

Student Assessment: Perception of Knowledge and Scientific Decision-making Skills

The second assessment measurement had students rate their perceptions of their own knowledge and scientific decision-making skills. The instrument was completed in a pre/post test manner by 100 and 79 students, respectively in Fall 2001 in Interdisciplinary Science I (the course utilizing the ESA21 exercises), and was also completed by 169 students in Interdisciplinary Science II at the beginning of the same semester. All of the students in Interdisciplinary Science II had utilized the old laboratory program, allowing us to again compare the ESA21 and conventional exercises. The survey included open-ended and Likert-scale questions, and had six questions regarding content knowledge of basic science, nine questions about content knowledge of environmental issues, five questions about scientific skills, and three open-ended questions about how they view environmental issues. There were noticeable differences in the SCI 1101 pre and post survey results for all of the content and skills questions, with trends towards increased levels of content understanding or awareness of environmental issues in the post-survey. This indicated that the students felt the ESA21 exercises helped to improve their knowledge of the scientific process, basic principles in environmental science, and environmental issues. When the post-survey results (ESA21) were compared to the Interdisciplinary Science II students (old exercises), many of the same trends appeared as in the comparisons of the pre and post-surveys. Students completing the post-survey (ESA21) generally reported higher levels of agreement with statements about increased knowledge and environmental awareness, indicating the ESA21 exercises may have been more successful at improving student perceptions of knowledge than the conventional exercises, perhaps due to the close tie-in with the lecture material and greater relevance to daily life.

Question	Response	Pre 1101 (101)	Post 1101 (79)	Pre 1102 (169)
How well do you understand: How scientific knowledge can help us solve societal problems	Not a lot	26%	8%	8%
	Somewhat	48%	30%	51%
	A lot	27%	62%	40%
How to represent data and how to get information from them	Not a lot	12%	4%	6%
	Somewhat	38%	29%	27%
	A lot	50%	67%	67%
How to evaluate an experiment	Not a lot	32%	4%	8%
	Somewhat	48%	32%	48%
	A lot	21%	65%	43%
How to evaluate a scientific claim	Not a lot	39%	6%	14%
	Somewhat	49%	37%	51%
	A lot	12%	57%	35%
How to decide if media coverage of a scientific issue is complete	Not a lot	44%	13%	17%
	Somewhat	41%	34%	49%
	A lot	16%	53%	35%
The relationship between science and truth	Not a lot	26%	5%	11%
	Somewhat	48%	24%	35%
	A lot	26%	71%	54%
The structure of atoms and molecules	Not a lot	60%	12%	45%
	Somewhat	29%	27%	33%
	A lot	11%	62%	22%
How energy flows through an ecosystem	Not a lot	68%	9%	32%
	Somewhat	22%	29%	36%
	A lot	9%	62%	21%

Question	Response	Pre 1101 (101)	Post 1101 (79)	Pre 1102 (169)
How an element moves through an ecosystem	Not a lot	74%	12%	43%
	Somewhat	22%	38%	36%
	A lot	9%	51%	21%
What an ecosystem is	Not a lot	51%	5%	15%
	Somewhat	36%	16%	36%
	A lot	13%	78%	50%
Factors that affect the population size of a species	Not a lot	38%	1%	12%
	Somewhat	42%	22%	36%
	A lot	21%	77%	50%
The concept of natural selection	Not a lot	38%	8%	20%
	Somewhat	39%	27%	34%
	A lot	23%	66%	46%
The causes of global warming	Not a lot	39%	5%	19%
	Somewhat	46%	21%	37%
	A lot	16%	68%	44%
The problem with ozone	Not a lot	33%	5%	21%
	Somewhat	46%	29%	40%
	A lot	21%	66%	40%
The causes of another environmental problem	Not a lot	41%	2%	20%
	Somewhat	38%	20%	32%
	A lot	21%	78%	48%
I am able to: Pose questions that can be addressed by a scientific method	Disagree	17%	4%	10%
	No opinion	34%	14%	28%
	Agree	48%	82%	63%
Search for scientific data relevant to an environmental issue	Disagree	8%	5%	5%
	No opinion	17%	8%	11%
	Agree	75%	87%	84%
Evaluate the source of scientific data	Disagree	9%	8%	6%
	No opinion	28%	14%	23%
	Agree	63%	78%	71%
Collect and use statistical data to develop an argument around an environmental issue	Disagree	14%	8%	4%
	No opinion	22%	13%	17%
	Agree	63%	80%	79%
Make informed choices on public policy issues dealing with environmental issues	Disagree	11%	5%	4%
	No opinion	25%	11%	24%
	Agree	64%	84%	73%
Are environmental problems of concern to you?	Yes	87%	89%	85%
	No	13%	11%	15%
Are you doing anything to alleviate environmental problems? If so, what?	Yes	42%	44%	49%
	Recycle	24%	19%	19%
	No	35%	37%	32%
Briefly describe an example of the use of science in solving a societal issue	Acceptable	40%	34%	40%
	Not acc.	31%	16%	10%
	No answer	30%	49%	50%