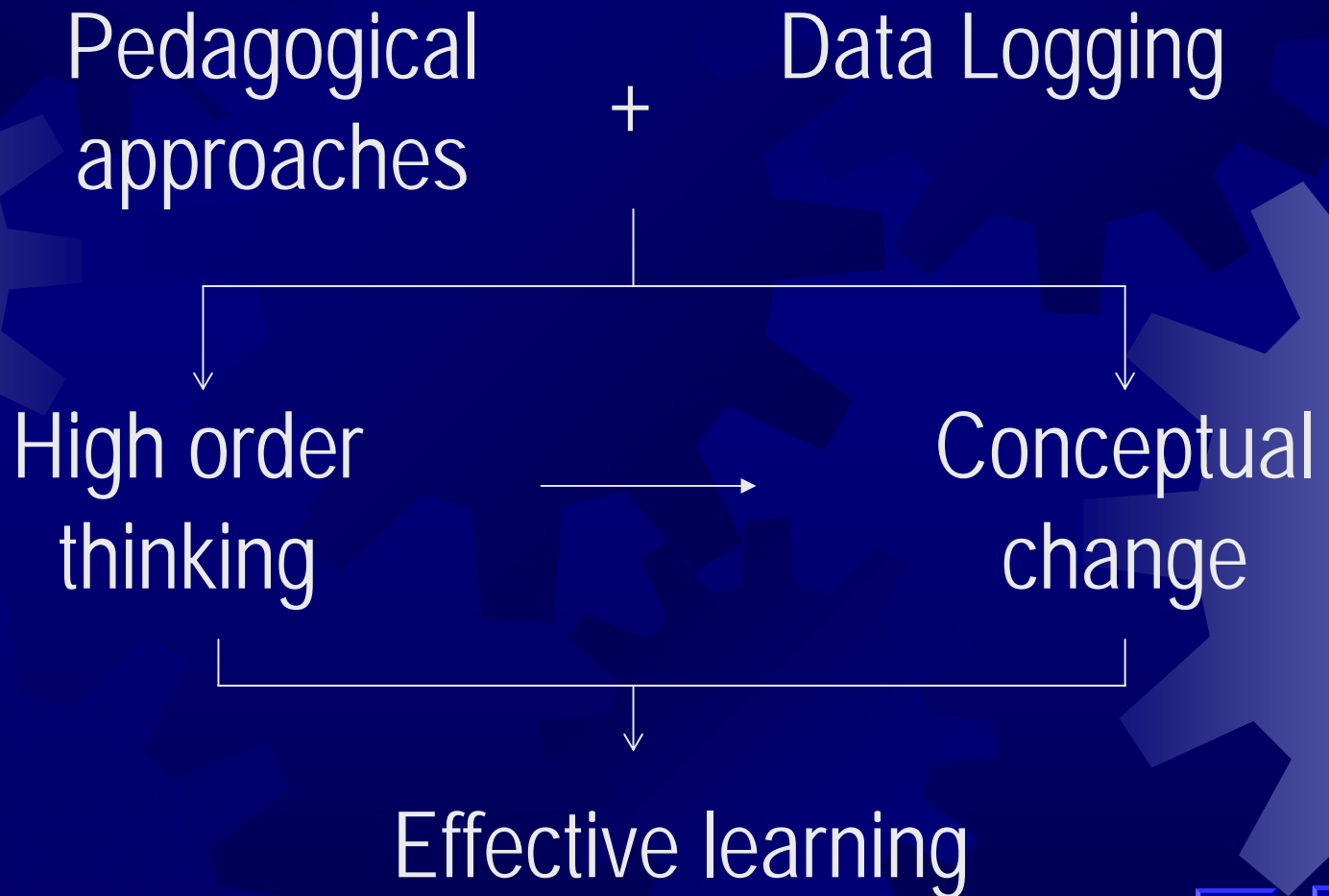
Components of the data logging system

Interface unit

Computer

LCD Projector

Sensors

Data collection

By video recording the science lessons conducted in the laboratory

Topic selection

| Year	Class	Topic	Objectives
S1	1C	Evaporation	**To show the relationship between evaporation and cooling. To find out the factors which affect the rate of evaporation. (Frost, 1998 P.94-97)**
S2	2C 2B	Acids and alkalis	**To find out that the amount of acid required to neutralize an alkali depends on the amount of the alkali dissolved, and not the volume of water added. (Frost, 1998 p.89)**
S3	3D	Digestion	**To find out how temperature and amount affect the activity of enzyme (amylase). (Frost, 1998 P.117)**

Data Analysis

From the perspective of pedagogical approach, the analysis involves the following aspects:

1. Identifying the activities performed by teacher and students
2. Defining the objectives of the activities
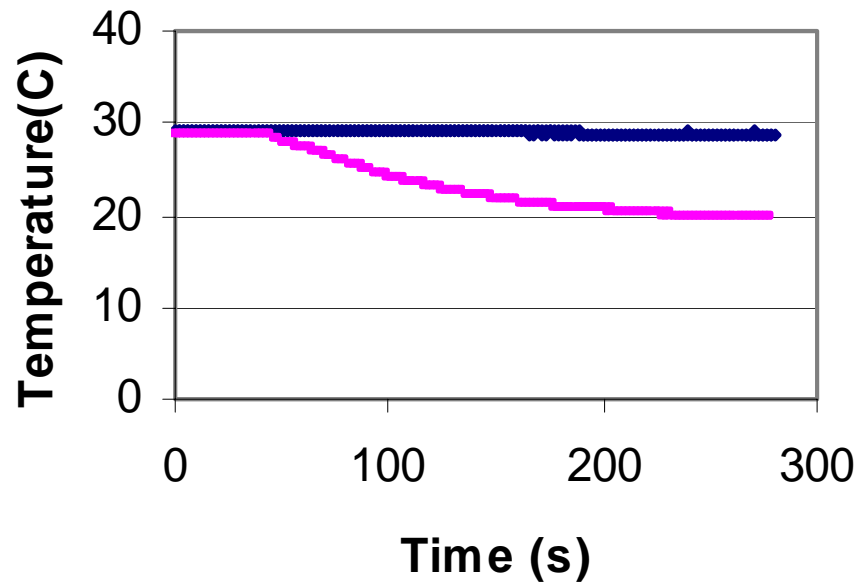3. Evaluating the effects as a result of the activities.
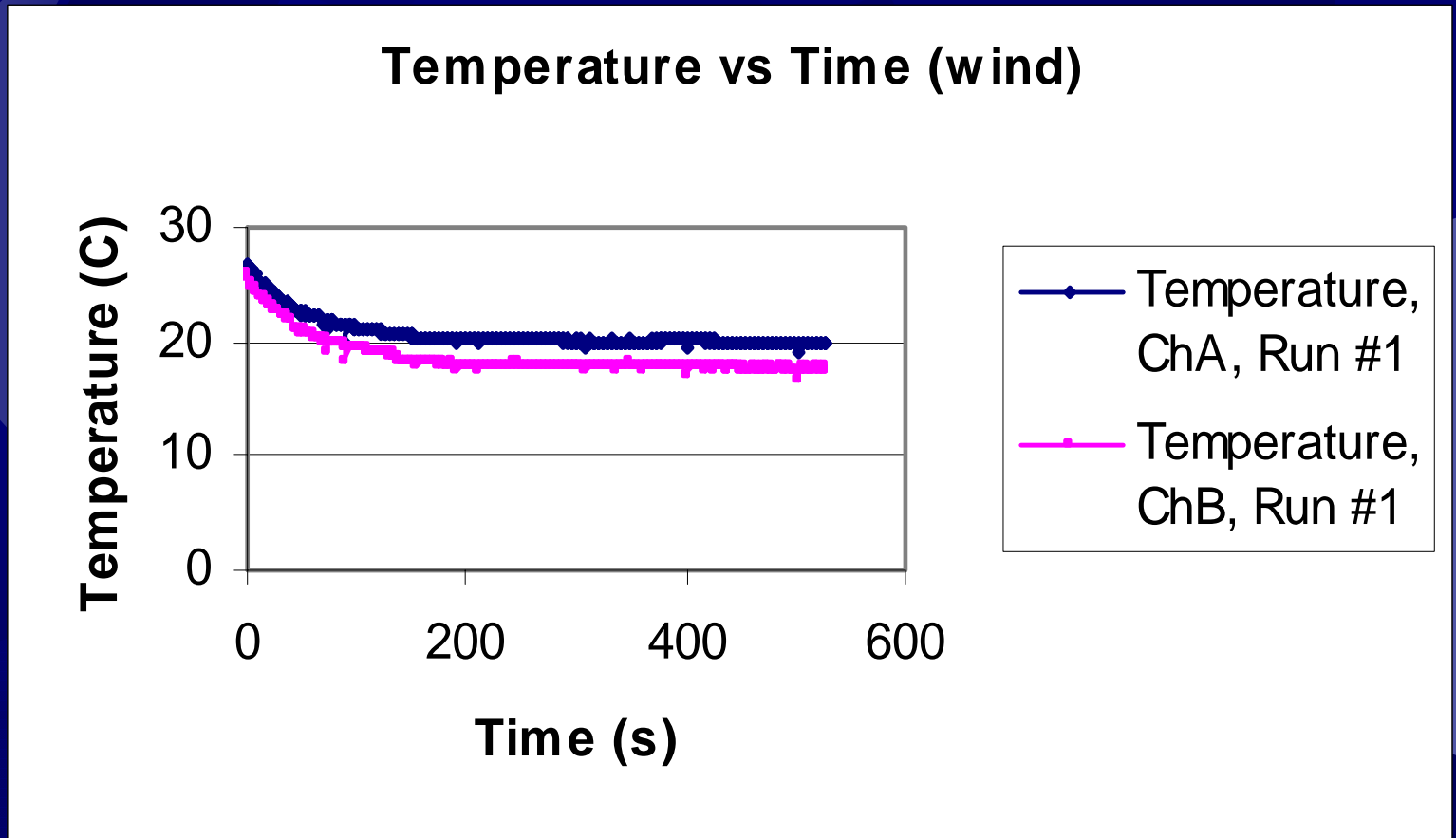
Pathways of interaction
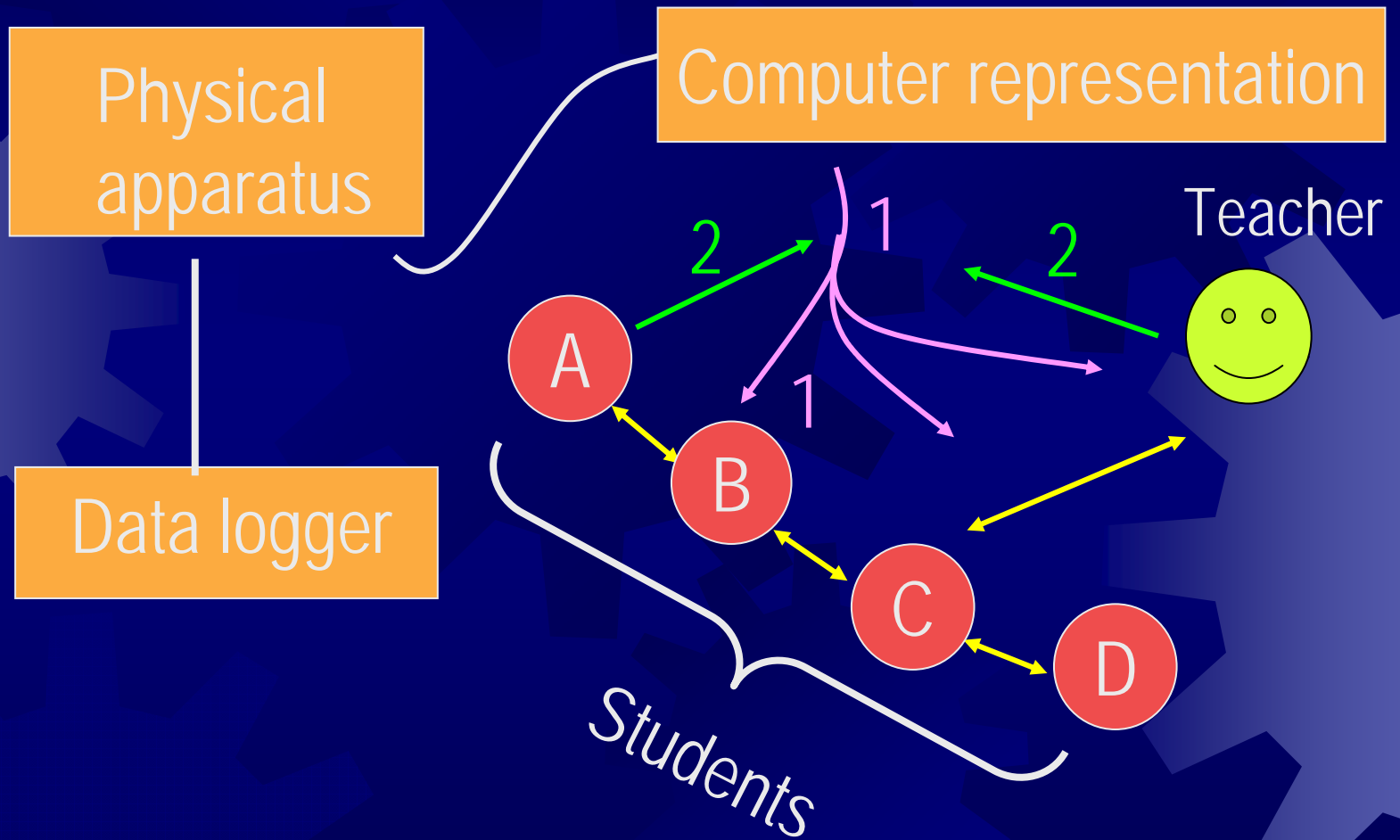
Effect of evaporation on temperature
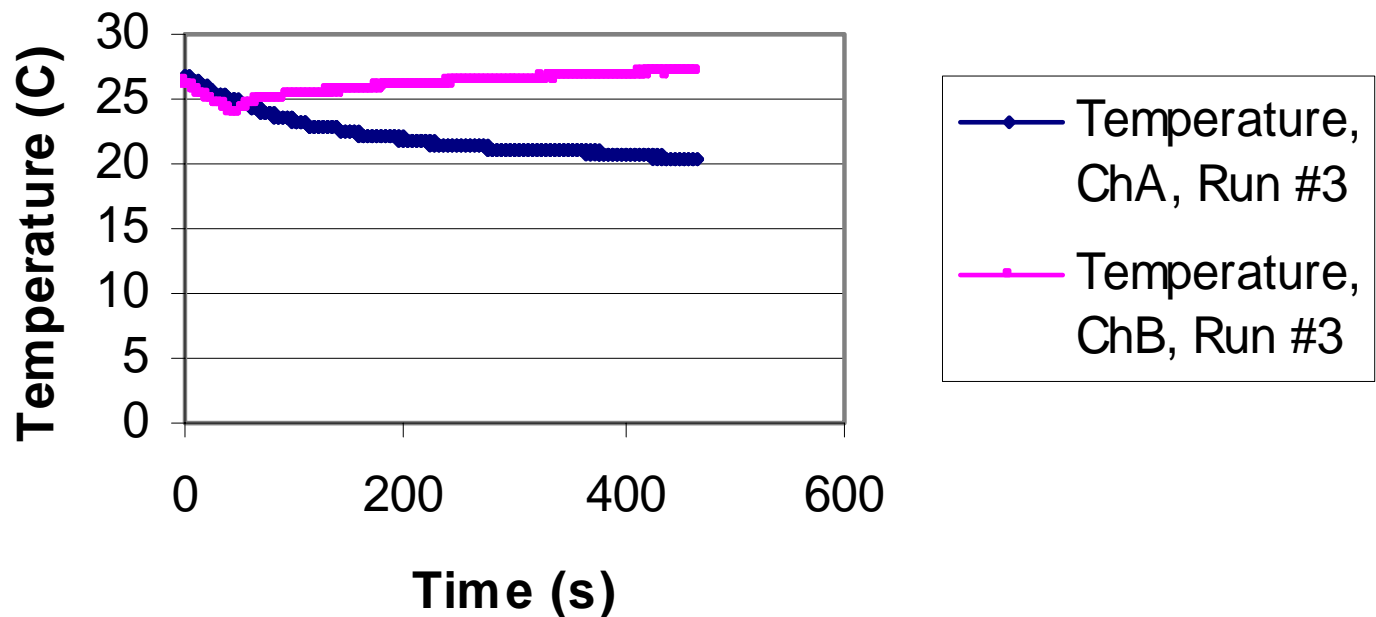

Temperature vs Time (Evaporation)
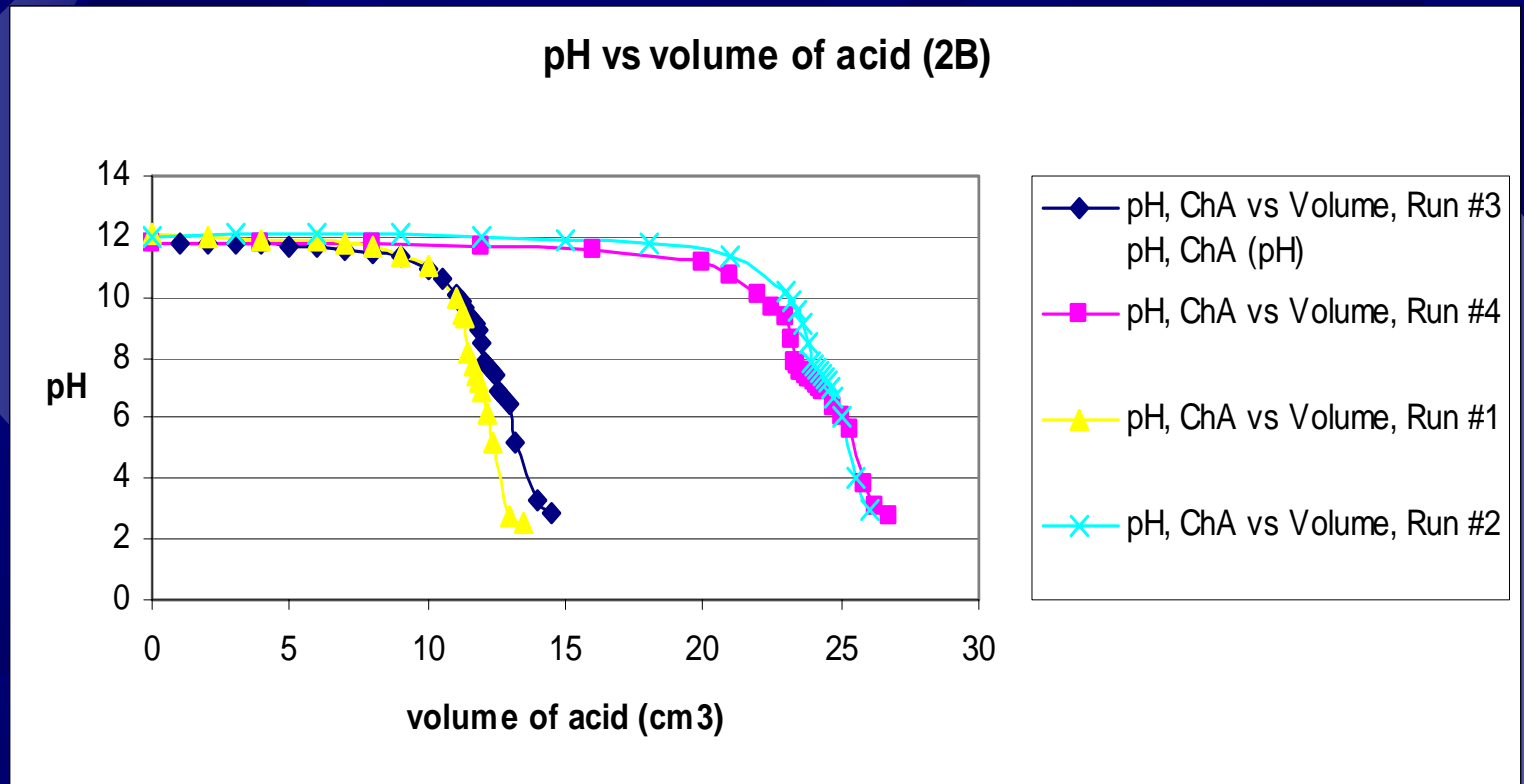
Effect of wind on the rate of evaporation

Temperature vs Time (wind)

Effect of area exposure on the rate of evaporation
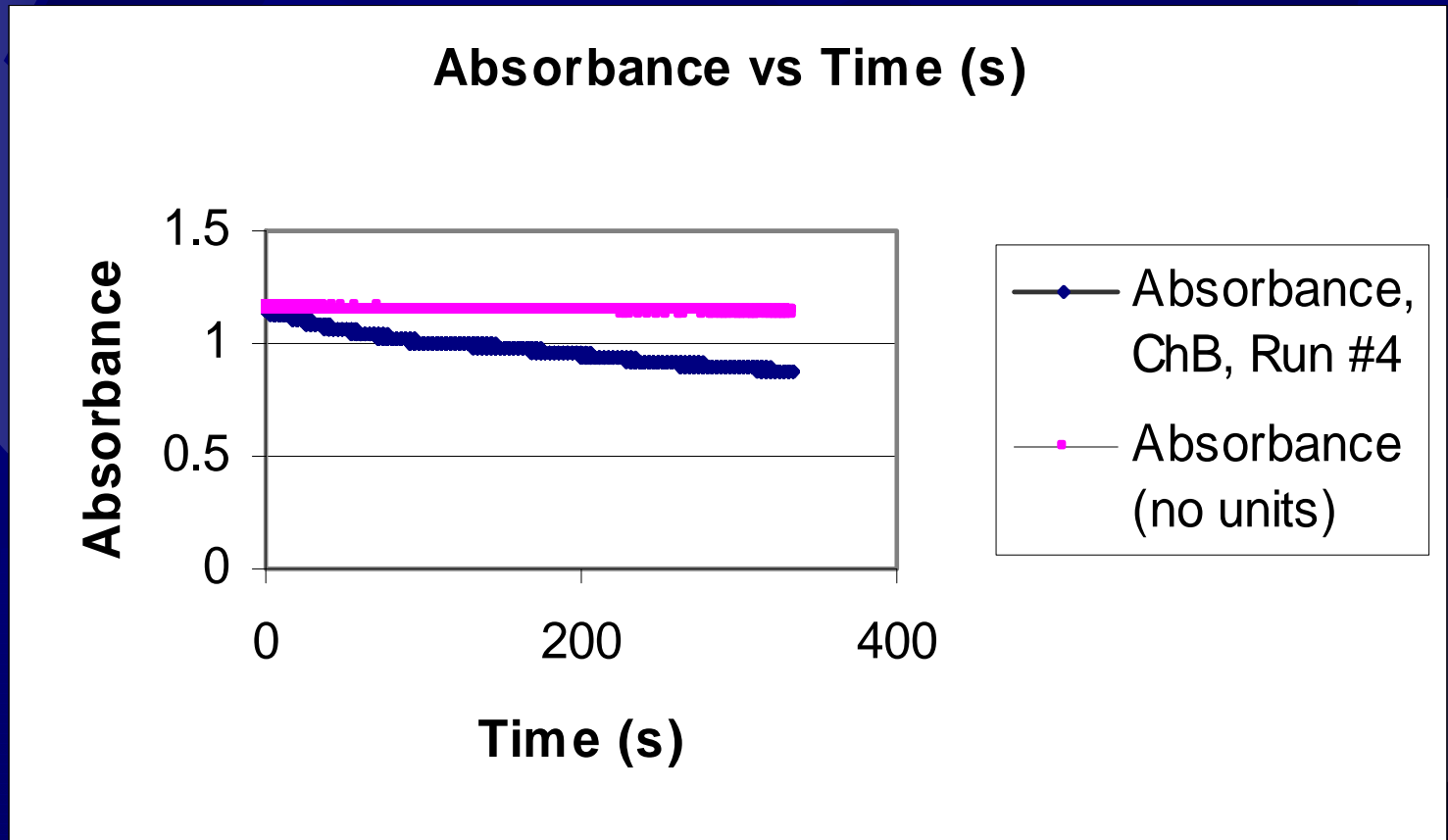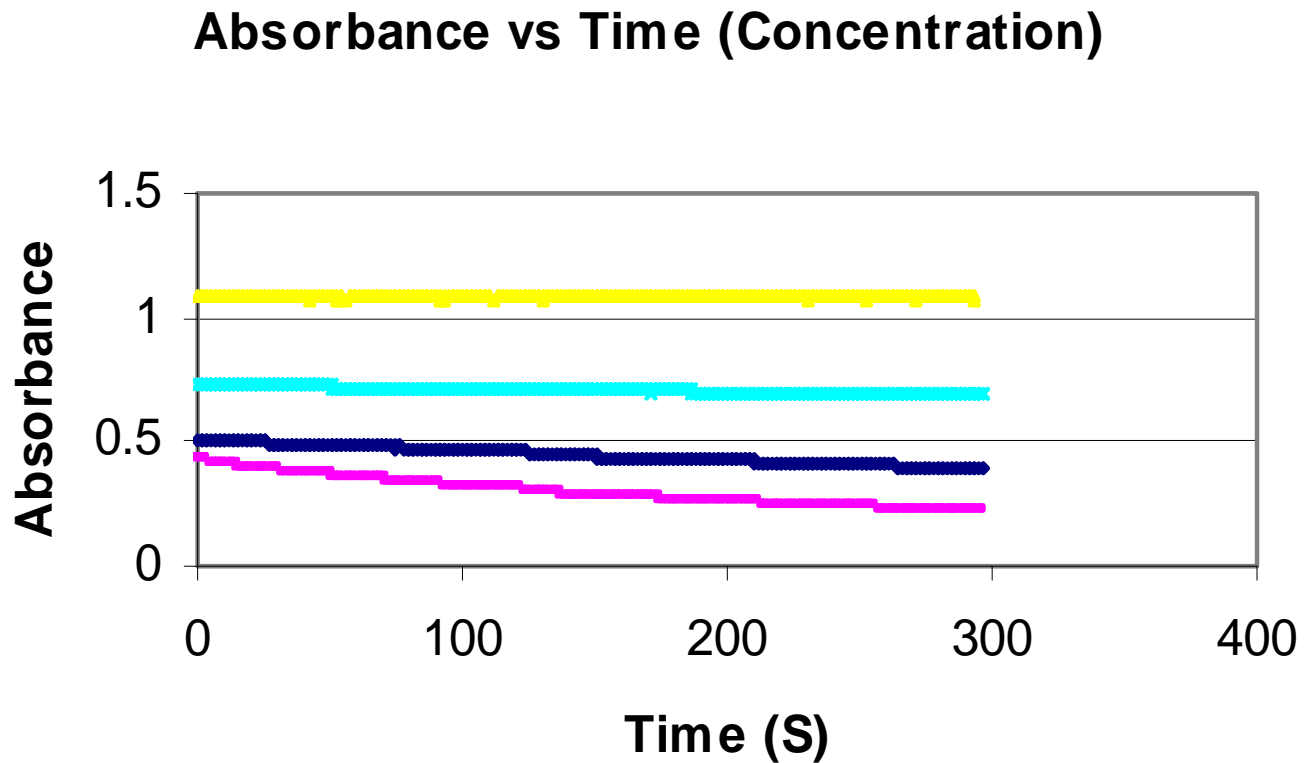
Titration curve

Effect of temperature on the activity of enzyme

Effect of concentration of amylase on its action

Findings

1. Using data logging as the tool to demonstrate experiment, inductive/discovery pedagogical approach is adopted by teacher who has posed structured questions to help students analyze data and formulate concepts.

2. Students are stimulated and engaged in high order thinking that subsequently leads to conceptual change.

3. The computer representations can enter the interaction network via multiple ways due to the disparity in the employment of the representations by teacher and students as their roles are different in the discourse

Conclusion

1. The instantaneously data presented on the screen has provided a shared focus on which discussion can take place.

2. In order to guide students through the process of formulating conceptions, inductive /discovery pedagogical approach is adopted.

Conclusion

3. Students are guided into a framework of analysis which involves high order thinking that is characterized as depicting uncertainty, effortful thinking, making judgments , interpretation and decision.

4. The representations generated by the data logging play the role to enhance the collaborative interactions between teacher and students as well as between student and student.

Challenges

1. Overcoming obstacles to implementation
2. Implementation of innovation
3. Planning activities using data logging
4. Defining learning objectives
5. Adopting appropriate pedagogical paradigm.