



# The Results of Data Collected from Surveys to Predict the Effectiveness and Analyze the Trends of Undergraduate Research Experience Programs and Virtual Seminars

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## Abstract

The Undergraduate Research Experience in Ocean, Marine, and Polar Science (URE OMPS) program is set up to promote the professional development of undergraduate students through their participation in ocean, marine and polar science research. Each student was assigned to a specific research team, where they worked closely with the assigned faculty. An additional component of the program was the opportunity for students to participate in virtual seminars. These seminars allowed the students to become more familiar with topics such as global warming and ice sheets, and it also allowed students to interact with the nation's most prominent scientists.

The primary focus of the research project was threefold. First, research was conducted on the role of the Institutional Review Board (IRB). During the research of the IRB, mock IRB approval applications were submitted for review. These actions had to be taken before any research could begin.

Second, the focus of the research project was to assess the hypothesized success of both the URE OMPS program and the virtual seminars through a comprehensive data analysis of questionnaire responses using experimental statistics.

Third, the design of experimental questionnaires was explored. Demographic, Likert Scale, open- and closed-ended survey questions were all used for questionnaires that were administered after the virtual seminars. Calculations of the statistical measures were done using the two sample test for observational data using the statistical software packages Excel-StatPlus and Minitab.

## Institutional Review Board

Institutional Review Board (IRB), also known as the Independent Ethics Committee (IEC) or the Ethical Review Board (ERB), is a committee that has been organized to approve, monitor, and review biomedical and behavior research involving humans to protect their rights as research subjects. There are many research projects that can be done with human subjects but some cannot involve children.

This project involved the use of research involving the use of educational tests survey procedures in which the subjects identity stays hidden and brings no harm to the subjects and survey or interview of public research involving the collection or study of existing data and documents, if these sources are publicly available in such a manner that subjects cannot be identified. Before the research could start, there was a twenty-two page document to be filled out. The packet asked question so the IRB will know exactly what is being tested, how many test subjects, and if the subjects' identities will remain anonymous. If the subjects were to remain anonymous then there was a procedure to tell why they are remaining anonymous.

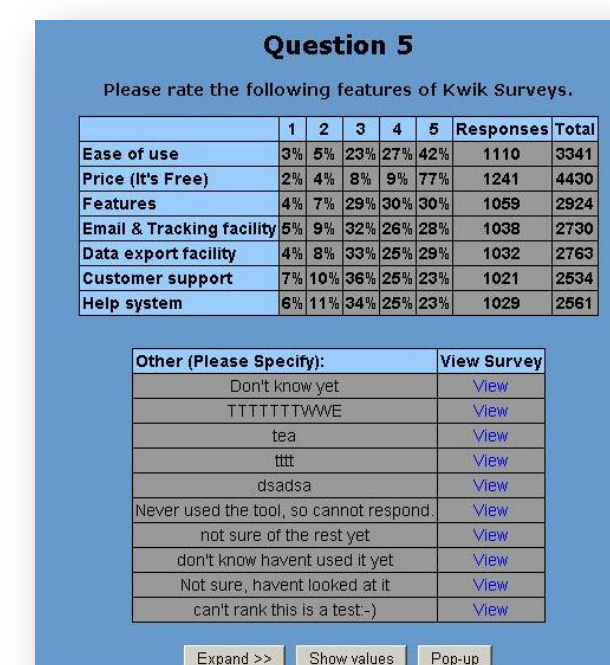
## Methodology

Kwik Surveys

- o Questionnaire builder
- o Storage device
- o Founded during January 2008
- o Attracted many clients internationally
- o (Disney, MySQL magazine, and Pepsi)
- o Free of charge
- o Advantages (email facility)
- o Disadvantages (User must log into their account at least once every 18 months)

URE OMPS Surveys used were made by staff of the program and contained:

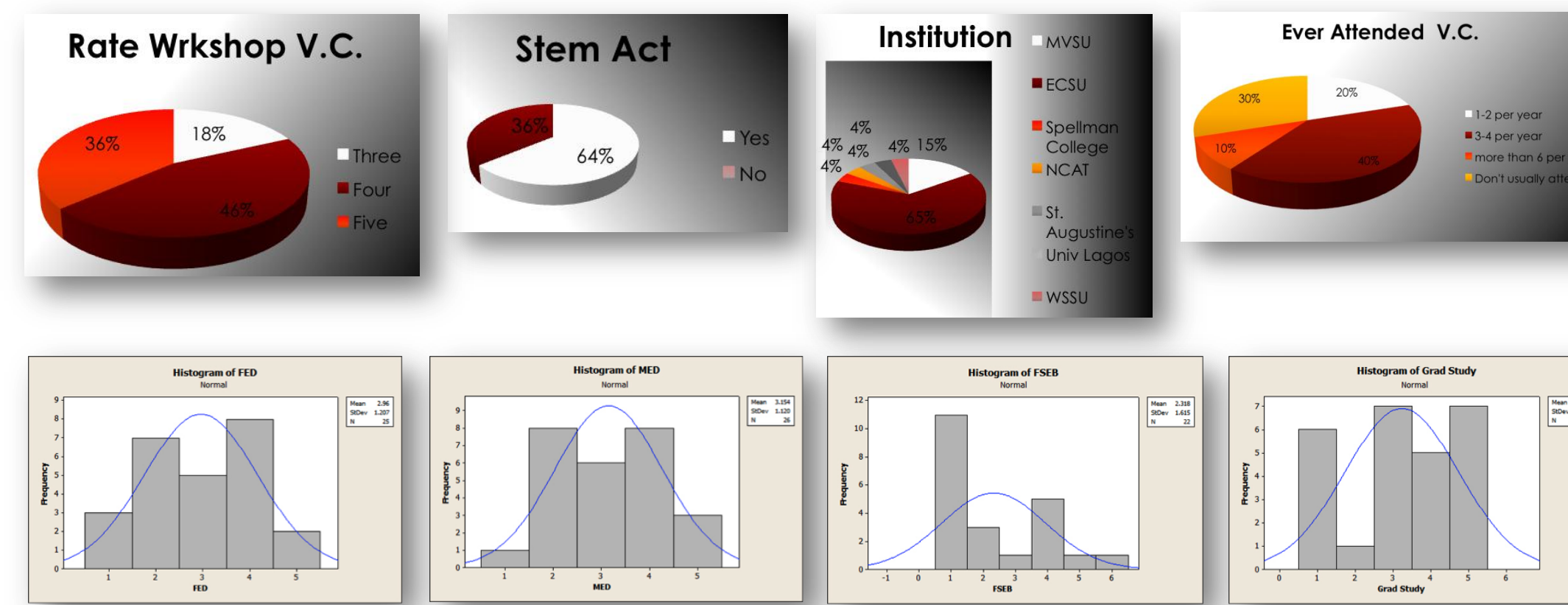
- o Identifiable Questions
- o Likert-Scale Questions
- o Demographical Questions
- o Open-and-Closed Ended Questions



## Data

Example of Data Collected

ID Number	Year	Institution	Mentors	Gender	Race	Age	FSEB	Involvement	FED	MED	STEM ACT	URP	Con. w/ Faculty	Mean	UR Comp.	Years Left	Grad Study	Further Ed.
1	2008	ECSU	Jeff Hood	Female	African Amer.	19	4	NO	1	3	NO	NO	NO	Mathematics	1	3	1	3
2	2008	ECSU	Jeff Hood	Male	African Amer.	19	4	YES	1	3	YES	YES	NO	Mathematics	1	3	5	5
3	2008	ECSU	Jichun Yuan	Female	African Amer.	19	1	NO	2	3	NO	YES	NO	Sec. Educatio	1	3	3	4
4	2008	MVSU	Jeff Hood	Male	African Amer.	20	4	NO	2	4	YES	YES	NO	Mathematics	2	3	3	4
5	2008	MVSU	Jeff Hood	Male	African Amer.	19	4	NO	3	5	NO	NO	NO	N/A	1	4	2	4
6	2008	MVSU	Nagora LaMonte	Female	African Amer.	20	1	YES	2	2	NO	NO	NO	Mathematics	2	2	3	5
7	2008	ECSU	Ernie Wilson	Male	African Amer.	N/A	1	NO	3	3	NO	NO	NO	Mathematics	1	3	5	5
8	2008	MVSU	Nagora LaMonte	Female	African Amer.	20	1	NO	3	2	NO	YES	N/A	N/A	2	2	5	5
9	2008	Spelman College	Jichun Yuan, Dr. Andrea Lawrence	Female	African Amer.	19	6	NO	3	1	NO	YES	N/A	N/A	1	4	5	5
10	2008	NCAT	Jichun Yuan	Male	African Amer.	20	1	YES	4	2	NO	YES	N/A	N/A	1	3	1	3
11	2008	St. Augustine's	Jichun Yuan	Male	African Amer.	20	4	NO	4	2	YES	YES	N/A	N/A	2	2	4	4
12	2008	St. Augustine's	Jichun Yuan	Male	African Amer.	20	4	NO	4	2	YES	YES	N/A	N/A	1	3	1	3
13	2008	UVA-Lynch	Peter Waddell	Male	African Amer.	23	1	NO	4	2	YES	YES	N/A	Digital Cartography	4	3	4	5
14	2008	ECSU	Nagora LaMonte	Female	African Amer.	19	1	YES	5	2	YES	YES	N/A	Computer Applications	1	3	5	5
14	2008	MVSU	W. Wilson, Dr. Cardwell	Male	African Amer.	21	1	NO	5	2	YES	YES	N/A	N/A	3	1	3	4



## Formulas/Calculations

The central tendency of a distribution is an estimate of the "center" of a distribution of values. The Mean or average is probably the most commonly used method of describing central tendency. To compute the mean add up all the values and divide by the number of values. The Median is the value found at the exact middle of the set of values. One way to compute the median is to list all scores in numerical order, and then locate the value in the center of the sample. The Mode is the most frequently occurring value in the set of scores. In some distributions there is more than one modal value. For instance, in a bimodal distribution there are two values that occur most frequently. If the distribution is truly normal (i.e., bell-shaped), the mean, median and mode are all equal to each other.

$$\bar{x} = \frac{\sum (x - \bar{x})^2}{(n-1)}$$

$\bar{x}$  = each score  
 $\bar{x}$  = the mean or average  
 $n$  = the number of values  
 $\Sigma$  means we sum across the values

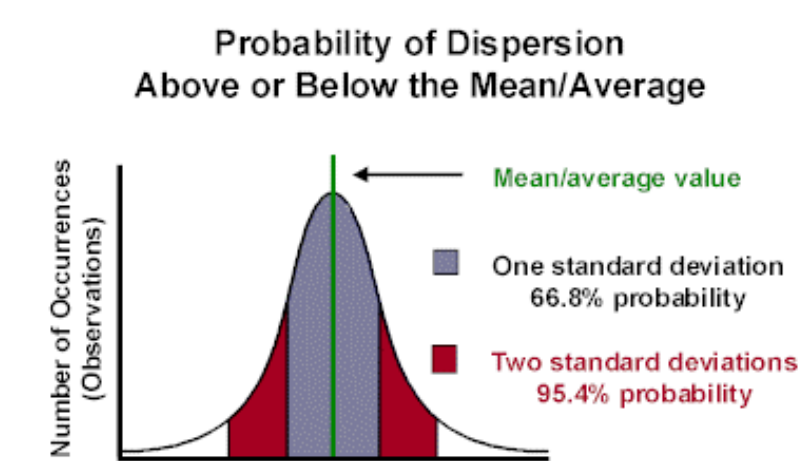
There are two common measures of dispersion, the range and the standard deviation. The range is simply the highest value minus the lowest value.

The Standard Deviation is a more accurate and detailed estimate of dispersion because an outlier can greatly exaggerate the range. The Standard Deviation shows the relation that set of scores has to the mean of the sample.

Sample variance is a measure of the spread of or dispersion within a set of sample data.

The sample variance is the sum of the squared deviations from their average divided by one less than the number of observations in the data set.

$$s^2 = \frac{1}{n-1} \sum (x_i - \bar{x})^2$$



## Results

FED Hypothesis Test

Comparing Means [ t-test assuming unequal variances (heteroscedastic) ]

Descriptive Statistics	VAR	Sample size	Mean	Variance
		14	3.07	1.4884
		11	2.82	1.2321

Summary	Degrees Of Freedom	Hypothesized Mean Difference	Test Statistics
	22	0.E+0	0.53504 Pooled Variance

Two-tailed distribution	p-level	t Critical Value (5%)
	0.59799	2.07387

MED Hypothesis Test

Comparing Means [ t-test assuming unequal variances (heteroscedastic) ]

Descriptive Statistics	VAR	Sample size	Mean	Variance
		14	2.93	1.0609
		12	3.42	1.2321

Summary	Degrees Of Freedom	Hypothesized Mean Difference	Test Statistics
	23	0.E+0	1.15993 Pooled Variance

Two-tailed distribution	p-level	t Critical Value (5%)
	0.25798	2.06886

FSEB Hypothesis Test

Comparing Means [ t-test assuming unequal variances (heteroscedastic) ]

Descriptive Statistics	VAR	Sample size	Mean	Variance
		14	2.43	2.9584
		8	2.13	1.6129

Summary	Degrees Of Freedom	Hypothesized Mean Difference	Test Statistics
	18	0.E+0	0.46686 Pooled Variance

Two-tailed distribution	p-level	t Critical Value (5%)
	0.6462	2.10092

GRAD Hypothesis Test

Comparing Means [ t-test assuming equal variances (homoscedastic) ]

Descriptive Statistics	VAR	Sample size	Mean	Variance
		14	3.21	2.1609
		12	3.25	2.1904

Summary	Degrees Of Freedom	Hypothesized Mean Difference	Test Statistics
	24	0.E+0	0.06895 Pooled Variance

Two-tailed distribution	p-level	t Critical Value (5%)
	0.9456	2.0639

## References

1. R. Larson and B. Farber, Elementary Statistics: Picturing the World, 4th Edition. Upper Saddle River: Prentice Hall, 2009.
2. StatPlus:mac homepage. AnalystSoft. <http://www.analystsoft.com/en/products/statplussmac/>. Retrieved July 2010.
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## Discussion

Improvements

Not enough data from the surveys that were collected to make any solid results that show more of a trend in the data.

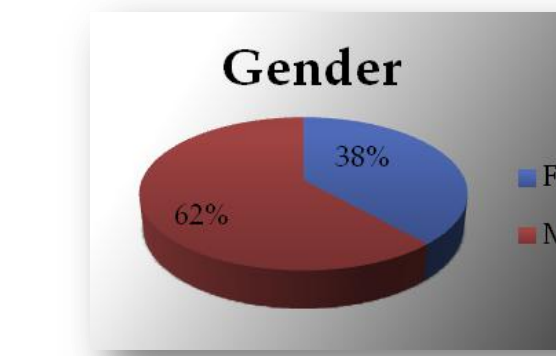
Not much to be done with the virtual conference because it was only a limited supply of people that participated in taking the survey in there was not enough data to compare and reveal how effective the virtual conference was.

In the histogram graphs, there were not enough normally distributed graphs to receive the best results, however the results were still reliable.

	Total %	# Males	%	# Females
MVSU	44.4	3	60	25
ECSU	55.6	2	40	75

Do Mississippi Valley State University and Elizabeth City State University affect the ratio of women to men in this program?

Inferred, because a majority of the students in the program were from the two schools.



Is there a preference of having more males in the program over females?

Inferred based on the opinion of the Secretary of Education, who thinks that are not enough male teachers.

## Future Work

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- Include surveys from previous years to increase sample size.
- Consistent numbering of positive and negative responses. Ex: is "1" great or not great.
- Redesign "Family Socio-Economic Background" to be more compatible with student choices.
- Clarify questions such as asking for a minor, but not a major.
- Design surveys so that entered data will be accessible from the web.

