METHODOLOGY FOR ANALYSIS OF SCIENCE TEACHING MATERIALS FROM A CREATIONIST WORLD VIEW

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Abstract

This article introduces a methodology for analyzing science materials for evidence of creationist content. The Institute for Creation Research tenets were used as a basis for the analysis. A field test of the methodology as used on four Christian publisher's science texts is presented.

Introduction

Various Christian publishers have attempted to include a creationist based world view in their science education materials. Concerned citizens also recognize the need for creationist based curricular materials and frequently contact the Institute for Creation Research (ICR) requesting information about such materials. ICR has not analyzed Christian science education materials for secondary schools. Therefore, the authors recognize the need for an analysis of the materials currently available. This paper presents a methodology for such an analysis and the results of its application.[1]

Christian creation science materials should provide knowledge that explains the natural world scientifically and Biblically and have the ability to unify, illuminate, and integrate other facts.

Why Creation Science?

> All knowledge is not equally important and curriculum decisions require that distinctions and priorities be made. In selecting content for the biological sciences, knowledge that explains the natural world scientifically and that has the ability to unify, illuminate, and integrate other facts must be emphasized. Creationist tenets cannot meet these criteria. (Shankar and Skoog 1993).

This bias is typical of many secular humanistic science educators. Another example is an article by one of the world's leading geneticists, Theodosius Dobzhansky (1973), entitled "Nothing in biology makes sense except in the light of evolution?

It is our position that science (including biology) should not be taught from an evolutionary world view but rather from a creationist world view. The false nature of evolution has been clearly demonstrated and described in numerous publications by both ICR and other authors.[2]

Many authors have also written about a crisis in science education. It is our opinion that this crisis is partly due to the evolutionary based assumptions found in much of science education today. This crisis has manifested itself in both student attitudes and student interests. For example, Gogolin and Swartz (1992) measured students attitudes after the first college science course. Among students who intended to major in science, they found a decrease in student attitudes toward their teacher, as well as a decrease in their value of science, their self esteem, and their enjoyment of science. Furthermore, their anxiety toward science increased, and their motivation to take additional science classes decreased. Similarly, Yager (1986) found that after taking a science class, many students lost interest in science and retained almost nothing of what they were taught. However, Bliss (1978) found that high school students

> seem to be more highly motivated and to learn more effectively when studying science from a two-model (creation/evolution) approach. . . . The experimental group seem to develop more critical thinking habits than those who studied origins from an evolutionary model only.

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Research Questions

The major questions considered in this research were: Do selected Christian curricular materials show evidence of being creationist based? Can evidence of the scientific and or Biblical creation tenets be found in the text?

Creationist Tenets

To analyze Christian science materials, the tenets of the Institute for Creation Research (ICR) will be used to determine the presence or absence of the creationist world view. These tenets are found in the July 1980 Impact Article entitled *The tenets of creationism,* by Henry M. Morris.

Methodology

Analysis team. The reviewers involved in this analysis included four ICR graduate students and Professor Steve Deckard. These persons were participants in the study of Curriculum Design in the ICR graduate school program in Science Education.

Selection of materials. The ICR Department of Science Education sent a letter to 15 Christian publishers requesting science materials be submitted for analysis. Four publishers responded, two with standard classroom textbooks and two with self-paced materials. One of the reviewers brought a fifth publisher's science materials, resulting in five publishers' materials being considered for analysis. One of the sets of materials was written for middle school use and was not included in this study. The other four included a variety of high school level disciplines. The discipline common to all four, biology, was chosen for analysis. The publishers and their materials were:

A Beka Book Publications. *Biology: God's Living Creation.* Pensacola, FL, 1988.
Accelerated Christian Education. *Biology PACEs.* rev. ed. Lewisville, TX, 1993.
Bob Jones University Press. *Biology for Christian Schools.* second ed., by William S. Pinkston, Jr. Greenville, SC, 1991.
Christian Light Publications. *Science: God's Light in Science.* rev. ed. Harrisonburg, VA, 1980.

Sampling of content. The standard classroom textbooks were analyzed by chapter. The self-paced materials were analyzed by booklet, and we treated each booklet as a chapter. Each reviewer selected chapters for analysis based on an examination of the titles and subheadings in the table of contents. Titles and subheadings were examined for expected evidence of creationist tenets. Two additional chapters were selected by a random drawing with replacement. A chapter was randomly chosen from each text for each reviewer to practice the analysis process. The chapter used for practice was not included in the results.

Analysis process: preparation and development. Before the analysis began, the team reviewed each of the tenets. Each reviewer read their randomly selected practice chapter looking for evidence of the tenets. This practice analysis revealed the need for guidelines. The resulting analysis process was:

1. Before beginning a chapter analysis, the reviewer reread the tenets.
2. Information found in the student text including boxes, articles, charts, diagrams, and illustrations was considered for analysis. Student review questions were not included.
3. Each chapter was read for evidence of the tenets.
4. The rating categories used were:
   yes (y): text expresses stated tenet. implied yes (I+): text alludes to stated tenet. no (n): text is contrary to stated tenet. implied no (I-): text appears to contradict stated tenet.
5. If any portion of a scientific or Biblical tenet was recognized in the text, it was considered as evidence of the entire tenet.
6. When evidence of a tenet was found the reviewer rated the phrase by comparing it to the specific tenet.
7. Some key phrases that were common to most texts were used to indicate evidence of specific tenets. The scientific tenets were categorized as shown in Table I.

Table 1. Key Phrases with Corresponding Tenets.

	Scientific			Biblical
	physical sciences	biological sciences	human biology	
"God made"	1	2	4	4
"God designed"	8	3	3	4
"God created"	1	2	4	4
"God sustained"	6	6	6	3

Example of the Analysis Process

The following example is extracted from: Accelerated Christian Education. Biology PACEs. rev. ed. Lewisville, TX, 1993. This example illustrates evidence for scientific tenets number two and three. The text is from the Biology booklet number 1107 and is found in a chapter entitled Man: Reproduction, Genetics, and Embryology on page six. It reads as follows:

"When God created the process of sexual reproduction, He designed each step with great care."

This was marked as a yes (Y+) for tenet number two and an implied (I+) yes for tenet number three. The two tenets are:

2. The phenomenon of biological life did not develop by natural processes from inanimate systems but was specially and supernaturally created by the Creator.

3. Each of the major kinds of plants and animals was created functionally complete from the beginning and did not evolve from some other kind of organism. Changes in basic kinds since their first creation are limited to "horizontal" changes (variations) within the kinds, or "downward" changes (e.g., harmful mutations, extinctions).

Results

Results are presented in Table II. The reader may request copies of tables of the raw data from the senior author.

Table 2. Frequency of Occurrence of Tenets (y and I+).

	Publisher				
Scientific Tenets	A Beka Book	ACE	Bob Jones	CLP	Total Occurrence
1	2	2	2	3	9
2	1	7	3	3	14
3	3	7	3	1	14
4	2	4	3	1	10
5	1	5	2	0	8
6	2	1	4	4	11
7	4	1	2	1	8
8	3	2	2	1	8
9	1	0	1	2	4

	Publisher				
Biblical Tenets	A Beka Book	ACE	Bob Jones	CLP	Total Occurrence
1	2	1	1	3	7
2	1	7	3	2	13
3	3	1	4	3	11
4	3	5	4	2	14
5	2	4	1	0	7
6	0	6	2	3	11
7	0	4	2	1	7
8	0	2	2	1	5
9	0	4	2	1	7

Discussion

The tenets were found useful for analyzing Christian science materials. The review team found that it was possible to identify evidence of the tenets in the material analyzed. Little indication of evidence of the rating factor "n" was found and no evidence of the rating factor "I-" was found. This may be likely because the reviewer would have had to try and read the authors' intention into the material. On the other hand it was

very easy to recognize consistent usage, especially since evidence of any part of the tenet could be rated as either "y" or "I+."

The tenets also appear to be useful for making comparisons of different curricular materials. On the basis of this analysis strengths and weaknesses of tests were evident by their inclusion or exclusion of the various tenets. Materials can also be screened for contradictions to the tenets. This process does not serve as a complete analysis of curricular materials, but it could be used as an important first step in making a choice among different curricula. For the purposes of this study, this analysis was limited to high school level biology texts, but the process is versatile enough to be used for analyzing other science curricular materials.

The issue of inter-rater reliability was discussed and addressed by use of the practice exercise. The data from all four publications seems to indicate that the rating of items was consistent with that which might be expected. According to Table 1, scientific tenets 1 and 8 were more closely related to the discipline of physical science and scientific tenets 2 and 3 to biological science. Although inter-rater reliability does not appear to be a serious problem, a process for measuring its consistency needs to be developed.

The analysis indicated some weaknesses for all four publications in the representation of the scientific and Biblical creationist tenets. Some publications did not show evidence of all of the tenets.

Recommendations for Further Study

Tenet usage. Science curricular materials should be studied for proper integration of the tenets. Sometimes all aspects of a tenet were not used. Taking concepts from a tenet and inserting them into the material is not integration. Therefore, complete and appropriate usage of the tenets in an integrative fashion becomes an issue.

Quality and quantity. An analysis based solely on the creationism tenets does not include the issues of currency and accuracy or quality and quantity of the scientific principles covered in the text. Currency and accuracy should also be subject to analysis. Finally, the depth and breadth of coverage should be considered when analyzing a curriculum.

Scope, sequence, and continuity. All of the science materials (all disciplines and grade levels) of a publisher should be studied to provide a full representation of the publisher's use of the tenets. Some tenets are more applicable to particular disciplines than others.

Other considerations. Other considerations include the organizational sequencing of subject matter and the overall appearance and attractiveness of the materials. Charts, graphs, maps, and illustrations should be clear and easy to use. The readability of text, usage of vocabulary, level of abstraction, and application of higher cognitive skills need to be appropriate for age and grade level. Other ancillary materials such as questions, laboratory activities, student workbooks, teacher manuals, and any other supplementary materials should be analyzed.

Analytical techniques. Techniques for analyzing and measuring the above considerations in order to facilitate further studies need to be developed. Applying an objective tool will lead to greater validity and inter-rater reliability than a subjective analysis.

Endnotes

1. The ICR Science Education Department does not endorse a particular curriculum but can provide an analysis from a creationist perspective. This article describes a field test that lays the ground work for a long term research program for analyzing science education materials.
2. For example refer to the following works:

Bird, Wendell R. 1991. The origin of species revisited. 2 vols. Regency, Nashville.

Gish, Duane T. 1993. Creation scientists answer their critics. Institute for Creation Research. El Cajon, CA.

_____ 1985. Evolution: challenge of the fossil record. Creation-Life. El Cajon, CA.

_____ R. B. Bliss, and W. R. Bird. 1981. Summary of scientific evidence for creation. *Impact* 95-96.

Ham, Ken, A. Snelling, and C. Wieland. 1992. The answers book. Master Books. El Cajon, CA.

Johnson, Phillip E. 1991. Darwin on trial. Intervarsity Press. Downers Grove, IL.

Morris, Henry M. 1984. The biblical basis for modern science. Baker Book House. Grand Rapids, MI.

_____, and G. E. Parker. 1987. What is creation science? 2nd Ed. Master Books. El Cajon, CA.

Oller, W., Jr. 1988. A theory in crisis. *Impact* 180.

Thaxton, C. B., W. L. Bradley, and R. L. Olson. 1984. The mystery of life's origin. Philosophical Library. New York.

Whitcomb, J. C., and H. M. Morris. 1961. The Genesis Flood. Presbyterian and Reformed. Phillipsburg, NJ.

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Bliss, Richard B. 1978. A comparison of students studying the origin of life from a two-model approach vs. those studying from a single-model approach. *Acts and Facts* 9(7):i-iv ICR Impact No. 60).

Dobzhansky, T. 1973. Nothing in biology makes sense except in light of evolution. *The American Biology Teacher* 35:125-129.

Gogolin, Luanne and Fred Swartz. 1992. A quantitative and qualitative inquiry into the attitudes toward science of nonscience college students. *Journal of Research in Science Teaching* 29:487-504.

Morris, Henry M. 1980. The tenets of creationism. *Acts and Facts* 7(6):i-iv (ICR Impact No. 85).

Shankar. G. and G. Skoon. 1993. Emphasis given evolution and creationism by Texas high school biology teachers. *Science Education* 77:221-233.

Yager, Robert E. 1986. What's wrong with school science? *The Science Teacher* 53:145-147.

Quote: Lincoln on the danger inherent in surrendering government to the Supreme Court

"I do not forget the position, assumed by some, that constitutional questions are to be decided by the Supreme Court. . . . At the same time, the candid citizen must confess that if the policy of the government, upon vital questions affecting the whole people, is to be irrevocably fixed by decisions of the Supreme Court, the instant they are made . . . the people will have ceased to be their own rulers, having to that extent practically resigned their government into the hands of that eminent tribunal."

Lincoln, Abraham. 1861. First inaugural address. Reprinted in Doren, Carl Van. 1942. The Literary Works of Abraham Lincoln. The Readers Club. New York. pp. 175-185.