THE INFLUENCE OF KNOWLEDGE ON YOUNG PEOPLE'S PERCEPTIONS ABOUT WILDLIFE

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Abstract: Knowledge and attitudes are major components of environmental perception and are important influences on each other. Knowledge about ecological concepts, wildlife, and endangered and threatened species was measured, using 1,300 8th-graders in Broward County, Florida, as the sample group. Knowledge scores were associated with attitudes, non-consumptive attitude orientations, involvement in animal activities, and other variables. Knowledge plays a relatvely minor role in predicting attitudes. Knowledge was significantly related to 16 to 25 attitude items, but the associations were weak, indicating that other factors may be more important determinants of attitude. Non-consumptive users of wildlife greatly outnumbered consumptive users and were more knowledgeable. Sex, race and parental education were the most important demographic predictors of knowledge. Urban and rural differences appear to be significant, but this finding is tentative due to the small number of rural residents in the population. Parental association with an animal or wildlife-oriented organizations was not significantly related to knowledge. Participation in animal-related activities showed the highest association with knowledge of any of the variables examined. Level of participation was associated with 18 of 25 attitude items, but the correlations were weak. Knowledge was not associated with the frequency of consumptive activities like hunting and fishing but was associated with hiking, reading about wildlife, and having pets.

Proc. Ann. Conf. S.E. Assoc. Fish & Wildl. Agencies 35:661-668

To produce an effective public environmental education program, it is necessary to know the educational needs of the various target populations. Little effort has been spent in identifying these needs, and less effort has been spent in evaluating the program effects. Most wildlife programs are designed to increase knowledge as a means of increasing personal awareness and commitment to wildlife preservation. While the goal of increasing knowledge is an admirable one, there is conflicting research about the interrelationships of knowledge, attitudes and commitment (Malone and Ward 1973, Iverson 1975, Dispoto 1977).

Literature about the role of knowledge and the attitude-belief-behavior-perception complex is conflicting, apparently because some researchers equate knowledge with formal education and also because of the bewildering array of tests used to measure environmental knowledge and attitudes. Perhaps the greatest confusion lies within the vague concept of environmental perception, a concept dependent on both environmental and individual phychological variables such as beliefs, attitudes, knowledge and personality factors. The relative importance of each of these factors is subject to considerable debate, and many of the terms are used interchangeably in the literature. LaHart and Barnes (1979) have summarized this extensive literature and developed the functional model of environmental perception shown in Fig. 1. This research focused on the relationship between the cognitive system and the affective system.

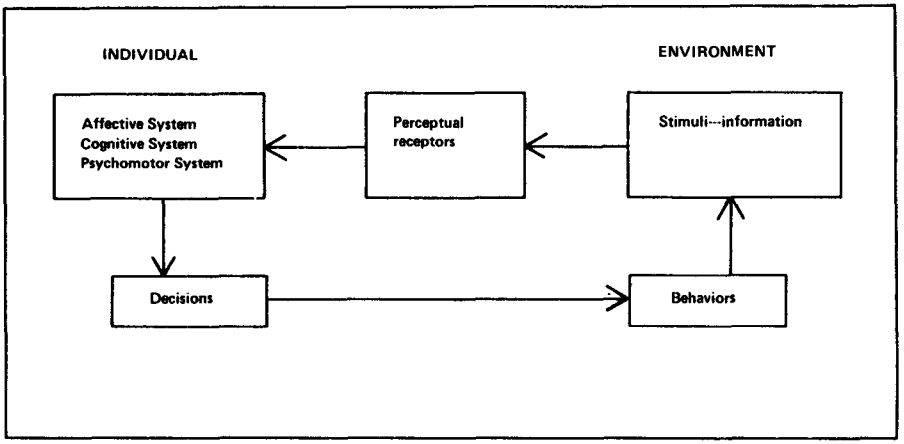

Fig. 1. A conceptual scheme for research into environmental perception (LaHart and Barnes 1979).

This study was partially funded by a grant to Florida State University from the National Wildlife Federation, the U.S. Fish and Wildlife Service and the Florida Game and Fresh Water Fish Commission.

METHODS

This study used a teacher-administered questionnaire designed to: (1) measure knowledge, animal-related activities, and attitudes as components of environmental perception, and (2) examine demographic variables as possible influences on perceptions.

The knowledge portion of the questionnaire, developed with cooperating science and social studies teachers familiar with the environmental concepts in the curricula of middle school students, was divided into 3 components. The *ecological component* was modified from Pomerantz (1977), reworded, and designed to use examples of Florida's unique environmental system. The *animals component* included key questions from Kellert (1976). Demographic items and the frequency of involvement in animal-related activities were used to obtain data on the possible influences of these variables on perception. Consumptive and non-consumptive orientations were obtained from the animal-related activity data.

The draft questionnaire was examined by consultants involved in the Florida-wide 8th-grade assessment program, including persons working with attitude measurement and a reading specialist employed by the study site's school system. Recommended changes were incorporated into the questionnaire, which was field tested on 30 8th-grade students in Leon County, Florida. Copies of the questionnaire are available from the author.

Broward County was selected as the study site because of the large number of 8th-graders available and the assurance of cooperation from the school system. This southeastern Florida county, where the city of Fort Lauderdale is situated, had a population of 902,500 early in 1978 and is growing at an annual rate of 7%.

It has 25 public middle schools (grades 6, 7 and 8). Data were collected during the week of 6 March 1978, by 15 cooperating teachers in 7 middle schools distributed throughout the study area. Data analysis was done at the Florida State University's Computer Center, using the Statistical Package for the social Studies Program, Version 7. Chi-square (X^2) is a test of assoication, and C is an index of the degree of association and is a function of chi-square. The sample in this study was 1,315, sufficiently large to select an alpha of 0.05, a power of 0.995, and an effect size of 0.25 of the standard deviation (Cohen 1969) for all chi-square tests.

A small probability (0.05 or less) indicates that variables are not independent, and a number of significant associations were discovered among the 25 attitude questions.

The Pearson Product moment correlation examined the linear relationship between knowledge and attitudes. The analysis produced Pearsonian r values similar to the contingency coefficient C, indicating there were no strong linear relationships between level of knowledge, level of involvement in animal activities, and attitudes.

Factor analysis statistically combines similar variables and was used to examine attitude groupings in the 3 knowledge categories. Since factors loaded at weights higher than 0.5, factor analysis could provide little information about the structure of the high, medium and low-knowledge groups.

Discriminant analysis weighs and combines variables, thus they are forced to be as distinct as possible. This technique did not indicate that any of the attitudes were effective discriminators among knowledge levels.

Multiple regression analysis is a special case of discriminant analysis that indicates the degree of linear relationship between 1 dependent and a set of independent variables. A step-wise multiple regression analysis failed to provide any evidence that variance in knowledge could be predicted by any attitude or combination of attitudes or by the animal activity score.

RESULTS AND DISCUSSION

The scores on the 3 components of the knowledge test were not different enough to warrant separate analysis. They were all low, with the students correctly answering 49% of the ecology questions, 41% of the animal questions, and 47% of the endangered and threatened species questions. Knowledge of ecology, animals, and endangered and threatened species was combined into a total knowledge score with a mean of 22.7 (46%) and a standard deviation of 6.7. The highest possible score was 49, and the range was from 1 to 42. The *total knowledge scores* and frequency of involvement in *animal-related activities* were divided into 3 groups — high, medium and low — each representing about ⅓ of the sample.

Knowledge level was significantly associated with 15 attitude items; animal activities were associated with 18 items; non-consumptive orientations were associated with 21 items; but consumptive orientations were associated with only 15 items. Table 1 summarizes the C values and chi-square probabilities for level of knowledge and level of involvement in animal activities. These data indicate there is not a strong relationship between attitude items and level of knowledge or level of animal activities. Only 8 of the 25 items were associated with level of knowledge ($C = 0.20$), and only 5 attitudes were associated with animal activities at that level. The highest coefficient was $C = 0.30$.

Table 1. Attitude items with chi-square probabilities[a] and contingency coefficients for level of knowledge and level of animal activities.

Attitude Item	Knowledge		Activity	
	P	*C*	*P*	*C*
More interested in pets	0.000	0.18	0.000	0.26
Wildlife in better health	0.626	0.05	0.044	0.09
Interested in learning more	0.000	0.23	0.000	0.29
Most wildlife dangerous	0.000	0.28	0.000	0.18
Like to live near wildlife	0.000	0.28	0.000	0.30
Wrong to kill wildlife just to display it	0.580	0.05	0.328	0.07
Thoughts and feelings of animals and humans different	0.000	0.12	0.068	0.09
Don't like animals close	0.000	0.20	0.000	0.24
Instinct regulates animals	0.065	0.09	0.642	0.05
Stop hunting seals	0.000	0.14	0.000	0.14
Protect endangered species	0.000	0.21	0.000	0.17
O.K. to kill for medical needs	0.131	0.08	0.570	0.06
Do not protect farm predators	0.000	0.16	0.000	0.18
Eliminate animals that eat food crops	0.325	0.07	0.209	0.08
Eliminate unnatural zoos	0.000	0.15	0.023	0.10
Animals exist for people	0.000	0.14	0.023	0.10
Common animals are important	0.011	0.11	0.002	0.12
Give up eating meat if I had to kill it myself	0.007	0.11	0.326	0.07
Leave endangered species alone	0.227	0.07	0.165	0.08
O.K. to let small animals be extinct	0.000	0.26	0.000	0.17
Do not protect hawks and weasels	0.000	0.29	0.000	0.20
Flies and mosquitoes are important to nature's balance	0.000	0.26	0.000	0.17
Wild animals fall in love	0.679	0.05	0.018	0.10
Animals feel pain	0.000	0.21	0.004	0.12
Animals think about actions	0.020	0.10	0.009	0.11

[a] $P > 0.05$ is usually not considered significant.

There are some interesting attitudes that were not associated with knowledge levels. For example, there were no differences ($X^2 = 4.37$, df = 6, $P = 0.627$) among knowledge levels and how participants felt about the relative health of wild animals compared to pet animals.

Knowledge was not significant ($X^2 = 3.98$, df = 6, $P = 0.680$) in determining how a person would respond when asked if wild animals fall in love. This may indicate that anthropomorphic attitudes and, perhaps, personification of animals are prevalent in young people despite their knowledge about wildlife. Protecting endangered species was perceived as important by 91% of the population and had

a relatively high association ($X^2 = 60.80$, df = 6, $P = 0.000$) with knowledge ($C = 0.21$), but attitudes toward managing endangered species were not associated with level of knowledge ($X^2 = 8.15$, df = 6, $P = .227$, and $C = 0.07$). This may indicate that while young people want to preserve endangered species, they apparently view no management as the best management.

Knowledge was significant in predicting how people related to wildlife. Only 29% of the low-knowledge group *strongly disagreed* with the statement: "Animals exist mainly for the benefit of people," but 41% of the high-knowledge group *strongly disagreed.* There were significant differences between the attitudes of high- and low-knowledge groups toward lower forms of animal life. The more knowledgeable people *strongly agreed* (low = 24%, high = 44%) that even flies and mosquitoes are important. They also were shown to be more tolerant of predators than was the low-knowledge group (low = 24%, high = 40%). In fact, attitudes about protecting hawks and weasels revealed the strongest relationship with knowledge of any of the items examined ($C = 0.29$).

The chi-square probabilities and contingency coefficients for animal activities (Table 1) closely parallel those for knowledge. Only 4 questions are different when the chi-square probabilities are compared, and in each case the contingency coefficient is very low for both knowledge level and level of involvement in animal activities.

Knowledge and Activities

Table 2 compares knowledge levels and levels of involvement in animal activities. The association between knowledge and animal activities was significant ($X^2 = 84.81$, df = 4, $P = 0.000$); the contingency coefficient was 0.25.

Table 2. Percentage of responses by knowledge level and level of animal activities ($N = 1{,}311$).

	Level of involvement in animal activities			
	% of Total	Low	Medium	High
Knowledge Level				
Low	36	47	30	24
Medium	30	34	36	30
High	34	26	25	49
Level of Involvement in Animal Activities				
Low	36	47	36	25
Medium	30	29	36	26
High	34	25	28	49

The Pearsonian correlation for these data was $r = 0.23$, indicating that some linear relationship exists between the knowledge scores and the frequency of involvement with animal activities. The interrelationship between these variables cannot be overemphasized when designing programs to increase knowledge. Of the 36% of the students who scored in the low-knowledge group, only 25% were highly involved with animals, and 47% indicated a low frequency of involvement. This contrasts with the 34% of the study population assigned to the high-knowledge

group, of whom 49% were highly involved with animals, and only 26% indicated a low frequency of involvement. Frequency of involvement with animals shows similar associations with knowledge. Of the 36% of the population that indicated a low frequency of involvement with animals, only 26% scored in the high-knowledge group. Of the 34% in the high-involvement category, 49% scored in the high-knowledge group.

Demographic Variables and Knowledge

Age and knowledge of the study participants were not significantly associated ($X^2 = 15.26$, df = 8, $P = 0.060$.). Almost 91% of the participants were between the ages of 13 and 15 years, and all were in the 8th grade.

Sex and knowledge were significantly associated ($X^2 = 68.98$, df = 2, $P = 0.000$). Forty-six percent of the males and 24% of the females fell in the high-knowledge category, while only 25% of the males and 40% of the females were in the low-knowledge group.

Race and knowledge were also significantly associated ($X^2 = 67.34$, df = 8, $P = 0.000$), the largest difference being between blacks and whites. Whites made up 79% of the tested population, and 39% scored in the high-knowledge group. Blacks represented 17% of the test population, but only 17% scored in the high-knowledge category. Differences in the low-knowledge level were even more pronounced, with 29% of the whites and 54% of the blacks assigned to this grouping. Spaniards, American Indians and Orientals made up the remaining 4%, not enough for meaningful analysis.

Knowledge and education of the young people's parents were significantly related (father's education: $X^2 = 33.85$; mother's education: $X^2 = 46.32$, df = 8, $P = 0.000$). Forty-two percent of the children of college graduates were in the high-knowledge group; 33% of the children of high school graduates were in the high-knowledge group; and 29% of the children of non-high school graduates were in the high-knowledge group.

The low-knowledge level contained 28% of the children of college graduates, 30% of the children of high school graduates, and 33% of the children whose parents did not complete high school. Participation in animal-related activities was not related to parental education (father's education: $X^2 = 9.04$, df = 8, $P = 0.338$; mother's education: $X^2 = 2.75$, df = 8, $P = 0.979$).

Persons with consumptive and non-consumptive orientations toward wildlife were both studied. Results indicate that consumptive and non-consumptive orientations are well developed by the time young people reach 8th grade. Although knowledge appears to have some association with resource orientation, knowledge alone is not a particularly important variable. The frequency of animal activities is more highly associated with consumptive and non-consumptive resource activities than is knowledge. LaHart and Barnes (1978) document this aspect of the study.

CONCLUSIONS

This study examined knowledge about ecology, animals, and endangered and threatened species and its relationship to certain variables. A specific population was examined — 8th-grade students in an urban south Florida county. The findings reflect this particular population, and generalization of other school districts should be done with caution. Because the population was homogeneous for age and grade level, it is important that these data not be used to characterize older and younger students.

Knowledge and attitudes are related components of environmental perception but apparently have little influence on each other. Knowledge level was significant in 16 of 25 attitude variables, but the index of association never exceeded $C = 0.30$.

Knowledge appears to be more closely associated with such activities as hiking to look for wildlife and watching TV wildlife programs than with participating in consumptive activities such as hunting and fishing.

Attitude orientations toward consumptive and non-consumptive uses of wildlife appear to be well developed by the time young people reach 8th grade; non-consumptive users greatly outnumber consumptive users and are more knowledgeable.

Participation in animal-related activities showed the highest association ($C = 0.25$) with knowledge of any of the variables examined. Level of participation in animal-related activities was associated with 18 of 25 attitude variables, but the strength of the associations never exceeded $C = 0.30$.

Some demographic factors were significantly associated with level of knowledge. Sex, race and parental education were all significantly associated with knowledge, supporting Kellert's (1976) conclusion that sex, race and education are significant predictors of knowledge level.

Urban-rural-suburban differences were significantly associated ($X^2 = 11.07$, df $= 4$, $P = 0.026$), but the number of rural participants in this study was low ($N = 49$).

Educational Implications

Data from this study demonstrate a relationship between knowledge and attitudes but indicate that programs designed to increase knowledge about wildlife and endangered species should include abundant examples of humans having positive interactions with animals (managing habitats, protecting specific species). Activities with animals appear to have more influence on attitudes than knowledge about animals. Animal activities influence attitudes as much as knowledge does, confirming the need for such animal-oriented activities as camping, bird watching and hiking as a means of educating young people.

Differences in level of knowledge and attitudes toward wildlife and endangered and threatened species were partially obscured by other factors, including demographic variables. It may be necessary to design programs aimed at specific targets (Blacks, women) to maximize effectiveness. This is equally true for resource management agencies and the formal education sector.

Attitudes toward consumptive and non-consumptive uses of wildlife appear to be well formed by the time young people reach the 8th grade, implying that programs designed to increase tolerance toward consumptive uses of wildlife should probably be directed at younger children. While attitudes toward hunting were not an important part of this study, understanding hunting as a management tool is critical to an overall understanding of wildlife management. This study found that young people with consumptive attitudes were less knowledgeable than those with non-consumptive attitudes. Although there is some evidence (Kellert 1976) indicating that this difference is reduced in adult populations, there appears to be a specific need for educational programs aimed at young hunters and fishermen.

Systematic treatments, such as field trips, designed to influence both cognitive and affective systems, appear to be effective producers of knowledge.

The literature and this research identified associations among such variables as knowledge, environmental attitudes, and participation in animal activities. The associations were statistically significant but tended to be weak, indicating an abundance of linkages with other variables. Environmental educators concerned with perceptions about wildlife and endangered species should design experiences that include a diversity of activities that emphasize contact with animals and involvement in animal-related activities as a means of increasing knowledge and influencing attitudes.

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