

March 2008

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Recommended Citation

Deckard, Steve W.; DeWitt, Dave; and Pantana, John, "Measurement of Creation/Evolution Student Attitudes and the Importance of a Correct Understanding of Worldview within a Young-Earth Creation Context" (2008). *Faculty Publications and Presentations*. Paper 86. http://digitalcommons.liberty.edu/educ_fac_pubs/86

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Measurement of Creation/Evolution Student Attitudes and the Importance of a Correct Understanding of Worldview within a Young-Earth Creation Context

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ABSTRACT

College student's views of science make up a significant component of their overall worldview. In an ongoing effort to understand the creation worldview construct and the impact of teaching from a creationist perspective, students at Liberty University have been pre- and post-tested in a required course on the creation/evolution controversy using the Creationist Worldview Scale (CWS). Previous studies have demonstrated a shift toward a stronger creationist view after the course. The present study compares the CWS with two other instruments used to evaluate origins views. The other scales were (1) a modified version of MATE and (2) a portion of the Lawson and Worsnop Scale. Interestingly, while a significant difference was observed on the post-test for the CWS and the Lawson and Worsnop Scale, there was no difference for the MATE. The Lawson and Worsnop Scale may have invalid items because students identified as Creationist disagreed with the items which Lawson and Worsnop predicted they should agree. This study highlights the importance of a correct understanding of the creationist worldview in the development of instruments used to measure the construct.

INTRODUCTION

In an on-going effort (since 2001) to understand the construct of worldview within a science and Young-Earth Creationist perspective, we have been testing students at Liberty University. This testing has occurred primarily in The History of Life course using the CWS (Creationist Worldview Scale) to evaluate students' worldviews. This course covers a broad range of topics on the Creation/Evolution controversy and embraces/uses a YEC perspective. The CWS contains a subscale, which measures student attitudes and beliefs toward specific science issues related to the creation/evolution controversy. We report on various aspects of the CWS science subscale and how it relates to two additional subscales: a modified portion of the MATE, and a modified portion of the Questionnaire Assessing a Belief in Special Creation or Evolution and Related Beliefs, (Lawson & Worsnop, 1992; Rutledge & Warden, 2000).

DEFINING AND MEASURING WORLDVIEW (WITH ATTENTION TO YOUNG-EARTH CREATIONISM)

There are numerous definitions in the literature regarding the construct worldview. In the last century a widely accepted definition was one by James Sire (1976), who stated that a worldview is a set of presuppositions which every individual holds about the makeup of the world. As the definition of the term developed and changed, Pearcey (2004), explained in *Total Truth: Liberating Christianity from its Cultural Captivity*, that a worldview is not necessarily an abstract, academic concept. Instead, the term describes a search for answers to personal questions everyone wrestles with—the cry of the human heart for purpose, meaning, and a truth big enough by which to live. Consciously or

subconsciously, an individual's worldview determines how one will answer the core questions of life: Why are we here? What is ultimate truth? What is valuable and what is it worth living for?

A distinction must be made between the worldview that an individual possesses and a static list of beliefs that characterize the various worldview types. Sire (2004) expressed a recent and more pragmatic definition of worldview:

“...a commitment, a fundamental orientation of the heart, that can be expressed as a story or in a set of presuppositions (assumptions which may be true, partially true or entirely false) which we hold (consciously or subconsciously, consistently or inconsistently) about the basic constitution of reality, and that provides the foundation on which we live and move and have our being” (p. 122).

This definition moves the focus from a specific list of beliefs to an orientation of the heart in the individual. Such a distinction is important. As DeWitt suggested, an individual's worldview often consists of a “smorgasboard of different beliefs” (2007). Moreover, an individual can hold worldview elements that actually conflict with one another such as the Christian who is pro-choice or believes in reincarnation. Indeed, there is a full spectrum of beliefs regarding origins among those who claim to be Bible-believing Christians (Ross 2005). An individual's worldview can change over time and instruction can help to develop a more consistent worldview (DeWitt, Ross and Deckard 2007).

Deckard and DeWitt (2003) in *Worldview Studies Book 1: Developing a Creator-Centered Worldview*, analyzed seven literature-based definitions of worldview (pgs. 87-90). Their analysis showed the complexities of the construct worldview and the need for a YEC context centered definition. They stated:

In an effort to define worldview in an objective manner, a standard is pursued which is not man-defined. The only known source, which fits this criterion, is Scripture. . . A **Biblical** (*Christ-Centered*) *Young Earth Creationist Worldview* is an eternal set of beliefs about how the real world developed and is centered on the Supreme Being known as the Creator God, whose revealed truth is found in the Holy Scriptures (p. 17).

This creationist perspective worldview definition is a biblically based worldview taking into account the Trinitarian nature of man. Such a worldview stands in opposition and stark contrast to the worldview of evolutionary naturalism. A person holding an evolutionary naturalism view lacks understanding within the spiritual realm (1 Cor. 2:14-16). Thus, the Bible demands major consideration in any attempt to define worldview and how one views the world especially within three realms: physical, spiritual, and mental (Hebrews 5:14; James 5:8).

Measuring Worldviews (with Attention to Young-Earth Creation)

Deckard, Henderson & Grant (2003) shed further light on the importance of measuring issues related to worldview and the creation/evolution controversy:

A biblical worldview can be observed to have two key elements of the Deckard and Sobko (1998) worldview definition, namely a focus on why the world exists and on what is possible or impossible. The natural man's mind sets limits on what is physically possible and thus rules out the supernatural realm along with miracles. On the other hand, a spiritual man does not set boundaries in the realm of the supernatural. Thus the measurement of attitudes and beliefs related to the nature of God and the world is an integral part of the study of the two competing worldviews (p. 81).

Many studies using the CWS have been conducted for the specific purpose of measuring various aspects of a YEC worldview (Deckard, Berndt, Filakouridis, Iverson, & DeWitt, 2003; Henderson, et. al, 2003; Smithwick, 2002). In addition, other more secularly oriented instruments have been used to assess students' attitudes and beliefs toward

Creation and Evolution. For instance, Feder (1986) found that 62.3% of a Connecticut college student sample believed that “God created the universe.” Lawson and Weser (1990) found that 34% of an Arizona State University students believed that “All things were created during a short period of time by an act of God.” Brazelton (1999) used several question stems, which are similar to CWS items, to study college student beliefs and attitudes. For illustration,

Life likely began as related in the Book of Genesis in the Bible (63.8%).

Life was likely started by some intelligent creator, though not necessarily as related to the Bible (16.4%).

Life likely originated in some manner from the nonliving materials on other planets (16.7%).

Life likely arrived somehow from elsewhere in the universe (2.5%).

The above percentages represent those that chose that particular response. These results are from 111 undergraduate students and indicate that a sizeable percentage hold creationist views on the issue of when, where, and how life began. In another study: Bergman (1999) reported that the acceptance of creationism may be growing among college students. He reported on a survey of Mormon students, (completed in 1935), at Brigham Young University (BYU) where it was found that 36% (N= 1159) of the students agreed with the statement “Man’s creation did not involve biological evolution,” compared with 81% (N=1056) in 1973. Also, in 1935, 5% compared to 27% in 1973 agreed with the statement, “The world’s creation did not take millions of years.” Spencer (1988) found that 34% of the sample of Wichita State University students (N=149) labeled themselves as creationists, 61% theistic evolutionists, and 3% as atheistic

evolutionists. Continuing, Spencer noted that 47% believed the Genesis account of Noah and the flood, while 72% believed the Biblical account of Adam. Fuerst (1984) reported that about one-third of university students did not accept Darwinian evolution and that 77% of those who did accept evolutionary theory felt that creation science should be equally presented.

Measurement of the Construct “Worldview” within a Creationist Context

Using the Creationist Worldview Scale (CWS), Deckard, DeWitt, & Cargo, (2003), used the science subscale as an independent variable and reported a pre-test mean of 74.78 and a post-test mean of 79.43 (p = .006). In his dissertation Ray (2001) conceptualized the CWT (an older version of the CWS) as having three subscales; biology, geology and theology. He studied 132 high school students in eastern Atlanta, Georgia. The sample consisted of groups of 30 home school students, 42 public school students, 30 Christian school students, and 30 public school students in church youth groups. All participants had completed the equivalent of a high school level biology class. The means of those identified as Creationist and Evolutionist were compared on the CWT subscales Biology, Geology, and Theology. The results were as follows:

Table 1: Creationist Average compared to Three CWT Subscales

Subscales	BIOLOGY	GEOLOGY	THEOLOGY
CREATIONIST	63.3	38.66	76.61

A Chi square analysis across all three categories showed the results to be statistically significant (p = 0.01).

The more recent work in the form of the CWS scale has been conceptualized and reported in a number of studies (Deckard, DeWitt, & Cargo, 2003; Deckard, Henderson, & Grant, 2003; Deckard & Sobko, 1998; Deckard & Smithwick, 2002; Henderson, Deckard & DeWitt, 2003; Ray 2001; Skelly, 2004). A summary of the relevant findings follows.

Henderson, Deckard & DeWitt, (2003), reported results on the CWT for students in the Liberty University History of Life course. For the science subscale the pre-test mean was (52.94) and the post-test mean was (62.57). This showed a statistically significant shift with a movement toward a stronger creationist view. Skelly (2004), reported pre-test and post-test scores for a LU biology course in the same semester as the History of Life course. There was no significant difference in post test scores between students in the two History of Life courses with different instructors. However, while there was a strong shift in students' worldviews following the History of Life course, there was only a slight shift following the biology course. Even though all three instructors were young earth creationists, the biology course had only a minor impact on student worldview.

Confusion and Conflict in Origins Views

Numerous polls have been conducted regarding the origins views of Americans. One of the most recent polls (USA Today/Gallup) is particularly intriguing. Sixty-six percent of those surveyed said that "Creationism—that is the idea that God created human beings pretty much in their present form within the last 10,000 years" was definitely or probably true. This is encouraging to creationists, until noticing that 55% also said that "Evolution— that is, the idea that human beings developed over millions of years from less advanced

forms of life” was definitely or probably true. Thus, a majority of American say that both Creationism AND that evolution are definitely or probably true. Most likely, this is from a significant number of theistic evolutionists.

Such confusion is demonstrated in the views of students at the start of the History of Life course. For example, DeWitt, Ross & Deckard (2007) reported that 93.3% of students strongly agreed that “All humans are descendants of Adam and Eve.” However, only 62.5% strongly disagreed with the statement: “All living things share the same common ancestor. Another conflict was that 64.8% of the students strongly agreed that “All things in the universe were made by God in six 24 hour days,” yet only 48% strongly agreed that “Dinosaurs and man lived at the same time.” These results highlight the confusion and conflicting beliefs that people have regarding the origins controversy and may result from mixed messages from homes, churches, and the broader culture. Instruction from a creationist perspective has been shown to eliminate much of these conflicting beliefs as demonstrated by post tests from the same class.

Conclusions Regarding Worldview Definitions and the Measurement of Worldview

First, we have established that the measurement of worldview is complex and hard to understand and measure. Second, there is a need for the development of instruments that take into account the many facets and perspectives of the construct worldview. One of these is the YEC perspective. Third, there is a need to understand that there is a spiritual element found within the construct worldview and that the measurement of such is important in terms of trying to understand a biblical and YEC worldview. Fourth, the YEC worldview is closely tied to a biblical worldview and the teachings of the Creator

Jesus Christ. Fifth, from the literature it is apparent that there exists a growing number of students in colleges and universities with both secular and Christian nature who possess belief systems which are contradictory to the current evolutionary view. However, it is clear that there is a great deal of inconsistency in the students' belief systems. Thus, there is a clear call for teachers who can present, or at least clarify and teach, the basic principles of creationism (and especially YEC). Too often evolution is taught dogmatically, without critical assessment or alternatives being discussed. This tends to foster confusion and worldview inconsistencies.

REGARDING COMPARISON OF THREE SUBSCALES

Why the three subscales?

Searches of the literature, for scales other than the CWS, lead us to discover two studies of particular significance and interest (Lawson & Worsnop, 1992, and Rutledge & Warden, 2000). Both claimed to measure many of the same constructs within the creation/evolution controversy. In addition, these two studies are frequently cited in the more recent literature. Further, our brief preliminary review indicated that there were some issues with the items that merited further study (in Lawson & Worsnop, in particular). Even though many of the items of the two scales mirrored CWS items, there appeared to be some reliability and validity issues related to the Lawson & Worsnop items and their construction. We desired to do some work to confirm this suspicion.

In response to these two studies and the reasons above we decided to test some selected items from the two studies in our student population at Liberty University and compare them to the CWS items. In the fall semester 2003 the original CWS was modified into a

combination scale containing items from the three scales; a modified portion of the MATE, and a modified portion of the *Questionnaire Assessing a Belief in Special Creation or Evolution and Related Beliefs*, (Lawson & Worsnop, 1992; Rutledge & Warden, 2000). This was done by selecting specific scale items that measured constructs related to creation and evolution and specific aspects of YEC (see Appendix A).

The two studies are described below.

The Lawson & Worsnop Study

In a study titled *Learning about Evolution and Rejecting Belief in Special Creation: Effects of Reflective Reasoning Skill, Prior Knowledge, Prior Belief and Religious Commitment*, Lawson & Worsnop, constructed a questionnaire for assessing a belief in special creation or evolution and related beliefs for students in three sections of a secondary high school biology course. Students in three sections of a high school biology class were taught a unit on evolution and natural selection. Prior to instruction, students were pretested to determine their (a) reflective reasoning skills, (b) strength of religious commitment, (c) prior declarative knowledge of evolution and natural selection, and (d) beliefs in evolution or special creation and related religiously oriented beliefs (p. 143).

Rutledge & Warden Study

Rutledge and Warden (2000) constructed an instrument for measuring attitudes of teachers toward creation and evolution. Their instrument was named *Measuring Attitudes of the Theory of Evolution (MATE)*. Their items were carefully constructed and validated. An examination of their instrument seemed to reveal a consistent application of the theory of evolution and the construct of Young-Earth Creationism. Their instrument in many ways appeared to be a mirror image of the CWS. Interestingly,

they—like Lawson and Worsnop, (1992)—seemed to view the controversy from an evolutionary perspective (as reflected in the title of their instrument). Essentially, the measurement of attitudes that were positive on the Likert scale may be viewed as being in agreement with the evolutionary perspective. Thus, strong agreement on their Likert scale would indicate agreement with their evolutionary perspective.

In contrast to the MATE, the CWS is constructed and scored in such a way that strong agreement with the creationist perspective would be viewed in the positive sense. These two scoring formats inherent in a Likert scale illustrate the nature of the measurement of attitudes in that the direction of the scoring of the Likert scale is dependent on the researcher's perspective. The CWS which included the modified MATE items and a number of items from the Lawson and Worsnop (1992) study was administered as a pretest and posttest in the History of Life course at Liberty University during the summer of 2003. A total of 47 students participated in the study. The instructor, David DeWitt, met with the students for 3 hours a day for a total of 10 days. The pretest was given prior to any instruction and the posttest was administered after the final exam was completed.

Paired Samples Testing of the Combined Scale (See Table 2)

The three subscales served as dependent variables. Comparisons can be made between two related samples on the same dependent variables using a paired sample T-Test. This test is used in pre-post repeated measures, experiments where individuals are measured on the dependent variable twice using the null hypothesis logic (Shannon & Davenport, 2000). Three hypotheses were generated and tested using the paired samples data. These are discussed below.

Table 2: Paired Sample Statistics

Subscales	Mean	N	Std. Deviation	Std error of Mean
Pair CWS Pretest	110.43	47	7.08	1.11921
1 CWS Post test	158.35	47	9.58	1.51420
Pair Lawson Pretest	26.49	47	3.06	.44687
2 Lawson Post test	28.09	47	3.00	.43742
Pair MM Pretest	25.55	47	3.34	.48375
3 MM Post test	25.57	47	3.22	.46903

Results of Subscale Hypothesis Testing

Hypothesis One: The mean of the CWS subscale for the pretest is equal to the mean of the CWS subscale post test.

The mean of the CWS pretest (110.43) and post test (158.35) were found to be statistically different. The null was rejected (See Tables, 2 above and 3-4 below) showing the data for the paired samples.

Hypothesis Two: The mean of the LW subscale for the pretest is equal to the mean of the LW subscale post test.

The LW Pretest mean (26.49) and LW post test mean (28.09) ($t = -6.85$) were not similar. The null was rejected ($p \leq .05, .000$) (See Table 3 below).

Table 3: Paired Differences Statistics

Paired Differences	Df	Mean Difference	T	95% CI Lower Bound	95% CI Upper Bound	Sig. (2-tailed)
CWS Pretest CWS Post test	46	-47.90	-70.922	-49.26	-45.53	.000
Lawson Pretest Lawson Post test	46	-1.59	-6.850	-2.06	-1.13	.000
MM Pretest MM Post test	46	.012	.141	-.28	.32	.888

Hypothesis Three: The mean of the MM subscale for the pretest is equal to the mean of the MM subscale post test. The MM Pretest mean (25.55) and MM post test mean (25.57) were similar. The null was retained ($p = .888$) (See Table 3 above).

Although the differences in the three correlations are minor there is some indication that the CWS (.911) and MM .951 items show a more consistent measure of the constructs under consideration than those of the LW. However, this is in need of further study.

This is discussed in the individual item analysis section below

Table 4: Paired Samples Correlations

Subscales	N	Correlation	Sig
Pair CWS Pretest 1 CWS Post test	47 47	.911	.000
Pair Lawson Pretest 2 Lawson Post test	47 47	.861	.000
Pair MM Pretest 3 MM Post test	47 47	.951	.000

**Discussion
of the
Hypothesis
Testing**

The CWS

Pretest mean (110.43) and CWS post test mean (158.33) ($t = -70.92$), were not similar.

The null was rejected ($p = .000$). In addition, the paired samples T-Tests show a pattern of shift in attitudes from the pre to post-test on two of the three scales (CWS and

Lawson/Worsnop). The shift for the CWS was similar to previous studies of students at

Liberty University. For the Lawson/Worsnop subscale, the shift was as expected since

the content of the course was designed to assist the students in solidifying their creationist

worldview. The direction of shift was the same for the CWS and Lawson/Worsnop (both

towards stronger creationist views).

The shift in MM was expected to be negative to neutral as this subscale measured

attitudes toward evolution. In general, Liberty University students come into the

university and class with an overall view opposed to evolution. While there are significant inconsistencies in the worldviews of students at the start of the class, they are still generally opposed to evolution. The shift toward a stronger young earth creationist worldview is likely the result of eliminating inconsistent worldview elements. This change was most dramatic in the CWS. These results are consistent with previous studies of Liberty University students. In support of this contention, the CWS showed that the student attitudes shifted strongly toward a creationist view. This, along with the MM's stability from pre to post-test indicates the likelihood that the items for the MATE are valid and reliable.

Individual Item Analysis

Several individual pretest items were analyzed (6, 31, 34, 42 and 45). Pretest items 6, 42, and 45 were analyzed in an attempt to ascertain patterns of student views prior to treatment (the participation in the class). These were labeled as a unit and designated the Young-Earth Creationist Identifier (YECI). Second, two Pretest Lawson/Worsnop (31, 34) items were compared to the YECI items.

Setup of the YECI Identifiers

To test the perceived similarities and differences in the CWS, MATE, and Lawson/Worsnop we combined items from each into a 53 item scale that was used in a pre-test, post test study (see Appendix A) . There are several subscales within the total scale that are of particular interest for this study. They are designated as:

CWS = Creationist Worldview Scale (1-30, 41-45, 51-53)

LW = Lawson/Worsnop (31-40)

MM = Modified Mate (46-50)

YECI = Young Earth Creationist Identifiers (6, 42, 45)

Results of the Individual Data Analysis

The individual scale items analysis focused on two aspects. First, three items were used to identify students with a YEC perspective and establish a base-line for comparison purposes (items 6, 42, & 45). As noted above, these items are referred to as the Young-Earth Creationist Identifier (YECI). Table 5, below shows means for all three subscale items for the pretest. Second, selected individual LW items were analyzed in light of the findings related to the YECI.

Individual Items Analysis for YECI (6, 42, 45) (See Tables 5-8).

Table 5: Individual Items Analysis for YECI (6, 42, 45)

Subscale Item	Item #	Mean	N
Great quantities of sedimentary rock layers and fossils were deposited by a worldwide flood	6	1.36	47
Adam was created as a full grown adult and was not born from a mother's womb	42	1.11	47
The age of the earth is less than 10,000 years old	45	1.57	47

Overall these mean scores (Table 5 above) indicate general support for the young-earth creationist view by the students prior to their taking the History of Life class at Liberty University. The items were scored using a Likert scale, with the closer to 1 the greater the level of agreement (1 = a strongly agree response, and 2 = tend to agree response).

Item 6 analysis (see Tables 5 and 6): Great quantities of sedimentary rock layers and fossils were deposited by a worldwide flood. This is a key YEC construct; a person taking the CWS who holds to a YEC view would be expected to select *strongly agree* or *tend to agree* for this item. The mean (1.36) shows that this is the case with a total of 93.6% of the respondents agreement. In this group 78.7% strongly agreed (see Table 5 above and 6 below). Thus, there is a strong indication that this group of students holds to a YEC view (for this item).

Table 6: Frequencies for YECI Item 6

Great quantities of sedimentary rock layers and fossils were deposited by a worldwide flood.

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	37	38.9	78.7	78.7
Tend to Agree	7	7.4	14.9	93.6
Strongly Disagree	2	2.1	4.3	97.9
Total	1	1.1	2.1	100
	47	49.5	100	

Item 42 analysis (see Tables 5 and 7): Adam was created as a full grown adult and was not born from a mother's womb. The mean was 1.11 with 97.8 agreeing to some extent and 93.5% of these strongly agreed. This indicates widespread agreement with the idea that Adam and Eve were real, historical figures.

Table 7: Frequencies for YECI Item 42

Adam was created as a full grown adult and was not born from a mother's womb.

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	43	45.3	93.5	93.5
Tend to Agree	2	2.1	4.3	97.8
Strongly Disagree	1	1.1	2.2	100
Total	46	48.4	100	

Item 45 states (see Tables 5 and 8): The age of the earth is less than 10,000 years old.

Interestingly, what might be considered as the hallmark question regarding YEC received the lowest level of agreement (and strong agreement). Despite this, it is still indicative of a YEC view for 66% of the respondents (See Table 8 below). This item also had the highest level of *tend to agree* for the three YECI items (23.4%). It is also interesting to note that this item had responses in all five of the categories (SA A N D SD) whereas this was not the case for items 6 and 42. Granted, the numbers in the neutral, disagree, and strongly disagree were small; nonetheless, there were some respondents who were not in line with a YEC view on this particular item.

Table 8: Frequencies for YECI Item 45

The age of the earth is less than 10,000 years old.

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	41	32.6	66	66.0
Tend to Agree	1	11.6	23.4	89.4
Neutral	1	1.1	2.1	91.5
Tend to Disagree	2	2.1	4.3	95.7
Strongly Disagree	2	2.1	4.3	100
Total	47	49.5	100	

Discussion & Conclusions Regarding YECI

All three YECI items showed a high degree of agreement with the YEC perspective. This was to be expected and mirrors the trends found in previous studies. However, item (45) which might be considered as the hallmark for a YEC worldview showed the lowest level of agreement. This is not surprising as the age of the earth is a very contentious issue within both the science and Christian community. Further, it may be that this item is the least clearly defined and presented within the biblical text. Item 42 ($x = 1.11$) is a fairly straightforward biblical construct (Genesis 1 and 2). Item 6 ($x = 1.36$) is evidently also clearer to this particular group of students, although the difference in means is not great and the pattern of responses is similar. It appears from this data that the YEC community has some work to do in terms of convincing college students that the earth is less than 10,000 years old.

Lawson & Worsnop Individual Item Analysis (31 & 34)

Two of the LW items, 31 and 34, seemed particularly troublesome so an analysis was conducted. These two items are illustrative of several issues that will be discussed in the Discussion & Conclusions Regarding the Comparisons (Pre to Post and Individual items analyses)(below).

Item 31 analysis (see Table 9 below): Landforms like the Grand Canyon were created by God and have not changed since then. For this item 34% showed some level of agreement (23.4 strongly and 10.6 tend to agree). In addition, 14.9% were neutral with 51.1% that disagree (23.4% tending to disagree and 27.7% strongly disagreeing). Interestingly,

Lawson and Worsnop claimed that a YEC should agree with this item. While some of the students did, most clearly did not.

Table 9: Frequencies of LW Item 31

Landforms like the Grand Canyon were created by God and have not changed since then.

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	11	11.6	23.4	23.4
Tend to Agree	5	5.3	10.6	34.0
Neutral	7	7.4	14.9	48.9
Tend to Disagree	11	11.6	23.4	72.3
Strongly Disagree	13	13.7	27.7	100
Total	47	49	100	

Item 34 analysis (see Table 10 below) Fossils were intentionally put on the Earth to confuse humans.

For this item, 12.8% agreed (4.3% strongly and 8.5% tend to agree), while 87.3% disagreed (12.8% tending to disagree and 74.5% strongly). Lawson and Worsnop expected religious people, including those who believed in special creation, to agree with this item. Clearly, the Liberty student population did not fit their expectations since so few students were in agreement in spite of the overall creationist bent.

Table 10: Frequencies for LW Item 34

Fossils were intentionally put on the Earth to confuse humans.

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	2	2.1	4.3	4.3
Tend to Agree	4	4.2	8.5	12.8
Tend to Disagree	6	6.3	12.8	25.5
Strongly Disagree	35	36.8	74.5	100
Total	47	49.5	100	

Discussion & Conclusions Regarding the Comparisons (Pre to Post and Individual Items Analyses)

The Pretest Young-Earth Creationist Identifier (YECI) individual item analysis showed a strong set of attitudes toward a worldwide flood (93.6% agreement), a literal Adam (97.8%), and somewhat surprisingly 89.4% young-earth (the surprise was that only 66% were in strong agreement). The fact that student attitudes shifted toward a stronger creationist view on the post-test is encouraging and stands in opposition to the lament of evolutionary literature about not being able to impact their clientele's worldview in a direction of greater belief in evolution.

The two selected LW items (31 & 34) show a markedly different pattern than the YECI items. Lawson and Worsnop claim one should agree with this item 31 if he believes in special creation. At first glance the item appears to measure an important YEC construct. However, the fact is that this item is problematic for a knowledgeable YEC. The reason is that YEC's do not believe God created the Grand Canyon. Instead, they believe that it was formed by post-flood tectonic events. So, Lawson and Worsnop say that those who believe in special creation should agree with this item. The results of the Liberty University study do not support this contention. On the contrary, the results support the contention that Lawson & Worsnop item 31 is flawed.

Since item 34 shows a similar pattern of distribution to item 31 and is a component of the *Questionnaire for Assessing a Belief in Special Creation or Evolution or Related Beliefs*, one who has beliefs that tend to rest in the special creation and religious camp would be expected to agree with this item. In other words those who do not believe in

evolution are supposed to agree with this item. Again, (similar to the item 31 results) the Liberty study does not support the contentions of Lawson and Worsnop. Therefore, this item also appears to be flawed. In fact, for the most part, YEC's in the Liberty University study reject the notion that fossils were put on the earth by God to intentionally confuse us.

Overall Conclusions and Remarks

The results of the Liberty University study show a pattern of shift in attitudes from the pre to post-test on two of the three scales (CWS and Lawson/Worsnop). This change was much more dramatic in the CWS. The shift was expected for the Lawson/Worsnop subscale as it would be expected that the content of the course would assist the students in solidifying their creationist worldview. The direction of shift was the same for the CWS and Lawson/Worsnop (toward a creationist perspective). The modified MATE did not show a shift in student attitude (($p \geq .05$, .888).

It is apparent that student attitudes were negative toward evolution prior to the class and this aspect of student beliefs did not substantially change upon receiving the treatment (teaching). This is similar to the 2003 Blackwell study and his lamenting about the students' negativity toward the acceptance of evolution. This is not surprising for the population studied since most students were observed to be strongly in the creationist camp prior to the course. In addition, Liberty University is a conservative evangelical Christian school so there is strong self-selection in this population.

Several more important implications may be discerned. First, it is apparent that there exists a growing number of students in colleges and universities of both secular and

Christian nature who possess a belief system contradictory to a strict evolutionary view. This may present a situation where there is a mismatch between the teachers' worldview, students' worldviews, and the curricular materials. Thus, there is a clear call for teachers who can present or at least clarify and teach the basic principles of creationism.

Nonetheless, the problem in requiring the teaching of creationism in public school science classes is that of unqualified teachers. Since creationism is unthinkable in virtually every secular college and university in the country, the majority of the teachers will not have been exposed to a reasonable presentation on creation. Furthermore, since they have exclusively been taught the evidence supporting evolution, many are also unaware of the legitimate problems with the evolutionary theory (DeWitt, 2002). Too often, evolution is taught dogmatically, without critical assessment or alternatives being discussed. This tends to stifle rather than promote learning. We are not suggesting that teachers be required to teach creation. However, it would seem prudent for the evolutionist to at least understand what creationists really believe. We have shown, at least for some of the ardent evolutionists, that this is not the case. This is disturbing and work needs to be done to correct this. Since there is so much confusion and conflicting beliefs even among Christians, it is not surprising that evolutionists and atheists would be unaware of the actual tenets of creationism. This problem is compounded by those evolutionists who claim that intelligent design proponents and theistic evolutionists are creationists as well.

Second, there is ample evidence showing belief shifts by students toward a creationist view and away from an evolutionary one. On the other hand, a clearly documented shift toward an evolutionary view is not apparent, nor documented in the current literature. In part, this may be due to the many secular scientists and non-Christians who show a lack of understanding of what Creationists believe and thus, they are ineffective in promoting change in their view. This appears to be especially true regarding the Young Earth Creationist (YEC) position. However, it also may be a reflection of the specific items on the testing instrument or the nature of the instruction. We observed virtually no change on the modified MATE items after the creation course, however, that CWS and LW items *did* change. Thus, the worldview impact would appear negligible because of the specific items that were measured. Clearly, great care must be taken in designing instruments that measure worldview elements. It is also interesting to note the difference between a biology course and an origins/worldview course. In the study by Skelly (2004) there was only a slight change in creation views of the students in the biology course taught from a creation perspective. This closely parallels the studies by evolutionists that report minimal change following biology/evolution instruction. In contrast, a course like History of Life has been designed specifically to impact students' worldviews and clearly does so. Third, our comparative study shows that student attitudes toward a worldwide flood (93.6% agreement), a literal Adam (97.8%), and young earth were in strong agreement with a YEC perspective. This is further illustrated by the two selected LW items which do not appear to measure what they were supposed to measure, which is a validity problem.

In conclusion, the creation and evolution communities can learn much from each other. Both sides should agree that it is important to develop scales with items that accurately measure the construct under consideration. The ideas that we can share should lead to better understanding and thus better science education for all students.

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