

## An Evaluation of the Studies on Environmental Attitude and Knowledge

### Çevre Tutum ve Bilgisini Araştıran Çalışmaların Değerlendirilmesi

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#### Abstract

The aim of this paper is to reevaluate the previously prepared environmental attitude and knowledge scales and to fill the gaps in the area of environmental education that has resulted from the dissemination and interpretation of findings. This study consists of four sections. These are different interpretations of environmentalism, theoretical frameworks and interpretations of findings, pathways of test development, and research methodologies.

*Key Words:* Environmental attitude scale, environment and theory, environmental knowledge, research methodology.

#### Öz

Bu çalışmanın amacı, çevre tutum ve bilgisini ölçmek için daha önce hazırlanan ölçeklerin yeniden değerlendirilmesi ve araştırma sonuçlarının çevre eğitimi alanındaki sunumundan kaynaklanan boşlukları gidermektir. Dört alt başlıktan oluşan çalışma sırası ile çevreciliğin farklı yorumlarına, araştırma teorilerine ve sonuçlarının yorumlanmasına, ölçek geliştirirken izlenmesi gereken yollara ve araştırma metodlarına ilişkin eleştirel bakış açısı getirmektedir.

*Anahtar Sözcükler:* Çevre Tutumu Ölçeği, çevre ve teori, çevre bilgisi, araştırma metodu.

#### Introduction

The purpose of the present paper is to re-evaluate environmental attitude (EA) and knowledge scales (EK) and shed light on possible drawbacks throughout their development processes. In particular, this paper aims at presenting: a) alternative conceptions of EA and EK scales, b) an interpretation of EA studies based on a theoretical framework/s, c) the development process of EA and EK scales which should fit contemporary science education perspectives according to guided standards, and d) controversies in research methodologies.

One of the most recent and important criticisms was written by Zelezny (1999) and appeared in the Journal of Environmental Education. As she pointed out, the quality of environmental education (EE) studies is sometimes debatable.

This paper attempts to draw clear conclusions regarding drawbacks related to EA and EK studies and pave a concrete path both for environmental (science) educators and researchers and for EA and EK projects. Thus, as a first step, select problems will be highlighted in relation to the following aspects of these studies:

1) The perception of environmentalism: Inconsistent characteristics of environmentalism (Arcury and Christianson, 1993); 2) Theoretical framework and interpretations (Kim, 1999; Abramson and Inglehart, 1995); 3) Development of attitude and knowledge scales (Nickerson, 2003); and, 4) Research methodology (Hungerford et al., 1980; Schwandt, 1994).

#### Inconsistent Characteristics of Environmentalism

There is no consistent variable explaining and interpreting the origins of EAs (Arcury and Christianson, 1993). The factors that might affect EAs of people can vary depending on a number of influences.

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For instance, according to Easterlin and Crimmins (1991), personal expectation is one of the most influential determinants for EAs. Another study conducted in Australia shows that high school students believe that "money will always win out over the environment" (Connell et al., 1999). This outcome is interesting because even though Australia is a developing country combating economic problems, the new generation is mostly pessimistic regarding environmental issues. The aforementioned perspective expressed by high school students in Australia can also be found in Gigliotti's (1993) research, conducted in the U.S.

Krugman (1992) stresses that the income gap between the poor and the rich is another factor that shapes EAs. Other researchers such as Mohai and Bryant (1998), Kim (1999), Uyeki and Holland (2000), also use different independent variables to elucidate the factors that are influential. According to Mohai and Bryant (1998), a person's socioeconomic level is one of them. Another outcome of Mohai's and Bryant's research (1998) is that there is no statistically significant effect of race on the awareness of global environmental problems. Contrary to popular belief, however, the research, nevertheless, shows that African-Americans are more concerned about their neighbourhoods' problems than the Whites are. Uyeki and Holland (2000) used similar variables such as age, income, race, and gender to determine what factors can affect pro-environmental, pro-animal, and less-growth attitudes of people. The findings show that people with lower incomes and less education are more pro-environment and pro-animal. Another study conducted in South Korea addresses the influences of traditional values on EAs. According to Kim (1999), the EAs of South Korean urban residents are the result of traditional national values. Other researchers stress the importance of particular geographic regions on EAs of people (Rohrschneider, 1988; Blake, 2001).

Different variables have been used to explore individual's environmental attitudes. Although these studies have helped to demonstrate the relationships between different variables and environmental attitudes, there have not been concrete explanatory variables that could uncover the whole or part of the puzzle because of the complexity of human behaviour. Optimistically,

some theories, such as the Post-materialist Approach (Abramson and Inglehart, 1995) and the New Environmental Paradigm (Dunlap and Van Liere, 1978) have given researchers an opportunity for almost 25 years to outline a concrete framework for EAs and their foundations.

The inconsistent characteristics of EAs should be taken into account more than ever in order to enhance the quality of studies in the area of EE. To do that different independent variables should be employed, and the sociological and psychological aspects of EAs in the same area should be reconsidered in explaining the foundation of EAs.

#### Theoretical Framework and Interpretation of Data

One of the most important requirements of social studies is an unbiased interpretation depending on concrete theoretical frameworks. Unfortunately, a logically acceptable theoretical framework for EAs has not been produced yet, with some exceptions, such as Abramson's and Inglehart's (1995) and Dunlap's and Van Liere's (1978). Although many environmental attitude and knowledge scales have been developed over the years, most of them have not had any definitions about the theoretical background of survey questions. Thus, the relationship between EAs and their foundations have not been comprehended yet. One of these articles, written by Arcury and Christianson (1993), mentions the inconsistent characteristics of environmental attitudes. Although this criticism is partly correct in explaining actual situations, it does little to help researchers in the area of EE. If this is the case, what are we supposed to do to explore the origins of EA and interpret the data without bias?

According to Holsman (2001), without political action, environmental education programs will always be at risk. From this point of view, the quality of environmental education affiliated studies should be supported by strong theories that might be ideologically oriented. Many studies have emphasized the relationship between ideology and environmental attitude (Dunlap, 1975). Every researcher should disclose what kind of approach/es she/he has pursued throughout the study e.g. ecocentric / technocentric (O' Riordan, 1988; 1995)

or feminist (Eaton and Lorentzen, 2003) and should label the present instrument, so that the credibility of the research will be acclaimed without criticism; or, at least, a researcher will have a chance to reduce the criticism about his/her research quality.

Even though these select theoretical frameworks might invite even more criticism, it should be noted that it is quite appropriate approach to choose a theory, and to take a strong stand with data well defined rather than to create a gap in explaining the existing situation without any theory.

#### Development of Attitude and Knowledge Scale

Certainly, developing a new scale involves challenging steps. However, the aforementioned issues should be considered before beginning developing environmental attitude and knowledge scales. Basically, randomly selected questions on surveys from any source; applying different psychometric measurements do not help to interpret data and validate the credibility of research (Neumayer, 2002). According to Schindler (1999), demographic characteristics of survey are one of the vital components of the scale's supportive and evaluative elements. In addition, age appropriateness, psychometric principles, and comprehensibility of the items on the survey are other components of the scale that support the validity of research (Musser and Malkus, 1994). The validity of the instrument can be defined in different ways such as traditional or Unitarian (Messick, 1989; Thorndike et. al, 1991). Even if we do not have a common agreement surrounding the validity concept, some terms such as appropriateness, meaningfulness, and usefulness are the basic supportive elements in defining this term (Messick, 1989). As seen, validity is quite flexible term. However, it does not mean that it is just related to the measurement instrument rather than the whole research process. As Lecming and Dwyer (1995) state, "meaningful comparisons among investigations in this area [environmental attitude] are difficult" because most of the researchers have ignored psychometric properties. Though this is one of the most important issues regarding the development and validation of new scales,

beyond that many other issues should be considered in order to strengthen the whole project before the beginning and throughout the process of the research.

First, how do we support the content validity of environmental attitude and knowledge scales? According to some researchers (Yılmaz, et. al, 2002; Lecming et.al, 1995), professional researchers can certify content validity of the survey, which is commonly accepted in academia. But who the professional is and who will decide on content validity are not conclusive issues.

Second, the questions on the survey should be chosen very carefully, both linguistically and conceptually. As stated by Hungerford and his co-workers (1980), curriculum development constitutes "a valid, syntactically sound, suitable framework for use in guiding development in environmental education". This is also a valid perspective for developing a measurement instrument. Again, not all, but many researchers believe that as long as the curriculum includes some environmental topics (Yılmaz et al., 2002), these topics can be placed on the test instrument as an item, a view which is very debatable. Considering the centralized curriculum in many countries, questions about the curriculum development process and about whose values and assumptions the curriculum based on, create controversial issues throughout the study and discrepancies in the research results.

Third, science educators should clarify what environmental education will provide students with, and why we need environmental education desperately in the 21st century. According to Vande Visse and Stapp (1975), "...without a clear statement of goals, an environmental education program would become a series of unrelated experiences, focusing on limited program objectives." From this point of view, environmental education has different dimensions that are compatible with the contemporary tendencies and perspectives of science education according to the National Science Education Standards (1996), authentic problems, creative and critical thinking, problem solving, collaborative working, and professional development are some of the most vital components of the 21st century science education, which I believe to be almost universally accepted by science educators.

Unfortunately contemporary EE related studies, as discussed later on in this paper, could not bring up the aforementioned dimensions of the standards (AAAS, 1989; NRC, 1996; NRC, 2000) in their projects. Consequently, it is difficult to say that previously developed scales have measured EAs or EK adequately and have fitted the nature of science or the practical purposes of science education that have been stressed frequently in many guides.

If it is a common goal of science education to motivate critical thinking in students without bias and rote memorization and to help the students comprehend the nature of science, we should develop appropriate scales and conduct studies appropriate to these purposes. Unfortunately, some of the tests that were published have not embraced these purposes. For example, some items from an environmental knowledge survey, developed by Leeming and Dwyer (1995), are not appropriate in this instrument to measure actual knowledge (The aforementioned study is based on pre-test/intervention/post-test). For example:

*Item 8)* The most common poisons found in water are:

- a) Arsenic, silver nitrates
- b) Hydrocarbons
- c) Carbon monoxide
- d) Sulfur, calcium
- e) Nitrates, phosphates

*Item 3)* Ecology assumes that man is what part of nature?

- a) Special
- b) Related to all other parts
- c) Not important
- d) The best part
- e) The first part

*Item 13)* Which of the following is the most dangerous to the earth's environment?

- a) Damming rivers
- b) Overpopulation
- c) Tornadoes
- d) Household pets
- e) Nuclear power plants

*Item 30)* Which of the following groups is the most interested in environmental issues?

- a) Boy Scouts of America
- b) The Sierra

- c) Kiwanis
- d) 4-H Club
- e) American Cancer Society

First, the underlying assumptions of the questions, and thus the choice of correct answers, are debatable. Which is the most dangerous, which is the most interested and such items might create some bias and raise questions about the credibility of the survey. All these questions depend on the researcher's perspective and subjectivity, which is a result of there not being a theory behind the existing survey. At least, researchers should have shown how they sustained the content validity of the survey so that the items could not be perceived as "biased questions" (Rasinski, 1989).

Second, there is no *theoretical framework* (as mentioned above) both *for the survey* and an *intervention* (O'Riordan, 1988). Which approach researchers chose before beginning their work (the survey) should have been defined, so as to establish credibility regarding the interpretation of the data. Since this did not happen, it is difficult to decide whether this survey could be used for other studies.

Third, there is no commonly accepted definition of ecology. It changes from person to person and from context to context, and there is thus no place for the term in strictly framed *inquiry-based science education* (O'Sullivan, 1991).

Fourth, questions on the survey are not appropriate to the *nature of science* that support critical thinking. Eventually, questions on the survey are not appropriate to the teaching goal of critical thinking, since they clearly address knowledge acquired by rote memorization, rather than implementing the standards which were presented in the National Science Education Standards (NSES). Fourth, questions on the survey are not appropriate to the nature of science that support critical thinking. Eventually, questions on the survey are not appropriate to the teaching goal of critical thinking, since they clearly address

Finally, "environmental knowledge was defined as a student's ability to understand and evaluate the impact of society on the ecosystem" by Gambro and Switzky (1996). Unfortunately, the categorizations and the articulations of items on the survey do not match the definition put forth by Gambro's and Switzky's. To

avoid these complications, future studies should take into account the NSES, critical thinking objectives, and the nature of science.

Some items from another instrument can be found below, which were basically developed to measure 4<sup>th</sup>-8<sup>th</sup> grades students' environmental attitudes (Yılmaz et.al, 2002).

*Item 1)* Pesticide and herbicide use should be increased to increase food production.

There are two major problems that weaken the credibility of this item. First, "herbicide and pesticide" are not easily understandable terms even for undergraduate students whose majors are in relevant fields such as environmental management and agriculture. Second, the term "increase food production" is quite a difficult phrase for 4<sup>th</sup>-8<sup>th</sup> grades students which needs to be thought through. Although this item is an excellent [inquiry based-knowledge] item, it should not be categorized under the attitude scale; because the latter aims at measuring environmental attitude, not environmental knowledge. Needless to say, in order to develop a new or modified scale, researcher should not assume that topics are pertinent to a scale simply because these topics are part of the curriculum.

*Item 2)* Economic growth is more important than environmental protection.

Terms such as "economic growth", "sustainable development", and "sustainable growth" are not clearly defined or universally accepted (Palmer, 1998). It is uncertain how students in the 4<sup>th</sup> through 8<sup>th</sup> grade will understand the term "economical growth."

*Item 3)* People should be free to use their land as they please.

The exact meaning of *free use of land* cannot be determined without a theoretical framework. For instance, the Dominant Social Paradigm (DSP) could have been used as a theoretical framework by the researchers to interpret the results (Pirages, 1977). As seen, this and similar items create a problem not only for understanding of students but also interpretation of data.

Consequently, if all these items lack a concrete framework, it is questionable whether this study and similar ones will help science educators and other researchers accumulate usable, practical, and accountable information about EAs.

## Research Methodology

Although research methodology is a controversial issue in the area of environmental attitude and knowledge measuring as well as in others, it should not be considered a major influential factor in the quality of EE studies, particularly EA and EK related ones. The problem is not itself one of the methodology; it is more one of application instruments and theoretical frameworks employed in the studies. Since, the techniques of qualitative research have more flexible pathways than the quantitative, this might create methodological discrepancies. That is why a working protocol throughout the research project should be clear for the qualitative applications as much as possible. Social inquiries have been influenced by different traditions and schools (such as the Chicago school), theoretical perspectives (phenomenology, symbolic interactionism, naturalism), research protocols (grounded theory, framework analysis), methods of data analysis (narrative, discourse, content analysis), and types of qualitative data (naturalistic or non-naturalistic) (Heaton, 2004, 56). These aforementioned traditions have been also used in the area of education. Even though generally qualitative and quantitative research techniques have been discriminated, in some case they have similarities such as secondary analysis. Secondary analysis can be used as a research technique in both quantitative and qualitative methods to allow for investigating new or additional research questions (Heaton, 2004, 15). As Glaser states (1962), "Secondary analysis is not limited to quantitative data. Observation notes, unstructured interviews, and documents can also be usefully reanalyzed. In fact, some field workers may be delighted to have their notes, long buried in their fields, reanalyzed from another point of view... A man is data gathering animal." As previously stated, environmental attitudes are not based on completely consistent characteristics that allow a deep understanding of sources of environmental attitudes. Numerous reasons and perspectives can be articulated in explaining the foundations of EAs.

Consequently, for an in-depth definition of foundations of EAs both quantitative and qualitative methods should be considered complimentary to each

other. Their appropriate integration (integrative research methods) can help come to a clearer understanding of the might help clear understanding aforementioned issues. As mentioned by Ezzy (2002, 9-12), as long as a researcher devotes himself/herself to probing the issues beyond pre-existing theories, there is no limitation to using both approaches together. Rather, applying both of them makes a study stronger.

### Conclusion

To sum up, we should answer how/why questions throughout the research project. As mentioned by Ma and Bateson (1999), environmental educators should focus on personal and social factors that might correlate with each other. Our research processes need to be informed by principles that go beyond basic psychometry. Considering the quality of EA and EK scales and affiliated all studies:

We should comprehend different dimensions of EAs, such as socioeconomic status of students, neighbourhood, ethnicity, cultural and regional/national traditions etc. Unfortunately, previously conducted studies about Turkish people's EAs have contained methodological mistakes such as inappropriate use of demographic variables (socioeconomic status, neighbourhood), limited sampling, lack of theoretical framework, and age-inappropriate items as in studies of Dunlap et al., (1993), Furman (1998), and Yılmaz et al., (2002) which might mislead the reader. In addition to the aforementioned studies, geographic district (in Burdur) and campus life specific studies (with undergraduate students) were conducted (Kasapoğlu and Ecevit, 2002; Berberoğlu and Tosunoğlu, 1995). However, as previously stated, with the exception Kasapoğlu and Ecevit's study, these are not based on any concrete theoretical framework to interpret data and do not yield any opportunity to make generalizations about the situation of the young generation in Turkey.

We should explain, and find answers for, all why questions which would help us explore the foundations of EAs of students. Our responsibility, as researchers, is not just to develop a scale; it is beyond that. As stated by Hatch (2002, 190) in the book *Doing Qualitative Research in Education Settings*, "students who are new

to research are sometimes reluctant to call their work "critical," "feminist," or "poststructural." Although most of the progressive educators such as Giroux (1988) claim that environmental education is a process for critical thinking, it is hard to find any critical thinking oriented research in the environmental education area that exposes the origins of environmental attitude and/or behaviour. Certainly if a new researcher comes along with a statement like "Deserved or not, much critical and feminist research is dismissed by mainstream science because it is seen as biased and/or not empirical. Findings are often read as political position statements rather than reports of research" (Hatch, 2002, 192).

It is not a surprising result not to find enough research in the environmental education area that deals with questions of 'why' and 'how' and puts them in a framework. To sum up, being critical does not mean ignoring the emergent patterns. Rather, as Freire states, it is more of a "reading of the world" (1973, 6).

We should not call putting all items in our instrument developing a new instrument. While talking frequently about the value of critical thinking in graduate courses, we should also engage in our research from this perspective.

Furthermore, we should discriminate between knowledge and attitude items on our surveys.

We should use logical, world-wide accepted theories, which might be ideologically oriented, to interpret data. It should be noted here that this does not mean that inductive approaches from qualitative studies are not useful. On the contrary, theory driven and theory-based processes complement each other.

Moreover, we should not force ourselves to be polarized with regard to research methodology. Both qualitative and quantitative studies can work together.

We should have enough environmental science knowledge to questions on the scales that enhance the validity and reliability of the particular survey as well as of the study as a whole.

Finally, both the basic goals of science education and the practical purposes of environmental education should be in harmony so that we can do more for our common future. To do that, we take into account all aspects of environmental education that help us go where we should: applying and doing science from a multidisciplinary perspective.

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