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ABSTRACT

After having secondary math education majors write an essay entitled, "What is Mathematics?" for the past 4 years, the first attempt was made to create an instrument based on the results of these essays that would measure math beliefs. Based on previous research which suggests that a math teacher's beliefs influence the teacher's methodology, the instrument was administered to elementary education majors to determine their methodological tendencies. The results are compared to similar data obtained from secondary math education majors (n=11) and urban, college-bound high school juniors (n=13). The results suggest that elementary education majors who expect to teach mathematics need a broader vision of what mathematics is. Appendixes contain the survey instrument and results. (Author/NB)

Teachers' Definition of Math:

Creating and Implementing an Instrument

by

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Abstract After having secondary math education majors write an essay entitled, "What is Mathematics" for the past four years, the researcher made the first attempt to create an instrument, based on the results of these essays, that would measure one's math beliefs. Based on previous research that suggests that a math teacher's beliefs influence the teacher's methodology, the instrument was administered to elementary education majors to determine their methodology tendencies. The results are compared to similar data obtained from secondary math education majors and urban, college-bound high school juniors.

What is mathematics? What initially appears to be a rather straight-forward question become increasingly more complex as the respondent begins to formulate an answer. This experience can be even more frustrating when the respondent is a mathematics student, mathematics major, or mathematics teacher.

Early in 1994, this researcher was a participant on an electronic mailing list for math teachers. One of the other members posed the question, "What is mathematics?" The lack of response from the thousands of participants and, further, the variations of responses from those that attempted to answer was perplexing. It would seem that on the day of the first class of a geology or an economics or a British Literature course, the high school teacher or college professor often defines these course names for the students. However, as a college math major, the researcher cannot recall a single instance in which a math teacher or professor attempted to define the term, "mathematics" with the exception of one college professor who enjoyed pointing out that mathematics is a human-created art whose rules are negotiable.

Being a first-year college professor and teaching "Instructional Methods in Mathematics" to secondary math education majors for the first time, the researcher posed the question to the nine students of the methods class. The class was assigned an essay with the theme, "What is mathematics?" Many initially turned to the dictionary for assistance and were frustrated to find a result such as, "the science of numbers and their operation, interrelations, and

combinations and of space configurations and their structure, measurement, and transformations." (Webster's New Student Dictionary, 1964). Most found this definition lacking. The remainder of the essays varied; some spoke of mathematics as procedural while others described it as subdivided into special areas and still others spoke poetically about an "art" and a way of describing the patterns of nature and the universe. With such diverse descriptions of mathematics, would it not be the case that the views of each of these future math teachers would influence what aspects of the subject they would emphasize in their own classrooms?

Theoretical Background

Research in mathematics teachers' beliefs suggests that teachers have preconceived mathematical ideas that are resistant to change. (Thompson, 1992). Furthermore, Thompson studied the practice and conceptions of three junior high teachers and concluded that the teachers not only had differences in their predominant views of mathematics, but this was related to their teaching. (Thompson, 1984).

Hersh (1986) also states that a teachers' conception about what mathematics is affects their manner of teaching mathematics. Further, the National Council of Teachers of Mathematics stresses that a teachers' comfort with and confidence in their knowledge of mathematics affects what they teach and how they teach it. (NCTM, 1991). If it is understood that a teachers' beliefs affects their teaching of mathematics, the next question seems to be whether we can categorize teachers according to their beliefs. Thompson (1984) used a case study method to in order to define the beliefs of her subjects. However, could there exist a number of categories or a continuum in which teachers can be placed according to their beliefs? If so, then each category would suggest a

subsequent teaching methodology. Also, to change a teacher's methodology could more easily be done by first changing the teacher's beliefs about mathematics.

One possible model that may fit the continuum of teacher beliefs is presented by McBeath (1992). McBeath's work parallels that of William Perry's renowned work in the stages of growth in which learning takes place. McBeath defines four stages of teaching strategies that parallel the learning stages of Perry. McBeath's first stage is "teacher-dominated" in which the teacher expects and provides for dependent, authority-centered, linear-thinking students. In stage two, "subject-centered", the teacher presents more information and in more meaningful ways. In this stage, the teacher begins to allow the student to deal with ambiguities and to begin to understand different views and opinions. In stage three teaching, "learning task-oriented", the teacher moves toward less large-group, directive teaching and toward more cooperative, small-group instruction. "Inquiry-centered", the fourth stage of teaching encourages the student or students to hypothesize, investigate and test new ideas.

Although it is easy to visualize math lessons that represent each of the above stages of teaching, it may not still be clear which math beliefs match each of the models. On the one hand, a teacher who believes that math is procedural and merely the memorization of a set of steps would seem to fit stage one. On the other hand, a teacher who believes that math is a way of symbolizing naturally occurring patterns and who views math as a holistic language of our environment would most likely prefer their students to hypothesize and discover these through stage four activities. In order to confirm these hypotheses and to sub-categorize the behaviors and beliefs of math teachers, it would be helpful to have an instrument that would place the teachers into categories based on their beliefs.

Methodology

In order to begin to develop an instrument that may be used to categorize teachers based on their beliefs, this researcher used copies of four semesters' worth of "What is mathematics?" essays written by secondary math education majors. While reading the essays, the researcher wrote key terms on note cards. Afterward, the notecards were placed into piles based on commonalties, contradictions, and levels of complexity.

From these piles of cards, a list of nouns and adjectives were derived. One part of the instrument could contain these terms and ask the respondents to choose the five terms that best describe to them what math is. Furthermore, respondents could be ask to identify the terms that least describe math.

Also from the piles of notecards, certain terms suggested an analysis of beliefs based on a continuum. For instance, one card had the term, "art" on it. This leads to the question of whether math is a science or an art or exists somewhere between the two. When another card contained the word, "fun", the continuum between "fun" and "torture" arises. The researcher developed twelve continuums beginning with the phrase, "Math is . . ." The final instrument which contains the twelve continuums, two lists of the nouns and adjectives with instructions to number the five words which best describe and least describe math, and a concluding page of demographic items, can be found in Appendix A of this paper.

Those students in the secondary math methods class during the spring of 1997 piloted the survey (n=11). Although solicited, there were no suggestions regarding the format of the instrument. Instead, many students responded that they found the experience "interesting" and commented that they had not considered many of the terms listed when defining or describing mathematics.

Since the instrument underwent no critical formatting changes, this pilot experience produced usable data.

Also piloting the survey were a group of high school students, mostly juniors, from an urban public school system who participate in an Upward Bound Program (n=13). These students were in a Saturday morning SAT preparation course taught by the researcher. These students had no suggestions regarding the format, nor had any reaction, positive or negative, toward the instrument itself. Also, the students were accustomed to completing such assessments such as journal entries and essays to describe the solution of a math problem or to formulate strategies for the SAT.

Finally, once the demographic page of the instrument was added, the instrument was administered to two sections of an elementary math methods course in a large state university, the same institution which piloted the instrument. Elementary teachers are a population that typically is a concern among math education researchers. It is believed by many that these teachers fear mathematics themselves, do not necessarily enter the profession with a goal of conveying a love mathematics to students, and quite possibly transfer an anxiety toward mathematics to their students. Furthermore, it would be interesting to determine if there were any obvious differences between the elementary education majors and the secondary math education majors (as well as the high school students).

Unfortunately, the second and third pages of the instrument were altered between the pilot and the distribution to the elementary education majors. The original format asked that the respondent write the five words that best described math and then later the words that least described math. Fearful that a respondent's handwriting would be difficult to decipher and would hamper confidentiality, the page was reformatted with instructions to rank the top five

words from one to five. The nouns were listed in one column and the adjectives in another. As a results, approximately ten out of the fifty students that responded ranked the five top nouns and then ranked the five top adjectives on the same page. Also, approximately five of the students simply checked five words without using any numbers. As a result, the instrument will need to be revised before it is administered again. Therefore, the number of usable surveys was reduced to thirty-three for that portion of the instrument.

Due to a delay in the approval of the instrument by the Internal Review Board (because of misplaced paperwork), the only data available to present in this paper are percentage results of the two pilot groups and the group of elementary majors. Further data analysis would be able to determine if such demographic factors such as gender, perception of math confidence, and perception of K-8 math lesson experiences have any influences on the beliefs of the elementary education majors.

Preliminary Data

The data results of the survey can be found in the appendices. The Likert results seem to offer the more interesting, comparative information regarding the beliefs of the respondents.

The first Likert item, "Math is an art ... Math is a science", demonstrated that the secondary math education majors were more likely to hover between the two concepts and stay somewhat neutral regarding that item. The other two groups were more likely to have results widespread within the range. On the second Likert item, "Math is right or wrong ... Math is open-ended", the secondary math education majors were also more likely to state that math is more open-ended than the other groups. The secondary math education majors were also more likely than the other groups to feel as though math is something

that you get better at with practice rather than an ability you are born with (Item 4). The secondary math education majors were also more likely than the other groups to feel as though math gives them power rather than making them powerless (Item 5). Also, the secondary math education majors were more likely to see math as fun rather than torture than the other two groups who were a bit more divided on the issue (Item 12).

Both the secondary math education majors and the high school students were more likely to feel as though math is limitless, compared to the elementary education major respondents (Item 8). Likewise, both the secondary math education majors and the high school students were more likely to see math as active rather than passive (Item 9), math as valuable rather than useless (Item 10), and math as versatile rather than rigid (Item 11) compared to the elementary education majors.

The reader should note here that the above results are being determined by merely looking at the percentage results. No Chi Square statistics have been determined as of the date of the presentation of this paper.

Slightly less interesting are the results of the rank-order exercises. The respondents were asked to select from a list of nouns and adjectives the five words that best describe math and, from another copy of the same list, the five words that least describe math. The secondary education math majors were likely to see math as "valuable" and "empowering". After these, they chose the words "an adventure", "an exercise for the mind", "an exploration", "problem-solving", and "a tool" (in rank order). The elementary education majors chose the terms (in rank order) "valuable", "problem-solving", "an exercise for the mind", "formulas", "a tool", and "numbers". The high school students also chose "valuable" as their first choice, but chose "frustrating" as their second, followed by "exercise for the mind", "frightening", and "fun".

When asked what five words describe what math is not, the secondary math education majors chose "useless", "torture", "frightening", "rigid", and finally "counting", "laws", and "rules". The elementary education majors selected the words (in rank order) "useless", "torture", "frightening", "frustrating", "an art", "an adventure", "rigid", "a game", "a history", and "fun". The high school students selected "useless" as their clear first choice. "A game" and "torture" came in by a distant second, followed by "an adventure", "frightening", and "fun". ("Easy" appeared as a "write-in" entry.)

It is encouraging to see that all groups found mathematics to be valuable and not useless. However, it is interesting to note that the secondary education majors found math to be "empowering" when that term actually appeared on the "What math isn't" list of the other two groups. The elementary education majors also ranked the terms, "formulas" and "numbers" high on the list of what mathematics is. However, these terms suggest a low-level of understanding of the range of the field of mathematics. Also high on the "What math isn't list" for the elementary education majors were the terms, "an adventure", "a game", "a history", and "an art", which also suggests a lack of knowledge of the depth of the field of mathematics.

The demographics of the elementary education majors can also be found in an appendix of this paper.

Future Steps and Implications

Recalling that the long-range goal of this study is to produce an instrument that might be able to place a math teacher in a category according to his/her beliefs that would be able to predict the teaching method of the teacher, this preliminary data is quite helpful to that effect. A possible next step may be to place the rank-order items in categories (unknown to the respondents) based on

their place in McBeath's four categories of teaching. The placement should be validated by experts in the field. Each respondent would then receive a "four" for choosing a term from the fourth stage, a "three" for the third stage, and so on. The responses to "What Math Isn't" would produce reverse numbers. The sum of the five terms would produce a number between five and twenty for each rank-order exercise which would suggest where on the continuum of classroom authority they would appear. These numbers could then be correlated with the results of the Likert items to confirm the teachers' beliefs about mathematics.

The results of this prelimary research also suggest that the instrument must be revised once again so as to reduce the possibility of error from the respondents. Also, the results suggest that elementary education majors who, according to their demographic-related responses, expect to teach mathematics in their careers, need a broader vision of what mathematics is. Their college curriculum should provide experiences that help them understand mathematics as an adventure, an art, a history, and a game. When this occurs, the future students of these elementary majors will be better served by teachers who are able to create and properly implement meaningful math lessons full of student inquiry and discovery.

Appendix A - The Instrument

We would like to ask you your feelings about the definition of mathematics. Please circle the answer that best describes how you feel about each statement.

1. Math is an art					Math is a science
	1	2	3	4	5
2. Math is right or wrong					Math is open-ended
	1	2	3	4	5
3. Math is rules that never change					Math is rules that can be changed
	1	2	3	4	5
4. Math ability is something that you are born with					Math ability is something that you get better at with practice
	1	2	3	4	5
5. Math is abstract					Math is concrete
	1	2	3	4	5
6. Math gives me power					Math makes me powerless
	1	2	3	4	5
7. Math is trial and error					Math is a systematic process
	1	2	3	4	5
8. Math is finite					Math is limitless
	1	2	3	4	5
9. Math is active					Math is passive
	1	2	3	4	5
10. Math is valuable					Math is useless
	1	2	3	4	5
11. Math is versatile					Math is rigid
	1	2	3	4	5
12. Math is torture					Math is fun

1 2 3 4 5

From the lists below, choose the **five** words that best describe your view of mathematics. Rank them so that #1 is the word that most strongly describes your view.

The top **five** words that describe what mathematics **is**:

Nouns

____an adventure
____an art
____calculations
____counting
____exercise for the mind
____an exploration
____formulas
____functions
____a game
____a history
____a language
____laws
____logic
____measurements
____numbers
____operations
____patterns
____problem-solving
____a puzzle
____relations
____rules
____a science
____a tool

Adjectives

____abstract
____concrete
____empowering
____frightening
____frustrating
____fun
____gives meaning
____practical
____rigid
____torture
____useless
____valuable

Now, from the same list, choose the **five** words that least describe your view of mathematics. Again, rank then so that #1 is the word that least reflects your view of mathematics.

The top **five** words that describe what mathematics **isn't**:

Nouns

____an adventure
____an art
____calculations
____counting
____exercise for the mind
____an exploration
____formulas
____functions
____a game
____a history
____a language
____laws
____logic
____measurements
____numbers
____operations
____patterns
____problem-solving
____a puzzle
____relations
____rules
____a science
____a tool

Adjectives

____abstract
____concrete
____empowering
____frightening
____frustrating
____fun
____gives meaning
____practical
____rigid
____torture
____useless
____valuable

Please tell us a little about yourself. Remember that the questionnaires are confidential and that this information will be grouped with all other responses. **CIRCLE THE NUMBER THAT BEST DESCRIBES YOU.**

1. What is your gender?

   1 MALE 2 FEMALE

2. What is your age group?

   1 LESS THAN 21
   2 21 - 23
   3 24 - 30
   4 31 - 40
   5 41 - 50
   6 OVER 50

3. What is the highest level of high school math you have taken?

   1 PRE-ALGEBRA
   2 ALGEBRA I
   3 GEOMETRY
   4 ALGEBRA II
   5 PRE-CALCULUS / MATH ANALYSIS
   6 CALCULUS

4. How would you describe your mathematical ability?

   1 EXCELLENT
   2 COMPETENT
   3 AVERAGE
   4 WEAK
   5 POOR

5. How would you describe your memories of your kindergarten through grade eight math lesson experiences?

   1 VERY POSITIVE
   2 SOMEWHAT POSITIVE
   3 NEUTRAL
   4 SOMEWHAT NEGATIVE
   5 VERY NEGATIVE

6. How would you describe your comfort level toward teaching kindergarten through grade eight mathematics?

   1 VERY POSITIVE
   2 SOMEWHAT POSITIVE
   3 NEUTRAL
   4 SOMEWHAT NEGATIVE
   5 VERY NEGATIVE

7. Do you intend to teach mathematics during your teaching career?

   1 YES
   2 NO

THANK YOU FOR YOUR TIME AND YOUR COOPERATION!

Appendix B - Likert Items Results (in Percentages)

Likert Item Results in Percentage of Responses

1. Math is an art — Math is a science

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.00	.02	.18	.52	.28
Sec. Math Ed Maj. (n=11)	.00	.00	.45	.55	.00
H. S. Students (n=12)	.08	.08	.33	.25	.25

2. Math is right or wrong — Math is open-ended

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.02	.30	.30	.30	.08
Sec. Math Ed Maj. (n=11)	.00	.36	.27	.18	.18
H. S. Students (n=13)	.23	.08	.23	.15	.31

3. Math is rules that never change — Math is rules that can be changed

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.16	.22	.34	.22	.06
Sec. Math Ed Maj. (n=11)	.00	.45	.18	.18	.18
H. S. Students (n=13)	.08	.15	.23	.15	.38

4. Math ability is something that you are born with — Math ability is something that you get better at with practice

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.00	.00	.16	.48	.36
Sec. Math Ed Maj. (n=11)	.00	.00	.00	.18	.82
H. S. Students (n=13)	.00	.08	.08	.15	.69

5. Math is abstract — Math is concrete

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.06	.14	.68	.12	.00
Sec. Math Ed Maj. (n=11)	.00	.09	.82	.09	.00
H. S. Students (n=13)	.08	.15	.31	.23	.23

6. Math gives me power — Math makes me powerless

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.22	.30	.36	.08	.04
Sec. Math Ed Maj. (n=11)	.55	.45	.00	.00	.00
H. S. Students (n=13)	.54	.08	.15	.08	.15

7. Math is trial and error — Math is a systematic process

	1	2	3	4	5
Elem. Ed. Majors (n=49)	.04	.18	.45	.24	.08
Sec. Math Ed Maj. (n=11)	.18	.09	.36	.36	.00
H. S. Students (n=13)	.00	.00	.38	.15	.46

8. Math is finite — Math is limitless

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.04	.08	.22	.40	.26
Sec. Math Ed Maj. (n=11)	.00	.00	.09	.36	.55
H. S. Students (n=13)	.08	.00	.23	.08	.62

9. Math is active — Math is passive

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.48	.34	.12	.06	.00
Sec. Math Ed Maj. (n=11)	.73	.27	.00	.00	.00
H. S. Students (n=13)	.69	.08	.23	.00	.00

10. Math is valuable — Math is useless

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.56	.30	.10	.02	.02
Sec. Math Ed Maj. (n=11)	.91	.09	.00	.00	.00
H. S. Students (n=13)	.85	.00	.08	.00	.08

11. Math is versatile — Math is rigid

	1	2	3	4	5
Elem. Ed. Majors (n=49)	.22	.29	.33	.14	.02
Sec. Math Ed Maj. (n=11)	.55	.27	.18	.00	.00
H. S. Students (n=13)	.46	.23	.23	.00	.08

12. Math is torture — Math is fun

	1	2	3	4	5
Elem. Ed. Majors (n=50)	.06	.12	.26	.38	.18
Sec. Math Ed Maj. (n=11)	.00	.00	.27	.55	.18
H. S. Students (n=13)	.23	.08	.23	.31	.15

Appendix C - "What Math Is" Rank Order Results

Figure 1: What Math Is. Elementary Education Majors. n=33

	1	2	3	4	5	totals
an adventure		1			2	3
an art		1			1	2
calculations	1	1		2		4
counting		1		1		2
exercise for the mind	2	4	6	3	2	17
an exploration		1	2	3	2	8
formulas	1	1	4	2	3	11
functions		1	1			2
a game			1		1	2
a history						0
a language	4					4
laws				1		1
logic	4			2		6
measurements		2	1	1		4
numbers	4		1	1	1	7
operations			1	1	2	4
patterns	1	1			1	3
problem-solving	5	3	7	1	2	18
a puzzle		1				1
relations			1	1		2
rules		2				2
a science	2	2			1	5
a tool	1	4	4	1		10
abstract	1			3	1	5
concrete					1	1
empowering				2	3	5
frightening					1	1
frustrating					1	1
fun	2	1				3
gives meaning			1	2	2	5
practical		2	1	1	1	5
rigid						0
torture						0
useless						0
valuable	5	4	2	6	4	21

Figure 2: What Math Is. Secondary Math Education Majors. n=11

	1	2	3	4	5	totals
an adventure	1	1	1		1	4
an art		1			1	2
calculations					1	1
counting						0
exercise for the mind	1	1			2	4
an exploration	1		1	2		4
formulas				1		1
functions						0
a game			1			1
a history			1	1		2
a language		2	1			3
laws						0
logic					2	2
measurements						0
numbers						0
operations						0
patterns				1		1
problem-solving	1	2		1		4
a puzzle			1	2		3
relations						0
rules						0
a science						0
a tool			1		3	4
abstract						0
concrete						0
empowering	2	3		1		6
frightening						0
frustrating	2		1			3
fun						0
gives meaning		1			1	2
practical			1	1		2
rigid						0
torture						0
useless						0
valuable	3		2	1		6

Figure 3: What Math Is. High School Students. n=12

	1	2	3	4	5	totals
an adventure			1		1	2
an art	1					1
calculations	1	1				2
counting						0
exercise for the mind	1	4				5
an exploration					1	1
formulas						0
functions				1		1
a game	1					1
a history						0
a language	1					1
laws		1				1
logic			1			1
measurements			1			1
numbers				1	1	2
operations						0
patterns						0
problem-solving			1		1	2
a puzzle		2	1			3
relations		1				1
rules						0
a science	1					1
a tool		1			2	3
abstract						0
concrete						0
empowering				3		3
frightening	1		1	2		4
frustrating	2	2			2	6
fun			1		3	4
gives meaning				2		2
practical				1		1
rigid						0
torture				1	1	2
useless						0
valuable	3		5	1		9

Appendix D - "What Math Isn't" Rank Order Results

Figure 4: What Math Isn't. Elementary Education Majors. n=33

	1	2	3	4	5	totals
an adventure	1	4	3		2	10
an art	6	1		2	2	11
calculations			1			1
counting	1	1			1	3
exercise for the mind						0
an exploration		2	1	1	1	5
formulas			1			1
functions	1			1	1	3
a game	2		2	1	2	7
a history	1	3		1	2	7
a language	1		1	1		3
laws				1		1
logic				1		1
measurements					1	1
numbers					1	1
operations						0
patterns			1			1
problem-solving						0
a puzzle		1				1
relations				1	1	2
rules					1	1
a science					1	1
a tool						0
abstract						0
concrete		1	1	1		3
empowering		1	2		1	4
frightening	7	6	2	3	1	19
frustrating		3	3	4	1	11
fun			3	2	1	6
gives meaning		1			2	3
practical				1		1
rigid			2	1	6	9
torture	4	5	7	3	1	20
useless	9	4	3	5	2	23
valuable				1		1

Figure 5: What Math Isn't. Secondary Math Education Majors. n=11

	1	2	3	4	5	totals
an adventure			1			1
an art		1		1		2
calculations					1	1
counting				1	2	3
exercise for the mind			1			1
an exploration						0
formulas	1	1				2
functions						0
a game						0
a history						0
a language						0
laws			1	1	1	3
logic						0
measurements		1			1	2
numbers			1			1
operations				2		2
patterns						0
problem-solving						0
a puzzle					1	1
relations						0
rules			2	1		3
a science						0
a tool						0
abstract		1				1
concrete						0
empowering					1	1
frightening		2	3		1	6
frustrating				1	1	2
fun						0
gives meaning						0
practical						0
rigid			1	2	1	4
torture		5	1	1		7
useless	10			1		11
valuable						0

Figure 6: What Math Isn't. High School Students. n=13

	1	2	3	4	5	totals
an adventure	2	1			1	5
an art		1	1		1	3
calculations						0
counting						0
exercise for the mind		1				1
an exploration			2		1	3
formulas						0
functions						0
a game	2	1	1		1	5
a history				2		2
a language						0
laws						0
logic					1	1
measurements						0
numbers				1		1
operations						0
patterns						0
problem-solving						0
a puzzle			1		1	2
relations						0
rules						0
a science		1			1	2
a tool						0
abstract	1		1	1		3
concrete			1	1		2
empowering				2	1	3
frightening		1	1	1	1	4
frustrating			1		1	2
fun		1	1	1	1	4
gives meaning						0
practical		1				1
rigid				1		1
torture	2	2			1	5
useless	6	3	2	1		12
valuable						0
write in: easy			1			1

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Appendix E - Elementary Education Major Demographics

1. Gender:

Male	23%
Female	77%

2. Age Group:

Less than 21	6%
21-23	55%
24-30	27%
31-40	3%
41-50	9 %
Over 50	0%

3. Highest level of high school math taken:

Pre-Algebra	17%
Algebra	17%
Geometry	30%
Algebra II	13%
Pre-Calculus/Math Analysis	20%
Calculus	3%

4. Description of respondent's mathematical abilty:

Excellent	10%
Competent	48%
Average	39%
Weak	3%
Poor	0%

5. Description of respondent's memories of kindergarten through grade eight math lesson experiences:

Very Positive	19%
Somewhat Positive	45%
Neutral	19%
Somewhat Negative	10%
Very Negative	6%

6. Description of respondent's comfort level toward teaching kindergarten through grade eight mathematics:

Very Positive	32%
Somewhat Positive	42%
Neutral	19%
Somewhat Negative	6%
Very Negative	0%

7. Whether respondent's intend to teach mathematics during his/her teaching career:

Yes	94%
No	6%

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