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AUTHOR Dolgos, Kathleen A.; Elias, Joseph S.
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ABSTRACT

The philosophy of the Science, Technology, and Society (STS) model is illustrated in this planned course outline on a thematic unit on corn. Parts of the lesson include the instructional objectives, instructional strategies, projects, and evaluation. Students will learn about the role of corn as a source of energy, the importance of crop yield and its impact on society, and ecological aspects such as the farming of corn. Instructional strategies include group work, class discussions, concept mapping, and video productions. Evaluative techniques focus on analytic and holistic rubrics. The rubric checklists (STS concept map rubric, STS time line rubric, and STS video production rubric) contained in the lesson focus on the STS philosophy and are representative assessment tools for projects listed in the lesson. (MKR)

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Integrating the STS Model Into the Basic Education Curriculum

A paper presented at the Symposium on Science, Technology and Society sponsored by the State System of Higher Education of Pennsylvania at State College, Pennsylvania November 2-3, 1995.

Presenters: Dr. Kathleen A. Dolgos and Dr. Joseph S. Elias

College of Education
Kutztown University
Kutztown, PA

Integrating the STS Model Into the Basic

Education Curriculum

The philosophy of the Science, Technology and Society (STS) model is illustrated in the following planned course outline on the thematic unit Corn. Parts of the lesson include the instructional objectives, instructional strategies, projects, and evaluation.

The instructional objectives emphasize the interrelationship of science, technology and society using a simple topic. Students can experience the various aspects of the STS philosophy by learning about corn. They will learn about the role of corn as a source of energy, the importance of crop yield and its impact on society and, the ecological aspects of corn such as the farming of corn.

Instructional strategies list various ways to present the STS philosophy. Strategies include group work, class discussions, concept mapping, and video productions. Projects such as developing a concept map, creating time lines, and creating a video production also reflect the STS philosophy.

The evaluative techniques, following the model STS lesson, focus on analytic and holistic rubrics. The rubric checklists focus on the STS philosophy and are representative assessment tools for projects listed in the lesson Corn.

The science, technology, and society model can be found on the pages that follow. The evaluative tools are also included.

Science, Technology and Society Model Lesson

Corn

Part I. Instructional objectives:

The student will be able to:

A. Discuss the various uses of the corn plant;
B. Calculate the caloric value of the corn plant;
C. Explain the relationship between the amount of energy needed to drive the photosynthetic process and the amount of energy fixed by the process;
D. Compare the amount of energy, as a result of technology, used to grow and maintain corn with the energy yield from the final product;
E. Consider the ecological and economical aspects of corn as fuel for livestock production;
F. Discuss the changing role of corn (fuel) as a source of energy for consumer use;
G. Assess the overall value of technology as a means of increasing yield;
H. Evaluate the potential economical implications of technology in agriculture;
I. Consider the social implications of the increasing reliance in fuel sources to increase corn yields and;
J. Research the potential impact of scientific studies on crop yields in such areas as genetic engineering and hydroponics.

Part II Instructional Strategies:

group work
video production
field trips
guests speakers
class discussion
laboratories
concept mapping
research teams

Part III Projects:

A. Develop a concept map integrating science, technology and society as related to the topic of corn.
B. Develop time lines tracing the advancements in agriculture, crop yield, diversified uses of corn, and the input of resource to the output of the crop.
C. Create a video production using the corn unit as a springboard

Topics such as the following can be the focus of the video:
1. Describe an agricultural advancement and the impact on society and the environment.
2. Focus on alternative fuel development and technological/ biological advancements.
3. Document an environmental impact study of the perceived improper utilization of natural resources for the development of higher yielding crops.

D. Exploration and study in the laboratory setting:

Appropriate areas of studies can include:
- Calorimetry
- Photosynthesis
- Respiration
- Energy flow and nutrient cycles
- Soil ecology-nutritional needs of crops

Part IV Evaluation:

A. Rubrics both analytical and holistic
B. Traditional tests and quizzes
C. Journals
D. Portfolios
E. Mastery Checklists

Evaluation Techniques

The STS concept map project refers to the development of a concept map integrating science, technology and society as related to the topic of corn. The branches of the map illustrate the depth of knowledge the student has about corn and its role in the world, and its effect on the environment. The analytic rubric for the STS concept map (Fig. 1) guides the rater in a fair method of assessing the project by assigning points to appropriate focus areas. The holistic STS concept map rubric (Fig.2) assigns five levels of achievement for the map created. These levels of achievement are usually equal with the typical letter grades A to F.

The development of a time line tracing the advancements in agriculture, crop yield, and uses of corn is another project that can be assessed with the use of a rubric. An example of an analytic rubric for such a project can be found in Figure 3. This STS time line rubric shows six focus areas for assessing any time line project.

A video production rubric(Fig.4) was also created to match to the project involving the creation of a video highlighting the STS philosophy within the thematic corn unit. This holistic rubric shows the five levels of achievement and the related grades for the video project.

Figure 1. **STS Concept Map Rubric**

	Focus Areas	Possible Points	Your Score
1.	Student has focused on the topic in question.	5	_____
2.	The branches of the concept map are clear and explainable. The number of branches are appropriate for this topic.	5	_____
3.	The concept map reflects science, technology and society.	5	_____
4.	Different points of view are expressed in the concept map.	5	_____
5.	The concept map is easy to read.	5	_____
	Total :	25	_____

Rater Comments:

_____

_____

_____

_____

_____

Figure 2. **STS Concept Map Rubric**

Levels	
Expert (A)	Student has spent considerable time in creating the concept map. Branches are clear and well-expanded to include all aspects of science, technology and society. Creativity flourishes.
Good (B)	The concept map is well done and complete. The information is presented neatly and accurately. All necessary parts of the STS philosophy are evident. Embellishments are missing.
Average (C)	The student has completed the concept map with the essentials. Few branches are evident. Student has done the bare requirements. The STS approach is recognizable.
Poor (D)	The concept map is incomplete. The student has missed major topic areas. Omissions of necessary material is evident. You would not know that student is trying to integrate science, technology and society.
Failure (F)	The structure of a concept map is not apparent. The student has ideas that are unrelated and unconnected written on the page. Trying to relate STS to the map would be difficult.

Figure 3. **STS Time Line Rubric**

	Focus Areas	Possible Points	Your Score
1.	Three different time lines have been created to show advancements in agriculture crop yield and uses of corn.	5	_____
2.	Time lines clearly marked to distinguish one event from another	5	_____
3.	Information presented is accurate.	5	_____
4.	Time line is of adequate length.	5	_____
5.	Illustrations have been used to enhance important facts.	5	_____
6.	Time line ratios are to scale.	5	_____
	Total :	25	_____

Rater Comments:

_____
_____
_____
_____
_____

Figure 4. **STS Video Production Rubric**

Levels	
Expert (A)	Production is first rate. Video is well written and produced. Topic is presented in a creative but thorough way. Would actually sit through it again or show other people. The STS philosophy is evident throughout the video.
Good (B)	Production contains all the essentials. The topic is covered in a conservative fashion but adequately. Students spent time but not creativity on this one. STS is briefly mentioned in portions of the video.
Average (C)	Production is the appropriate length but sidesteps some of the issues involving the topic. Approach is one sided. The STS philosophy is barely recognizable.
Poor (D)	Students videod things around them. No creativity. Taping poorly done. Topic issues become secondary to actually taping. Science is mentioned.
Failure (F)	Students made an attempt to video. Tape is blank or if tape exists, the work is very amateurish. Students did not focus on topic. No STS philosophy is mentioned.

Summary

The preceding lesson and assessment rubrics model the philosophy of a unit embedded within the STS movement. Strategies used can be adopted to almost any topic and reflect effective teaching within the STS philosophy.