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DEVELOPMENT OF A PERCEIVED ENVIRONMENTAL CONTROL MEASURE

By

Randall Joseph Champeau

A DISSERTATION

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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#### ABSTRACT

#### DEVELOPMENT OF A PERCEIVED ENVIRONMENTAL CONTROL MEASURE

By

#### Randall Joseph Champeau

Locus of Control (L of C) constitutes a personality dimension that may be used in conjunction with other variables to explain and/or predict human social behavior. The purpose of this study was to construct a L of C instrument which could be used to measure the expected reinforcement perceived by an individual if specific types of environmental action are taken in a given situation. The instrument as designed was entitled the Perceived Environmental Control Measure (PECM).

The final instrument was comprised of 45 PECM items in three L of C belief orientations; 1) Internal (I); 2) Powerful Others (P); 3) Chance (C). These three belief systems were in turn applied equally across five categories of environmental action; 1) Legal Action; 2) Persuasive Action; 3) Political Action; 4) Ecomanagement; 5) Economic Action. Subjects were presented an environmental issue summary and asked to respond to the PECM statements as they pertained to the given issue. Participants in the study included sample populations of college students, Sierra Club members and K-5 teachers.

Results of this study support the proposed relationship between L of C and environmental action taking behavior. The majority of subjects perceived themselves as having some personal control over the stated environmental issues. However, powerful others and chance were also identified as agents having some control over the issues. Subjects showed a tendency to feel most in control with the "take it to court" or legal action process. It was further determined that sex, age and/or occupation may have some relationship to perceived control of the issue. College students scored significantly more internal than teachers of the study. Also college females were found to be more internal than college males.

The PECM exhibited evidence of reliability, content validity and construct validity. It contains a set of subscales which show potential for diagnosing environmental action taking behavior and for evaluating the effectiveness of environmental education curriculum. The time and efforts expended on this study are dedicated with love to two very special people, my parents. They will always be in my mind and on my heart.

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Chapter 1

INTRODUCTION

The Global 2000 Report to the President

Major Findings and Conclusions

If present trends continue, the world in 2000 will be more crowded, more polluted, less stable ecologically, and more vulnerable to disruption than the world we live in now. Serious stresses involving population, resources, and environment are clearly visible ahead. Despite greater material output, the world's people will be poorer in may ways than they are today.

For hundreds of millions of the desperately poor, the outlook for food and other necessities of life will be no better. For many it will be worse. Barring revolutionary advances in technology, life for most people on earth will be more precarious in 2000 than it is now - unless the nations of the world act decisively to alter current trends.

The above excerpt presents just a sample of the major findings and conclusions published in a study prepared jointly by the State Department and the President's Council on Environmental Quality. This study was requested by the Carter Administration in 1977 and was completed and presented to the President in late 1980. A major objective of the study was to project current trends in world population, resources, and environmental change to the end of the century.

The gloom and doom conclusions of the Global 2000 Report are by no means unique in general content. They only echo similar

projections and predictions of many other reputable books and research studies published over the last two decades.

An obvious question that plagues the world as a result of projections like those in the Global 2000 Report is: How can nations, states, cities or individuals "act decisively" to prevent a collision course with these potentially awesome developments? The answer to a question as immense as this is not simple. However, although the answer may not be simple, there are many within the profession of Environmental Education (EE) who believe there is an answer.

One seemingly idealistic, but in reality reasonable, solution that has been proposed is that educators around the world must begin to develop an "Environmentally Literate Citizenry." That is, a citizenry capable of identifying and investigating environmental issues and ultimately willing and able to take responsible action toward the remediation of those issues (Hungerford and Peyton, 1976).

When major environmental issues are put in their proper perspective (i.e., relative to human survival) environmental literacy seems like more than an appropriate goal for educators and citizens to strive for. A major component of environmental literacy is the willingness and ability of individuals to take responsible action on environmental issues (Peyton, 1977). This need to develop individuals who are responsible action-takers has been endorsed by the writings of many EE professionals (e.g., Hawkins and Vinton, 1973; Rilo, 1974; Loret, 1974; Hungerford and Peyton, 1976: Hungerford, et al., 1980; Childress, 1976; Belgrade Charter, 1976; Tbilisi Conference, 1978; Stapp and Cox, 1979). In order to achieve literacy

as a major goal of EE it is necessary for educators to identify those factors within individuals which promote willingness and ability to implement environmentally responsible action. A general goal of this study was to develop a research instrument which could be utilized to increase effectiveness in promoting environmental action taking behaviors.

Environmental education programming efforts aimed at achieving environmental literacy are indeed being pursued. However, many of these efforts have been based on the seemingly false assumption that a linear or domino type relationship exists among knowledge (cognitive), affect (attitudes) and behavior (conative) domains (Peyton and Miller, 1980; Burrus-Bammel, 1978). This relationship implies that a change in knowledge or beliefs influences attitudes which, in turn, will have an effect on behavior. Thus, many EE program objectives primarily address only knowledge and/or attitude development (Childress, 1978). It seems to be taken for granted that the desired behavior will follow.

Research studies discredit the assumption of a linear relationship between knowledge, attitudes and behavior (Borden and Schettino, 1979; Burrus-Bammel, 1978; Heberlein, 1973; Ramsey and Rickson, 1977; Bowes et al., 1978 <u>in</u> Shoenfeld, 1980). In fact, these studies seem to indicate that the interacting variables affecting an individual's environmental actions are more complex than previously assumed and little understood (Peyton and Miller, 1980). Evidence does seem to exist which supports the premise that environmental action-taking is situation specific (Bowman, 1977; Stamm et al., 1977; Koenig, 1975; Sharma et al., 1977; Trichenor et al., 1973

in Shoenfeld, 1980). Thus, in any given person the type or number of variables affecting action taking may vary from situation to situation.

Although it is not clear what variables affect action taking from situation to situation researchers have identified categories or types of environmental actions that people can or are prone to take across situations (i.e., environmental issues). Hungerford and Peyton (1980) present a three-part paradigm which identifies and defines specific categories of action, levels at which these actions can be taken and finally, the constraints that may affect the taking of a particular action. Of particular concern to this study are the specific categories of environmental action; these are listed and defined below.

### Categories of Environmental Action

- Persuasion: An effort to verbally motivate human being to take positive environmental action as a function of modified values, e.g., argumentation, debate, speech making, letter writing.
- 2) <u>Consumerism</u>: An economic threat by an individual or a group aimed at some form of behavior modification in business or industry (e.g., boycotting) or some conservative mode of behavior with respect to goods and/or services (e.g., discriminating and conservative use of goods and services).
- 3) <u>Political Action</u>: An effort aimed at persuading an electorate, a legislator (or legislature), or executive governmental agency to conform to the values held by the person or persons taking that action, e.g., lobbying, voting, supporting candidates.
- Legal action: Any legal/judiciary action taken by an individual and/or organization which is aimed at some aspect of environmental law enforcement or, a legal restraint preceding some environmental behavior perceived as undesirable, e.g., lawsuits, injunctions.

5) <u>Ecomanagement</u>: Any physical action taken by an individual or a group aimed directly at maintaining or improving the existing ecosystem, e.g., reforestation, landscaping, installing bird boxes.

In a final analysis, although investigators have an idea of what environmental actions can be or are taken, it would appear that findings are inconclusive as to how or what attitude and knowledge variables interact to promote or extinguish an individual's action taking behavior. Clearly more research into the causes of environmental action taking behavior is warranted if educators hope to enhance the development of environmentally literate citizens.

### Locus of Control and Environmental Action

A specific attitudinal variable which may impinge on the environmental action taking behavior of an individual is his/her perception of personal control over a situation or event (e.g., environmental issue). This perceived belief about personal control or non-control of an event is directly related to the theoretical construct called Locus of Control (L of C).

The L of C construct represents one of four equally weighted components of Rotters' (1966) Social Learning Theory (SLT). In its most basic form, the SLT states that "the potential for behavior to occur in any specific psychological situation is a function of the expectancy that the behavior will lead to a particular reinforcement in that situation and the value of that reinforcement." (Rotter, 1975, pp. 57). The four components of the SLT are: behaviors, expectancies for reinforcement, value of reinforcement, and the psychological situation. A formula and diagrammatic representation of SLT are presented in Chapter 2 of this study.

It is the expectancy for reinforcement, or the "probability held by the individual that a particular reinforcement will occur as a function of a specific behavior on his part in a specific situation or situations" (Rotter, 1954, pp. 107) which constitutes an individual's L of C. Phares (1976, pp. 16) describes the probability held for reinforcement (i.e., expectancy for reinforcement or L of C) as a "subjective probability... It is determined not just by one's objective past history of reinforcement" (i.e., specific expectancy) " but also by expectancies generalized from other, related behavior-reinforcement sequences" (pp. 16). Thus, when individuals are in a relatively unfamiliar situation, generalized expectancies will be relied upon. When individuals have a great deal of experience in a given situation, specific expectancies will be heavily relied upon and generalized expectancies will have less significance.

Rotter has identified two belief positions an individual may harbor with respect to specific or generalized expectancies of reinforcement (L of C).

> When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him... We have labeled this belief in <u>external</u> <u>control</u>. If the person perceives that the event is contingent upon his own behavior or his own relatively permanent characteristics, we have termed this a belief in <u>internal control</u> (Rotter, 1966, p. 1) (emphasis added).

Given that environmental action may be "situational" and that there are specific actions that can be applied across situations/ environmental issues, it is possible that an individual's willingness and ability to take action will, in part, be influenced by his expectancy (L of C) that the action taken will indeed produce the desired (i.e., valued) outcome or reinforcement. If one's expectancy is high for obtaining the desired results through use of some action, then the person could be described as internal about taking that action in that situation. If one's expectancy is low for obtaining the desired results through use of some action, then the person could be described as external about taking that action in that situation. It might also be hypothesized that a person who is internal about an action will be more likely to take that action than a person who is external about it.

### Measuring L of C

Since its initial introduction, well over 600 research studies have concentrated on the L of C construct and this number doesn't even take into account the unpublished master's theses and doctoral dissertations (Rotter, 1975). Many of these studies included the development of instruments designed to measure an individual's L of C. Using these instruments both generalized and specific expectancies have been assessed in a variety of age groups, populations, and content areas. Phares (1976) and Lefcourt (1976) both present a sampling of the different types of instruments that have been developed and tested.

Probably the most widely tested L of C instrument that has been developed is Rotters' (1966) Internal-External (I-E) Scale (Appendix A). This scale consists of 23 forced-choice items which are designed to measure expectancies across a wide range of situations, such as interpersonal situations, school, government, work and politics (Phares, 1976, p. 42). Because the I-E scale is designed to measure expectancies across a variety of areas it is labeled a generalized expectancy scale. In contrast, if the scale is designed to measure one content area (e.g., environmental action taking) then the scale is described as a situation specific scale.

Rotter (1975), Lefcourt (1976), and Phares (1976) all indicate that a measure of broad generalized expectancy allows for predictions in a variety of situations, but it may function at a low level in trying to predict actions in a specific situation. Therefore, the I-E scale, a measure of generalized expectancy, may do a good job of predicting people's behavior in general but it may miss rather badly in specific situations (Phares, 1976). On the other hand, a narrower, more situation specific measure should allow relatively high levels of prediction in the situation it was designed for but it is rather limited in breadth of application. If the only purpose is to explore environmental action taking behavior, then it might prove advantageous to construct an I-E scale with items that pertain solely to environmental action taking behavior.

In an attempt to refine the predictability of the I-E scale, instruments have been developed which distinguish between different types of externals (Crandall et al., 1965; Kleiber et al., 1973;

Levenson, 1972). Hanna Levenson (1972) constructed three generalized expectancy scales consisting respectively of Internal, Powerful Others, and Chance items (IPC Scale). She felt that people who believe the world is unordered (i.e., chance oriented) should behave differently from those who feel powerful others are in control; although both chance and powerful others would be considered external beliefs. In some situations Levenson's (1972a, b; 1973a, b, c; 1974) approach has shown a fair amount of success in discriminating between individuals with these three belief systems.

This tripartite analysis of Levenson's could be particularly applicable to exploring environmental action taking behavior. It is possible there are important behavioral differences between the external who feels that the outcome of a certain environmental issue is unpredictable (i.e., chance oriented) and the external who perceives the outcome is predictable but powerful others are in control.

Although Levenson's IPC scale is more sensitive to different external orientations than the I-E scale, it is still a measure of generalized expectancy. Based on this similarity, the IPC scale, like the I-E scale, could be subject to the weakness of low level behavior prediction in specific situations.

If the goal of a L of C instrument is to analyze certain behaviors in one situation or a somewhat homogeneous group of situations, then it might prove worthwhile to develop a scale with all items directed towards behavior in that situation(s) (Phares, 1976). Studies using generalized instruments have shown some indication of a relationship between L of C and environmentally responsible

behavior (Levenson, 1972; Tucker, 1978; Arbuthnot, 1977; Smith, 1979). It seems highly possible that these relationships could be better explored with a situation specific instrument. Although the need seems apparent (Peyton and Miller, 1980; Smith, 1979; Tucker, 1979), to date no situation specific L of C instrument has been developed to explore environmental action taking behavior.

### Statement of the Problem

The purpose of this research study was to develop a situation specific Locus of Control that can be used to measure an individual's perceived expectancy for environmental action taking in a stated situation. Specifically, the instrument assesses three L of C belief systems that could be applied by an individual to a stated situation (i.e., specific environmental issues). First, the instrument was designed to measure the degree to which an individual perceives himself/herself as in control of affecting the outcome of a stated situation through use of a) persuasive actions; b) economanagement actions; c) economic actions; d) legal actions; e) political actions. Second, it was designed to measure the degree to which an individual perceives powerful others to be in control of the stated situation regardless of the environmental actions he/she may take. Third, it was designed to measure the degree to which an individual perceives chance or fate to be in control of the stated situation regardless of the environmental actions he/she may take.

### Significance of the Study

It is generally agreed upon by the EE community that its ultimate goal is to develop a citizenry that is both able and willing to take responsible action toward the remediation of environmental issues. To pursue this goal it would be advantageous for educators to better understand the interacting variables that impinge upon an individual's willingness and ability to take responsible actions.

In this study L of C is presented as one variable which may play a role in affecting the environmental action taking behavior of an individual. Since its inception, a plethora of investigations have centered on the L of C construct and, as a result, several generalizations about the behavior of individuals can be inferred (Phares, 1976; Lefcourt, 1976).

Peyton and Miller (1980) identified and presented the following L of C generalizations and their implications for EE.

### 1. Internals more frequently participate in productive

### action taking than externals.

... The relationship between internality and individual action taking has strong implications for EE. Achieving the goals of EE depends on developing individuals willing to initiate positive, rational environmental action taking. In view of the generalizations reported here, this would seem to make internality desirable.

2. Internals differ from externals in their ability to

recall relevant material, and in how actively

they seek additional information.

... Having greater recall of relevant material and more actively seeking additional information are

certainly important abilities for effective environmental problem solving. If it is accurate that becoming more internal leads to increases in the above characteristics (causal relationship), then developing an internal L of C among citizens may be an important goal of EE.

#### 3. Internal individuals are superior to externals in their

#### utilization of information.

... Rational, objective problem solving would be enhanced by an increased ability to accurately apply information. If the relationship between this characteristic and internality is a causal one (i.e., becoming more internal would cause a greater utilization of information ), citizens' perception of L of C should be an important consideration of environmental educators.

#### 4. Internal individuals are more resistant to subtle

manipulation and are less influenced by high-prestige

#### individuals than externals.

... It is essential that the value positions and credibility of informational sources be carefully assessed when investigating the dimensions of an environmental issue. It seems reasonable to expect internals to be more capable and/or willing to reject information which comes from biased or prestigious, but uninformed sources.

#### 5. Internal individuals exhibit a superior capacity to

#### delay gratification in order to attain greater, long-

#### term gains.

... Solving environmental (and other social) problems, often requires behaviors that sacrifice short-term rewards for the attainment of greater, long-term gains. If EE is to produce citizens capable and willing to adopt behaviors to improve and/or maintain environmental quality, increased internality may be an important part of the process. 6. Internals respond differently to those tasks which

they perceive to be skill-related, than to tasks they

perceive to be chance-related.

... In view of the above findings, it appears important for EE to present citizens with the perception that the outcomes of environmental actions are skillrelated and not due entirely to chance events.

## 7. An individuals' perceived L of C is susceptible to

### change.

... Given that an internal L of C in citizens is accepted as a desired perspective in an environmentally literate individual, it is significant that L of C is responsive to training and experience. The nature and extent of such training to be offered by EE are by no means clear yet. However, the implications seem evident that environmental educators should begin to examine EE curricula and teaching methods to determine how an internal L of C may be best developed in citizens.

Although the inferred relationships between environmental action and L of C seem quite apparent, there has been little effort to investigate their authenticity. Those studies that do provide some indication of a linkage between L of C and environmental action are based on generalized instruments. Major proponents of L of C theory state that if the intent of a study is to measure behavior in a homogeneous class of situations then it would be beneficial to construct a scale with all items directed toward that particular type of situation. To date, no situation specific instrument has been developed which can be used to investigate the inferred relationships between environmental action taking behavior and L of C. The development of such an instrument was the proposed topic of this study.

### Limitations of the Study

Two specific categories of limitations can be identified in this study: (1) Limitations imposed by population variables; (2) Limitations imposed by instrument design.

## Population Limitations

- The sample size used and characteristic homogenity of the populations tested was determined by the availability of participants.
- 2. Due to lack of random sampling, generalizations from results to other non-tested populations should be made with caution.

## Limitations of Instrument as Designed

- The instrument was designed to measure an individual's perceived expectancy for personal use of environmental actions. It is possible that a person's perceived expectancy will not reflect actual behavior.
- The respondant was placed in a hypothetical situation and asked to react to that situation. Responses could have been different if it were a real-life situation.
- 3. The instrument was designed as a self-report measure. Under certain conditions, the individual's belief system may be in conflict with social norms and the respondant may attempt to hide true beliefs when responding.
- 4. Strong evidence of instrument validity can only be achieved through continued application of an instrument. This study only attempts to initiate evidence of instrument validity.

5. The instrument designed in this study was not tested against a generalized L of C instrument to determine its comparative diagnostic potential.

### Goals and Strategies of the Study

The general goal of this research study was to construct a situation specific L of C instrument which could be used to measure the perceived expectancy of an individual for taking specific types of environmental action in a given situation. In addition, this instrument was tested for initial evidence of validity and reliability. For purposes of clarification, the instrument designed in this study was entitled the Perceived Environmental Control Measure (PECM).

To achieve the above goal a series of strategies were considered which 1) established test item content; and, 2) tested for initial evidence of reliability and validity of the instrument.

## Strategies for Establishing Item Content

An item pool was developed with statements divided equally among three belief orientations: 1) Internal (I); 2) Powerful Others (P); 3) Chance (C). Furthermore, these belief systems were applied equally across five (5) categories of environmental action: 1) Legal Action; 2) Persuasive Action; 3) Political Action; 4) Ecomanagement; 5) Economic Action.

 Items in the I-scale were constructed to elicit responses which measure the degree to which an individual ... perceives that his/her use of an environmental action will have an effect on or control the outcome of a stated situation.

- Items in the P-scale were constructed to elicit responses which measure the degree to which an individual ... perceives powerful others, more than his/her own use of an environmental action, will control or have an effect on the outcome of a stated situation.
- 3. Items in the C-scale were constructed to elicit responses which measure the degree to which an individual ... perceives chance or fate, more than his/her use of an environmental action, will control or have an effect on the outcome of a stated situation.

### Strategies for Testing of the Instrument

In order to gain initial evidence of reliability and validity, it was proposed that two pilot studies and four field testings of the instrument be conducted. Strategies used to accomplish each of these studies are presented below.

### Pilot Study I

- 1) administer five (5) separate instruments with a combined total item pool of 150 statements.
  - i. 30 statements IPC Ecomanagement Instrument
    ii. 30 statements IPC Persuasive Action Instrument
    iii. 30 statements IPC Economic Action Instrument
    iv. 30 statements IPC Legal Action Instrument
    v. 30 statements IPC Political Action Instrument
- 2) analyze and select items for second pilot study based on item total correlation, item subscale correlation, item response distribution, and mean responses.

### Pilot Study II

 collapse qualifying items from pilot study one into one instrument. Administer that instrument along with a citizen action questionnaire. (Theoretically, internals should be more involved than externals in taking responsible citizen actions.)  Analyze and select items for the final instrument based on relatively high item total correlations, relatively high item subscale correlations, item response distribution and mean responses.

Field Testing of Instrument

- Administer a citizen action questionnaire along with a final version of the Perceived Environmental Control Measure as developed from pilot studies one and two.
- Analyze the instrument for evidence of subscale reliability, whole test reliability, content validity, and construct validity.
- 3) Investigate the following general research questions:
  - Can evidence of validity and reliability be established for an instrument developed to measure perceived L of C toward taking specific categories of environmental action in a stated situation?
  - Do selected sample groups differ significantly on Perceived Environmental Control Measure scores?
  - What relationship exists between scores on a measure of citizen action and Perceived Environmental Control Measure scores for a selected group of respondents?
  - 4. Do total Internal (I), Powerful Others (P) and Chance (C) scores from the Perceived Environmental Control Measure differ significantly for a selected group of respondents?
  - Do total (i.e., combined) I + P + C scores for each environmental action category in the Perceived Environmental Control Measure differ significantly for a selected group of respondents?
  - 6. Are the Perceived Environmental Control Measure Scores of a selected group significantly affected by different environmental issues summaries?
- \* Note: These research questions are more specifically defined and/or expanded in Chapter III of this study.

#### Chapter 2

#### REVIEW OF RELATED LITERATURE

"The success of public policy decisions, educational programs and other efforts dependent upon specific individual action in the realm of environmental issues may well hinge upon our understanding of the relationships among personality characteristics, attitudes and environmental values, knowledge and behavior" (Arbuthnot 1977, pp. 217).

Locus of Control (L of C) is proposed as one of several interacting variables which affect the environmental action taking behavior of an individual. This chapter will present a discussion of: (1) the theoretical origin of L of C; (2) techniques used to measure L of C; (3) categories of environmental action taking behavior; and (4) studies indicating a relationship between environmental action taking behavior and L of C.

#### Theoretical Origin of Locus of Control

The nature of Locus of Control (L of C) can best be understood through an examination of its theoretical origin. Locus of Control was first introduced as a component of J. B. Rotter's Social Learning Theory (Rotter 1954; Rotter, Chance, Phares 1972). This theory was first developed in an effort to explain and investigate the social behavior of psychotherapy patients. Since the introduction of Rotter's Social

Learning Theory (SLT) considerable empirical evidence has been established which supports its utility for explaining human behavior both in and outside of the clinical setting.

Rotter's SLT states that a person's actions or behaviors are a function of three equally interacting components: expectancy for reinforcement, value of reinforcement and the psychological situation. A "reinforcement" can be described as "anything that has an effect on the occurrence, direction, or kind of behavior: (Phares 1976, pp. 15). The "value of a reinforcement" may be defined as "the degree of preference for any reinforcement to occur if the possibilities of their occurring were all equal" (Rotter 1954, pp. 107). The "expectancy for reinforcement" is the "probability held by the individual that a particular reinforcement will occur as a function of a specific behavior on his part in a specific situation or situations" (Rotter 1954, pp. 107). The psychological situation is the accumulation of cues that might directly affect the expectancies and reinforcement values of a given person (Phares 1976, pp. 17). Figure 2.1 presents a formula and diagrammatic representation of SLT (adapted from Lefcourt 1976, pp. 26).

It is the expectancy for reinforcement which reflects an individual's L of C. The model in Figure 2.2 presents a conceptual summary of the L of C construct. Components of the model are explained below.

Expectancies fall into two categories: specific and generalized. Generalized expectancies are those which originate or are drawn from a variety of life's experiences. Specific expectancies refers to those which originate from a particular experience or homogeneous class of experiences. When an individual is in a novel or unfamiliar

## $BP_{x,S_1R_a} = (E_{x,R_aS_1} \text{ and } RV_{aS_1})$

The potential for behavior (x) to occur in situation (1) in relation to reinforcement (a)

is a function of

the expectancy of the occurrence of reinforcement (a) following behavior  $(\chi)$  in situation (1)

and

the value of reinforcement (a) in situation (1)

Figure 2.1 Formula and Diagrammatic Representation of Rotter's Social Learning Theory (adapted from Lefcourt 1976, pp. 26)




Figure 2.2. Conceptual Summary of the Locus of Control Construct

situation generalized expectancies will be important in determining expectancy for that situation. If an individual has a great deal of experience in a given situation then specific expectancies will be the primary determinants (Phares 1976).

Rotter (1966) has further identified two belief systems an individual may develop as a result of generalized and/or specific expectancies for reinforcement.

> When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him... We have labeled this belief in <u>external control</u>. If the person perceives that the event is contingent upon his own behavior or his own relatively permanent characteristics, we have termed this a belief in <u>internal control</u> (Rotter 1966, p. 1). (emphasis added)

The L of C construct is also described by Rotter (1966) as a distribution of individuals on a continuum according to the degree to which they accept personal responsibility for what happens to them. Lefcourt (1976) states that people are not totally internal nor external. The terms are not meant to imply that perception of control is a trait or typology. The terms internal and external control depict an individual's more common tendencies to expect certain events to be contingent or non-contingent upon their action.

#### Measuring Locus of Control

Lefcourt (1976) states that given the current status of assessment tools used in the study of L of C it would be possible to conclude that there is enough evidence to encourage investigators to both continue in their use of existing devices and to develop more criterion specific measures. A review of the research (Lefcourt 1976, Phares 1976) indicates that both these avenues of assessment have been pursued.

The most widely tested instrument is Rotter's Internal - External Scale (I-E Scale, Appendix A). This instrument consists of 23 forcedchoice items which attempt to sample beliefs across a wide range of situations such as school, government, work, politics and interpersonal situations (Phares 1976). The I-E scale has been very successful in establishing the validity of the L of C construct but since its development considerable efforts have been expended to improve and refine L of C measurement. Two areas of improvement or refinement of L of C measurement that are pertinent to this study are (1) development of situation specific instruments; and (2) discrimination between different types of externals.

# Generalized vs Situation Specific Measures of Locus of Control

Because the I-E scale was developed to sample beliefs across a wide range of situations it represents a generalized expectancy scale. In contrast a scale designed to measure one content area such as environmental action taking would function as a situation specific scale (Phares 1976).

Major proponents of the L of C construct state that measures of generalized expectancy allow for predictions in a large number of different situations, but at a low level (Lefcourt 1976; Phares 1976; Rotter 1975). A situation specific measure allows more accurate prediction

in the situation it was designed for, but its utility is confined to that specific type of situation. Thus, if the goal of a researcher is to predict behavior in one situation or a very homogeneous class of situations, then it would be advantageous to develop a scale with all items directed towards that situation. If the intent is to sample L of C beliefs across a wide range of situations (i.e., life in general) then a generalized scale would be warranted (Phares 1976).

A number of research studies have been conducted which support the premise that L of C instruments designed for specific situations can yield more refined predictions than a generalized scale applied to that same situation. Abramowitz (1973, in Phares 1976) compared college students having social action or political goals with those who were not political in nature nor social action-oriented. He obtained three types of I-E scores; one based on all 23 items, one based on world events or politically-worded items and a third based on non-political or personal control items. It was found that neither the total I-E scores nor the non-political item scores related to sociopolitical behavior. In contrast, a positive relationship between internality on the political items and action-oriented sociopolitical behavior did exist.

In another study Donovan and O'Leary (1978) present data which indicate that a situation specific instrument designed to address drinking related behavior differentiated significantly between alcoholics and non-alcoholics. It was reported the same populations did not differ with respect to scores on Rotter's measure of generalized expectancy (I-E scale).

Further support for the utility of designing situation specific instruments is provided by Wallston et al. (1976). These researchers assumed that a specially constructed health related L of C scale would provide more sensitive predictions of the relationship between internality and health behaviors than would the I-E scale. Eighty-eight college students were given the Health L of C scale, the I-E scale, and a measure of the relative value they placed on health. Subjects next read a "mildly-threatening" message about the dangers of hypertension. In addition, they took a difficult knowledge test on hypertension which was designed to reinforce the feeling that this was a subject about which they knew little.

After the message-test treatment, students were given the opportunity to broaden their knowledge on hypertension by choosing to read any number of 16 different information pamphlets on the topic. It was proposed that subjects who held internal L of C beliefs and who highly valued health would choose to expose themselves to more information (i.e., more hypertension pamphlets) about the given condition.

Results indicated that there was a "marginally significant" interaction between perceived health value and Health L of C scores. No such trend was found between I-E scale scores and perceived health value. In addition, when Health L of C scores were used as the basis of classification, high health value internals chose more pamphlets than all other types of subjects. The researchers state that no such results would have been evident if the more general I-E scale had been the only basis for classifying subjects as internals or externals.



Wallston et al. (1976) also conducted a second study on weight loss behavior of 22 overweight women. It was hypothesized that subjects in a weight reduction program whose orientation was consistent with their expectancies (L of C) would be more satisfied and more successful than subjects in a program inconsistent with their L of C beliefs. Prior to treatment, subjects were given the Health L of C scale and the I-E scale. Subjects matched on Health L of C scale were randomly assigned to one of two weight reduction treatments: an internally oriented self-directed program, or an externally oriented group program.

After an 8-week treatment period data on program satisfaction and weight loss were collected. Results indicated a significant interaction between Health L of C scores and program satisfaction. Those programs consistent with subjects' expectancies were evaluated more positively than were inconsistent programs. That is, internals in the self-directed program were more satisfied than those in the group program. Externals in the group program were more satisfied than those in the self-directed program. Internal-External scale scores indicate those in expectancy consistent programs did not differ in perceived satisfaction from those in programs inconsistent with expectancies.

Data on weight loss was less clear. Statistically significant results were not reported but the researcher claim results were in the expected theoretical direction when applying Health L of C scores. Externals in the group program lost more weight than did those in the self-directed program. Internals in the self-directed program lost more weight than did those in the group program. Internal-External scale scores indicated weight loss results were in a direction opposite to theoretical prediction.

Given the findings presented above it would seem that generalized L of C instruments may have limited usefulness in specific situations. Locus of Control scales with all items directed at the situation to be studied appear to be more effective in discovering L of C relationships. An appropriate application of this type of instrument may be in the area of specific categories of environmental action as proposed by Hungerford and Peyton (1980). Developing a L of C instrument with items directed at these actions may prove to be a better predictor of environmental action taking behavior than a generalized instrument.

#### Agents of External Control

A second means of refining I-E measurement involves the issue of unidimensional vs multidimensional control (Lefcourt 1976). Rotter's I-E scale is described as being unidimensional. It measures the degree to which people believe they exercise control over their lives (internal orientation) or the degree to which they feel their destinies are beyond their own control and are determined by fate, chance, or powerful others (external orientation). Several investigators have found reason to suggest that I-E functions as a multidimensional rather than a unidimensional construct (Crandall et al. 1965; Hersch and Scheibe 1967; Gruin et al. 1969; Mirels 1970; Levenson 1972a; Sanger and Alker 1972, in Reid and Ware, 1974). For example, a person who believes powerful others control events may behave differently from a person who is chance oriented. However, both chance and powerful other belief orientations are groups under the rubic of external control in the unidimensional I-E theory.

Phares (1976) points out that a multidimensional concept is apparent in Rotter's (1966) original definition of I-E. Although many expectancies are considered equivalent (i.e., chance orientation = powerful others orientation = lack of freedom, etc.) they may on occasion lead to dissimilar behaviors. Thus, there is understandable evidence of the existence of multidimensional factors in I-E construct but there is much less evidence that demonstrates the predictive utility of these factors. Phares (1976) has called for the development and testing of these factors.

Hannah Levenson has probably exerted the most effort toward examining the utility of assessing diverse agents of control (Lefcourt 1976). Levenson (1972b) proposed to measure three separate L of C belief orientations: Internal (I), Powerful Others (P) and Chance (C). Powerful others and Chance orientations are presented as two independent external belief systems. The rational for factoring out these two types of externals was that people who believe the world is unordered (chance-oriented) would behave and think differently from people who believe the world is ordered but powerful others are in control. In the latter case, a potential for control exists (Levenson 1974).

With a fair amount of success, Levenson (1973b) conducted a number of studies which serve to ascertain the validity of separating L of C measurement into I, P, and C dimensions. The three independent orientations were found to emerge in a series of factor analyses and were shown to be differentially related to such variables as philosophy of human nature, involvement, information, activism and perceived parental upbringing. Some examples of validating studies are discussed below.

# Factor Analysis of the I, P, and C Scales

Using responses from a population of college males (N=239) and a population of psychiatric patients (N=165), two factor analyses were computed. Results were as follows:

> For each of the samples, the first three factors to emerge were I, P, and C accounting for 60% of the total variance. Both analyses approach the ideal simple structure, since there is almost <u>no</u> overlap of the items on the factors and each I, P, and C factor remains conceptually pure in that only items from the appropriate scale load on the one factor.

The dimensions of internal control, powerful others, and chance seem to be consistent points of reference for both normal and abnormal samples. (Levenson 1973 (b), pp. 3).

Another study done by Walke (1979) seems to confirm Levenson's factor analysis findings. The I, P, C scales were administered to 71 male and 85 female New Zealand college students. A factor analysis of these responses according to Walke "clearly confirmed the three-factor structure underlying Levenson's questionnaire..." (pp. 532).

# Citizen Involvement and the IPC Scales

Levenson (1972b) studied a population of 96 adults to determine if I, P, C scores could be related to anti-pollution behaviors. One third of the  $S_s$  were selected randomly from the membership of a local anti-pollution group. Another third were selected from those who knew of the anti-pollution but decided not to join. The final third were not aware of the anti-pollution group. A series of scales including the I, P, C scales, an Involvement Activities Checklist and a measure of knowledge about pollution were administered to all the subjects. Levenson (1973b, pp. 3) presents the following summary of results. Results indicated that while the C scale had no relationship to involvement for females, males who believed that chance did not control their lives were involved in significantly more activities than those who perceived that chance had more control. No significant results relating the I and P scales to involvement were found. Similarly, male non-members scored significantly higher on the C scale than did male members. There were no significant differences between members and non-members on the I or the P scales.

It thus may be reasoned that expectations of control by powerful others or low expectations for control by self do not diminish involvement because the potentials for control still exist. For the high chance believer, however, there would be no such hope of control and so high C scale scores should be less involved.

# Information and IPC Scales

Seman and Evans (1962) conducted a validation study of the I-E scale by relating scores to the amount of information hospital patients had with respect to their illness. The theoretical rationale behind the study was that people who were internally oriented would attempt to control their environment through knowledge (Levenson 1973b). Results indicated that the more externally oriented the patient, the lower he/ she scored on an objective test about their illness.

A similar validation study was used with the I, P, C scales and knowledge of pollution matters. The sample population included subjects who were known to be members of the anti-pollution group discussed in the previous section of this paper (i.e., Citizen Involvement and I, P, C Scales). It was found that males who believed chance or fate controlled their lives had significantly less information than did those who felt chance did not control their lives. No significant relationship was found between P or I scores and amount of information.

## Student Activism and I, P, C Scales

Levenson (1973b) reports that a Master's Thesis done by Jim Miller at Texas A & M involved the administration of Kerpelman's Political Activity Scale - a measure of Conservationism-Liberalism and the I, P, and C scales to 99 undergraduate students. The intent of the study was to investigate possible relationships between student political ideology and activism and IPC orientation.

Analysis indicated that the I scale scores were unrelated to ideology or activism. However, significant findings with the C scale indicate that conservatives believe less in control by chance forces than liberals. In reference to the P scale, liberal activists had significantly higher P scale scores than conservative activists. Levenson speculated that conservative students might be discouraged from activism if they have a high perception of powerful others, while such perceptions might encourage the activism of liberals, who are by definition against the status quo.

# Parental Anticedents and I, P, C Scales

In an effort to examine the relationship between parental rearing and expectancies of control the I, P, C scales and the Perceived Parenting Questionnaire were administered to 276 undergraduates (Levenson 1973a, 1973b). Parental behaviors associated with internality were perceived differentially depending upon sex of the respondent. Males who perceived themselves to be helped and taught by their mothers had higher I scale scores. There was no such findings for females. However, girls who perceived that their mother did not worry about them had

significantly higher internal scores than those who thought their mothers were protective.

Individual's perceptions of the extent to which their parents were demanding, punishing, and controlling were all positively related to scores on the powerful others scale. Subjects who had problems in figuring out what to expect from their parents had significantly more perceptions of the world as unordered or as controlled by chance.

In addition to the above validation studies, Levenson has also found IPC factors operating differentially among prison inmates (Levenson 1974) and among psychiatric patients (Levenson 1973c). In summary, it appears that the refinement of the I-E scale into the tripartite I, P, C division is justified by a number of studies. Levenson has made a contribution to L of C measurement by demonstrating the utility of employing these factored scales. If, in fact, those who believe in powerful others differ from chance oriented people (as research seems to indicate) in cognitive and behavioral outcomes then it might prove advantageous to apply these two belief systems toward the expectancy assessment of environmental action taking behavior. Taking this direction may lead to a more sensitive analysis of proposed relationships between L of C and environmental action, than if the unidimensional I-E approach were pursued.

### Environmental Action Categories

Locus of Control theory contends that a person's expectancies may change from situation to situation. For example, an individual may

behave in a predominantly internal fashion when dealing with academic goals but be significantly more external in his behavior when love and affection are the goals involved (Phares 1976, pp. 40). Given the variance in expectancy from situation to situation L of C prediction ought to be enhanced when we measure perceived L of C as it related to a specific situation.

Environmental issues or problems present a rather diverse set of situations. Causes and effects will undoubtedly vary from issue to issue. Although the casues and effects may vary there are similar types of environmental actions that can be applied toward the remediation of these varying situations.

Reference to specific types of actions that can be taken across situations is made by Stapp (1971):

Specifically, citizens make these decisions as they cast votes on community issues; as they elect representatives to policy-making bodies; as they directly act upon the environment itself... They can ask informed questions... serve on advisory and policy-making committees... support sound legislation... (pp. 105-106)

Hirst and Schuck (1971) list the following as possible actions that can be taken by an individual or group "(a) leading an ecologically sensible life; (b) joining local, regional and national environmental organizations; (c) writing and influencing legislation and legislators; and (d) pressing legal actions against polluters." (on. 204).

Mason (1974, pp. 40-41) has classified the responses of society to an environmental crisis into five categories. Peyton (1977) states that these categories could be considered as a classification scheme for environmental actions.



 <u>Educational</u> - the creation of under-graduate and professional programs in environmental education at all levels of education, and government... and increasingly in those industries most closely associated with resources of the environment;

(2) <u>Political</u> - the generation of a number of issues related to the environment that have varying degrees of voter interest in all levels of the political process;

(3) <u>Economic</u> - the institution of various types of resource conservation measures including recycling, rationing, and special taxation designed to shift some of the costs of production from the environment back to the marketplace;

(4) Legal - the apparent interest in environmental law and attorneys as advocates for the environment with resultant challenge to existing laws and redefinition of terms relevant to new legislation related to the environment;

(5) <u>Cultural</u> - the apparent attempt to variously institutionalize a type of land or environmental code of ethics or standards within which society may choose to operate as it interacts with the environment in coming generations.

Hungerford and Peyton (1980) have attempted to combine the various environmental actions identified in the literature into a threepart paradigm. They identify and define specific categories of action, levels at which these actions can be taken, and criteria for selecting a particular action.

#### Categories of Environmental Action

 Persuasion: An effort to verbally motivate human beings to take positive environmental action as a function of modified values, e.g., argumentation, debate, speech making letter writing.

- <u>Consumerism</u>: An economic threat by an individual or a group aimed at some form of behavioral modification in business or industry (e.g., boycotting) or some conservative mode of behavior with respect to goods and/or services (e.g., discriminating and conservative use of goods and services).
- <u>Political Action</u>: An effort aimed at persuading an electorate, a legislator (or legislature), or executive governmental agency to conform to the values held by the person or persons taking that action, e.g., lobbying, voting, supporting candidates.
- 4) Legal Action: Any legal/judiciary action taken by an individual and/or organization which is aimed at some aspect of environmental law enforcement or, a legal restraint preceding some environmental behavior perceived as undesirable, e.g., law suits, injunctions.
- Ecomanagement: Any physical action taken by an individual or a group aimed directly at maintaining or improving the existing ecosystems, e.g., reforestation, landscaping, installing bird boxes.

Indirect economic actions of an individual are not well represented in the environmental action categories proposed by Hungerford and Peyton. For example, it could be argued that membership in environmental organizations and/or donations to environmental causes constitutes environmentally responsible behavior. Although these may be indirect environmental actions, they nonetheless involve more than a verbal committment by the contributing individual. This investigator would propose that the title of Consumerism be changed to Economic Action and redefined as:

> <u>Economic Action</u>: Constitutes an action similar to one of the following; a) an economic threat by an individual or group aimed at some form of behavior modification in business or industry, e.g, boycotting; b) some conservative mode of behavior

with respect to consumption of goods and services, e.g., purchase of recycled materials; c) some monetary contribution to an individual, group, or institution that actively favors or works for a position supported by the contributor, e.g., donations to environmental causes; membership fees paid to environmental activist organizations.

Economic action, as defined above, provides a more comprehensive approach to the various monetary actions that can be brought to bear by an individual on an environmental issue.

> Relationship Between Environmental Action Taking and Locus of Control

Locus of Control has been assessed across a variety of age groups, populations and topic areas. Results from these investigations allow a number of well grounded generalizations to be made about L of C's relation to human behavior (Lefcourt 1976; Phares 1976).

Peyton and Miller (1980) have described several L of C generalizations, supporting research and implications for EE. These were summarized in Chapter one of this study. In another section of the Peyton and Miller paper a model is presented in an attempt to graphically relate some of the many variables and processes which effect environmental action taking behavior (Figure 2.3). Within this model the conceptual niche of L of C, as an impinging variable on environmental action taking, can be visualized. The model analyzes the behavior of writing a letter to a senator about the Alaskan Land Bill, and is generally explained as follows:

The left side of the model includes those impinging variables (knowledge and experiences), beliefs ( $B_1$  and  $B_2$ ), and attitudes ( $A_1$ ), which EE has traditionally dealt with. More recently EE literature has encouraged, including a knowledge of, and



Figure 2.3. Anatomy of an Environmental Behavior (Peyton and Miller, 1980, pp. 184).

ANATOMY OF AN ENVIRONMENTAL BEHAVIOR



Figure 2.3.

experiences with, environmental problem solving as reflected by the impinging variables on the upper right side of the model... in addition, L of C implies that other beliefs (B<sub>3</sub> and B<sub>4</sub>) and attitudes (A<sub>2</sub>) are important considerations in bringing about a specific environmental action.

The processes involved as precursors to an environmental action are implied by the frame of reference component. The paradigm assumes that a citizen has a frame of reference which reflects all past learning experiences, values, beliefs, and attitudes, and which serves to process any new knowledge and/or experience. Some of this new input is modified to "fit" into the existing frame of reference (assimilation). In other cases, the frame of reference itself is adjusted to accept new perspectives (accomodation). The result is a constantly evolving frame of reference comprised of new beliefs and attitude systems. The attitude systems prevailing at any given time will determine the types of behaviors. if any. that are engaged in (pp. 183-185).

With the exception of some episodic studies based on the use of generalized L of C scales little effort has been expended by investigators to validate the proposed relationship between environmental action taking and L of C beliefs. Peyton and Miller (1980) recommend the development of "valid and reliable instruments which will measure situation specific (i.e., L of C in environmental problem solving) rather than generalized expectancy of reinforcement" (1980, pp. 185).

As previously discussed, Levenson (1972b) found that males who believe that chance did not control their lives were involved in significantly more anti-pollution activities than were those who perceived that chance had more control of their lives. Similarly, male members of an anti-pollution group scored significantly lower on the C scale (more internal) than did non-members. In addition, those who believed in chance were less knowledgeable about pollution than their less chance-controlled counterparts. Although Levenson's instrument assesses three separate belief systems (I, P, C), it samples across a variety of life's experiences and is therefore identified as a generalized L of C instrument. As the literature has shown, a generalized instrument may result in weak findings when applied to a specific situation. It is possible Levenson could have improved on her findings if the I, P, C items addressed the specific situation rather than life's experiences in general.

Arbuthnot (1977) developed a study to examine the social and personality profiles of recyclers (N=85 known users of a recycling center) and non-recyclers (N=60 conservative rural church members). The questionnaire administered to the group measured demographics, environmental behavior, attitude/personality and environmental knowledge. A number of questions in the personality/attitude section assessed personal control or L of C beliefs.

It was found that the four best predictors of the use of a recycling center were education, environmental knowledge, general conservatism and lack of personal control (i.e., L of C). Thus, a recycler in this study could be described as a person relatively well educated, knowledgeable about environmental issues, relatively liberal in political, social and religious beliefs and who feels he has some potential impact by his actions. Recyclers were more likely to score lower on Lack of Personal Control questions indicating their perceived ability to exercise control over events in their own lives. Recyclers were more concerned about the future consequences of present policies and felt more compeled to take action. At the same

time recyclers felt that their individual actions may have little long-range impact in the face of the ecologically unsound activities of large corporations and government agencies. Caution, however, must be exercised in reviewing Arbuthnot's results. Personal Control questions (L of C questions) were extracted from a variety of different L of C instruments which could have an effect on reliability and validity of the findings.

In a similar study, Tucker (1978) found that a predictive model consisting of internal-external control (as measured by the I-E scale) social responsibility, age, income, and social class was capable of significantly discriminating between members of a Sierra Club and/or Audubon Society group and the general population. Based on results Tucker identified Sierra Club and/or Audubon Society membership as a relatively "effective operational definition of environmental responsibility" (pp. 410). The model also proved to be an effective discriminator of high and low environmental responsibility in the general population. More specifically, it was found that individuals who undertake environmentally oriented activities perceive themselves as being in control of their life experiences.

Although findings indicate an initial linkage between L of C and environmental responsibility, Tucker recommended that "further research efforts should be concerned with modifying the internal-external control scale to represent more environmentally specific items" (pp. 415).

Smith (1980) was concerned with validating a newly-developed environmental L of C instrument (Tomera 1979) and with exploring the





possible relationships that might exist between a measure of environmental participation and L of C beliefs. The four groups of college students used in the study included in-service elementary teachers N=21), an environmental interpretation class (N=22), an introductory science methods class (N=17) and a group of environmental education students (N=43).

Smith found that the environmental education group perceived themselves to be significantly more involved in environmental actions then did the other three groups. No significant differences were found among the elementary teachers, environmental interpretation class, or the science methods class. Smith points out that these findings are supported by Bluhm (1979). He found environmental educators to be more involved in environmental action than environmental coordinators, pre-service teachers and the general public.

Further data analysis from the Smith study indicated a significant correlation between scores on the Rotter I-E scale and the Environment L of C scale for the elementary teachers group, the interpretation class and for the science methods class. Based on these findings Smith inferred that both instruments measured the same construct. However, she questioned whether either instrument was measuring L of C with respect to environmental action.

Significant low level negative correlations were found between I-E scores, Environmental L of C scores and perceived environmental action taking, only for the environmental education group. Thus, the Environmental L of C scale, which was intended to be more sensitive than the I-E scale, provided the same results. This would seem to indicate that little predictive power was gained by developing the Environmental L of C scale.

The Environmental L of C scale was a brief, four item, forced choice instrument. Validity questions arise since item and/or whole test reliability was not determined. Due to the rather inconclusive findings, Smith (1980) recommended further research be conducted with a more comprehensive valid and reliable situation specific instrument.

Miller (1981) conducted a study to determine if a Youth Conservation Corps experience had an effect on the participants' L of C. Levenson's I, P, C scales were used to measure the participants' L of C before and after the experience. Findings indicated no evidence that the YCC experience in general influenced L of C development in participants. However, positive correlations were found between reported number of environmental actions taken and internality. Based on these results Miller recommended the development of a L of C measure specific to environmental action situations so that the indicated relationship between L of C and environmental action taking behavior might be better investigated.

#### Literature Review Summary

Locus of Control constitutes a personality dimension that can be quantified and used along with other variables to explain and/or predict human behavior. The concept of L of C was originally introduced as one of four equally weighted variables in Rotter's Social Learning Theory and it can best be understood within the context of this theory.

The literature proposes that L of C may be one of many variables which impinge on the environmental action taking behavior of an individual.

Therefore, L of C research findings may have implications for the design of more effective environmental education programs.

Those research studies that indicate a relationship between L of C and environmental action taking have been brief and/or based on the use of generalized instruments which are subject to predictive shortcomings when applied to specific situations. Researchers have recommended that a L of C instrument specific to environmental action be designed and used to further investigate the proposed relationship between L of C beliefs and environmental action taking behavior.

Developing and refining situation specific instruments which discriminate between different external beliefs (e.g., powerful others vs chance) have proven fruitful. Incorporating these same refinements to further investigate L of C's relationship to environmental action taking behavior may also prove worthwhile.

### Chapter 3

# Research Procedures

The purpose of this study was to construct a Locus of Control (L of C) instrument which could be used to measure the perceived expectancy of an individual for taking specific types of environmental action in a stated situation. In addition, this instrument was tested for initial evidence of reliability and validity. The instrument designed in this study is entitled the Perceived Environmental Control Measure (PECM).

This chapter describes procedures used in instrument design, pilot and field testing of the instrument, as well as methods used for data analysis.

# Instrument Design

The final PECM is composed of two major sections. The first section contains the summary of an environmental issue and the second section contains the PECM statements. In this study a third section was attached to the PECM. This section contained questions on the extent and types of environmental actions actually taken by the respondent. This data was necessary to assess contruct validity of the PECM. Further rationale for the content development and inclusion of the various sections is presented below.

# Section I - The Environmental Issue

In section I of the PECM, respondents are asked to read a summary of an environmental issue and to consider themselves as directly involved in the issue. After reading the issue, the subject is directed to respond to the PECM statements.

Rationale for inclusion of the issue is based on Rotter's Social Learning Theory (SLT). According to SLT the probability of a given behavior is a function of the expectancy that a reinforcement will follow, the value of the reinforcement, and the nature of the specific situation in which the behavior is to occur. The environmental issue summary places the reader in a "specific situation." The reader is also confronted with a "reinforcement" (i.e., environmental quality outcome of the issue) that should be of some concern or value to the individual.

In addition, the issue is designed to make it possible for an individual to apply any or all five categories of environmental action which are synonymous with the behavior component of Rotter's SLT.

Thus, three classes of variables from the SLT are addressed by the environmental issue summary: 1) the specific situation; 2) the valued reinforcement; 3) a potential class of behavior.

# Section II - PECM Statements

Section II of the PECM is designed to measure the final component of Rotter's SLT, which is the "expectancy" for reinforcement (i.e., desired outcome) through use of the various environmental actions (i.e., behaviors).



It could not be assumed that the respondent would identify or associate the use of all environmental action categories with the situation described in Section I. To be assured that the respondent was aware of the actions that could be taken a definition of each is provided in Section II of the PECM. Following each environmental action definition are a series of L of C statements that pertain to the use of that action in the given situation.

#### Item Content and Scale Construction of the PECM

Initially, an item pool was developed with 150 statements divided equally among three L of C belief orientations - Internal (I), Powerful Others (P), and Chance (C). These belief orientations were applied equally across five categories of environmental action political action, persuasive action, economic action, and ecomanagement (environmental action categories are defined in Chapter 2 and Appendix B).

Examples of I, P, and C statements as they related to one of the five environmental action categories are presented in Figure 4. Letters in the parentheses indicate whether the item represents I, P, or C orientation.

Developing the PECM scale using the I, P, or C orientations and the five categories of environmental action as content parameters allows the instrument to capitalize on two refinements in I-E measurement that have proven fruitful. First, identifying and directing expectancy statements toward environmental actions allows the instrument to be situation specific. That is, it addresses behaviors that are POLITICAL ACTION: An effort aimed at persuading an electorate, a legislator (or legislature), or executive governmental agency to conform to the values held by the person or persons taking that action, e.g., lobbying, voting, campaigning for candidates, etc.

- (C) I believe that what is going to happen in this situation will happen regardless of any political action I take.
- (I) By participating in some type of political action, I can play an effective role in determining the outcome of this situation.
- (P) The political action I could take in this situation would be of little value in determining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.

Figure 3.1 Examples of Internal (I), Powerful Others (P) and Chance (C) statements as they relate to Political Action. specific to the situation described. Second, using the tripartite division of I, P, C allows the instrument to be more sensitive to the different external orientations that were identified by Levenson (1972b).

# PECM Scale Construction

Scales are devices constructed or employed by researchers to quantify the responses of a subject on a particular variable (Tuckman 1978). The scale employed in quantifying responses to PECM items is a six-point Likert-type scale.

A number of researchers support the use of a Likert-type format in measuring attitudes or beliefs. An important study concerned with the effectiveness of different attitude scales was conducted by Tittle and Hill (1967 in Borg and Gall 1979). It was reported that this study compared the effectiveness of various scales (i.e., Likert, Guttman, Sematic Differential, Thurstone, Self Rating) in predicting objective indices of voting behavior. The Likert scale was found to be superior to all other scales tested; it yielded a mean correlation coefficient of .54 with objective indices of voting behavior. Oppenheim (1966) also supports the use of a Likert-type scale. He states that the Likert scale tends to yield "good" reliability because of the wide range of answers permitted to respondents. Millward (1975, pp. 50 in Burrus-Bammel, 1978, pp. 44) states that Likert-type scales are "easy to construct and administer" as well as being "valid and reliable in measuring attitudes towards a variety of environmental topics."


### Scoring the PECM

In the PECM, the P and C items are written in the external direction and items in the I scale are written in the internal direction.

The P and C items were scores by the following key:

```
Disagree strongly = 1
Disagree somewhat = 2
Disagree slightly = 3
Agree slightly = 4
Agree somewhat = 5
Agree strongly = 6
```

The I items were scored by the following key:

```
Disagree strongly = 6
Disagree somewhat = 5
Disagree slightly = 4
Agree slightly = 3
Agree somewhat = 2
Agree strongly = 1
```

The I item scoring is reversed from P and C item scoring. This reversal is necessary so that all three scales reflect a common direction with regards to the externality and internality continuum. A relatively high score on the I items will reflect a low belief in that orientation. A relatively high score on the P or C items will reflect a high belief in those orientations. A relatively low score on the I items will reflect a high belief in that L of C orientation; whereas a relatively low score on P and C items reflects a lack of belief in those orientations.

Analysis of data from Likert-type scales are usually based on summated scores. To provide a manageable yet reliable and valid instrument it was proposed the final PECM contain 45-I, P, C items applied equally across the five categories of environmental action. Three types of summated scoring systems were applied to these 45 items and tested for utility. These scoring systems included individual I, P, and C scores summed across all environmental action categories; combined I+P+C scores for each environmental action category; and, combined I+P+C scores summed across all environmental action categories (total PECM score).

Table 3.1 presents the number of items and range of scores for the scoring system that recognized individual I, P, and C scores summed across all environmental action categories (total I, P, or C score). Based on this scoring system an individual received three scores - an I, a P and a C score. The range of each score falls on or between nine (internal orientation) and 45 (external orientation). This system of scoring differentiates between the external orientations of powerful others and chance and is similar to the tripartite analysis proposed by Levenson (1972b).

The second scoring system considered and tested for utility was the combined I+P+C scores (total action category scores) that were achieved by an individual for each action category. Based on this system the individual received five scores. The number of items involved in each score and the range of each scores is presented in Table 3.2. This type of scoring system falls back on the unidimensional approach to L of C measurement. That is, a person may exhibit a common tendency to score internal or external about the personal use of environmental action in a given situation. Differentiation between different types of external orientations is not considered in this scoring system. A relatively high combined I+P+C score could be assumed to reflect an external orientation toward the particular action category in which it was achieved.

Variable	· · · · ·	Range of Scores Internal External
Internal (I) Score	15=3 I's (5 action categories)	1590
Chance (C) Score	15=3 C's (5 action categories)	1590
Powerful Others (P) Score	15=3 P's (5 action categories)	1590
	45 Total Items	

Table 3.1. Number of Items and Range of Scores for Total I, P, and C Variables in the PECM.

Variable	Tota	.1	Nu	ımł	bei		of	It	ems	Range of Scores Internal External
Political Action Score	9 (	3	I	+	3	P	+	3	C)	954
Persuasive Action Score	9 (	3	I	+	3	P	+	3	C)	954
Ecomanagement Score	9 (	3	I	+	3	P	+	3	C)	954
Economic Action Score	9 (	3	I	+	3	P	+	3	C)	954
Legal Action Score	9 (	3	I	+	3	P	+	3)		954
	45	To	ta	1	It	e	ns			

Table 3.2. Number of Items and Range of Scores for Total Action Category Variables in the PECM.

A third type of scoring system being considered and tested for utility is the combined I+P+C score that can be achieved by an individual across all action categories (i.e., total score). The number of items involved in this scoring system and the possible range of scores is presented in Table 3.3. Based on this system the respondent will receive only one score for the entire PECM. This scoring system also reflects the unidimensional approach to L of C measurement. A relatively low total score might be assumed to reflect internality toward taking environmental actions in general. A relatively high total score might be assumed to reflect externality toward taking environmental actions in general.

### Section III - Citizen Action Questions

The third section attached to the PECM consists of questions designed to assess an individual's actual - perceived use of political, persuasive, economic, ecomanagement and legal actions (Appendix D). This section is not intended to be a permanent part of the final PECM. It is included in this study to test for evidence of instrument validity. Theoretically those who score internal on the PECM should also score relatively high on the environmental action questions (this hypothesis is discussed further in the validity section of this Chapter).

### Scoring Citizen Action Questions

One summated score was used to quantify the action taking reported by each respondent. An individuals final summated score for all citizen action questions could range from 0-121 points. A series of citizen action questions required a numerical response from the subject.

Variable	Total Number of Items	Range of Scores Internal External
Total Score	45 = 15 I + 15 P + 15 C	45270
	45 Total Items	

Table 3.3. Number of Items and Range of Scores for Total PECM Scores.

That is, the subject was asked to state the number of times he/she had taken actions within a certain time period. Each action cited was worth one point. The maximum on one question was six points. An example (Part A) is presented below.

How many times during the past two (2) years have you ...

 A) ...contacted a politician to express your support or opposition to a bill they have introduced or are considering for passage.

3 (no. of times)

B) (Please list up to three (3) titles or topics of such bills below).

3.

- 1. Bottle Bill
- 2. Alaskan Lands Bill

In this case, the individual responded three so he/she received three points. A response of eight would have received the maximum of six points. If no response was provided zero points would be received. As a further check on activism subjects were asked to list up to three examples of the actions they claimed to have taken (Part B above example). Subjects received two points for each example of an action they listed. In Part B of the above example, the individual listed two actions and received four points. If no activities had been listed, zero points would have been received. In the final two citizen action questions (Section III), the respondent was asked to only check ( $\nu$ ) responses that he/she perceived to describe actions he/she had taken. These questions are restated below.

Have you used your right to vote in an attempt to improve situations (issues) about which you are concerned?

Yes No

Please place a check mark  $(\checkmark)$  in front of each activity you have participated in over the last two (2) years.

- I have picked up litter and/or organized a litter campaign.
- 2. I have taken steps to reduce energy consumption.
- I have avoided the purchase of a product because of its negative effect on the environment.
   I have taken steps to reduce my water
- 4. <u>I have taken steps to reduce my water</u> consumption.
- I have recycled paper, glass, metals and/ or organic refuse.
- I have participated in a habitat improvement project (e.g., planting shrubs for wildlife, putting up birdhouses, stream renovation).

In the first question the individual received one point for checking "yes" to using the "right to vote." A "no" response would have recieved zero. In the second question each action checked was also worth one point. The range of point values for this question was 0-6.

## Validity and Reliability of the PECM

## Establishing Evidence of Content Validity

Rather than test the validity of measures after they are constructed, one should ensure validity by the plan and procedures of construction (Nunnally 1978, pp. 72). Two approaches were pursued to establish initial evidence of content validity for the PECM. First, an item pool was developed based on a specific set of objectives. Second, items were selected from the item pool, for the final instrument based on relatively high item subscale and/or item total correlations.

Borg and Gall state that "content validity is determined by systematically conducting a set of operations such as defining in precise terms the specific content universe to be sampled, specifying objectives, and describing how the content universe will be sampled to develop items." The content universe of PECM items is based on I, P, C Locus of Control orientations applied to five categories of environmental action (i.e., political, persuasive, ecomanagement, economic, and legal action). Specific objectives applied to development of the PECM items are presented below.

- Items in the I-scale will be constructed to elicit responses which measure the degree to which an individual perceives his/her use of an environmental action will have an effect, or control, the outcome of a stated situation.
- Items in the P-scale will be constructed to elicit responses which measure the degree to which an individual perceives powerful others, more than his/her own use of an environmental action, will control or have an effect on the outcome of a stated situation.

 Items in the C-scale will be constructed to elicit responses which measure the degree to which an individual perceives chance or fate, more than his/her use of an environmental action, will control or have an effect on the outcome of a stated situation.

Based on these objectives an item pool of 150 statements was developed and through pilot studies item total correlations (how well an item correlated with all other items that are proposed to measure the same variable) were calculated. Items with relatively high item total correlations were retained for the final PECM. This method of item selection is recommended by Nunnally (1978), Tuckman (1978) and Oppenheim (1966); it should yield a measure with a set of rather homogeneous items (i.e., items that measure something in common) which supports evidence of content validity.

## Establishing Evidence of Construct Validity

Construct validity is defined as "the extent to which a particular test can be shown to measure a hypothetical construct" (Borg and Gall 1978, pp. 216). To obtain information needed to establish evidence of construct validity, the investigator formulates hypotheses about those who have high scores on the instrument in contrast to those who have low scores. These hypotheses or theoretical formulations lead to certain predictions about how subjects at different score levels on the instrument will behave on certain other tests or in certain defined situations. If the investigators' theory about what the instrument (developed from the construct) measures is correct most predictions should be confirmed and evidence of construct validity is supported (American Pyschological Association 1974). As discussed in Chapter 2, researchers have shown some indication of a relationship between internality and environmental action taking behavior. Theoretically, similar findings should be attained with the PECM. That is, the more action taking an individual is involved in, the more he should socre in an internal direction on the PECM. To investigate this hypothesis, scores on a series of questions regarding actual-perceived use of political, persuasive, economic, legal and ecomanagement type actions were correlated with PECM scores. To support evidence of construct validity those who score internal on the PECM should score relatively high on the question regarding perceived use of the various actions.

## Establishing Reliability of the PECM

Coefficients of internal consistency will be calculated for all scoring systems being considered. The method used for estimating internal consistency will be Cronback's Alpha which yields an estimate of reliability based on average correlation among items within the instrument. Nunnally (1978) states that this type of reliability test should be applied to all new measurement methods.

## Pilot Studies I and II

Initially, a PECM item pool was developed and two pilot studies were run with the primary objective of analyzing and selecting valid and reliable items for a final instrument. A description of each pilot study is presented below.

#### Pilot Study I

The primary objective of pilot study I was to select a relatively internally consistent group of items for pilot study II. A total item pool of 150 statements was developed for the first pilot study. These items were divided into five separate instruments based on the five categories of environmental action. Each of the instruments contained the same environmental issues summary and 30 I, P, C statements directed toward the use of a particular environmental action in the given situation (issue). The I, P, C statements were randomly arranged (using a random number table) in each of the instruments. Figure 5 presents a listing of the five instruments.

Each instrument listed in Figure 3.2 was administered to a different sample of undergraudate students (N>50). These samples were drawn from three different universities and were selected based on availability. Each sample contained a diverse background of college majors. Results of this study are presented in Chapter 4.

#### Pilot Study II

Three objectives were set for pilot study II: 1) analyze and select reliable items for the final PECM; 2) investigate the reliability of the various scoring systems being considered; 3) test the PECM for evidence of construct validity.

With the exception of being longer, the instrument developed for pilot study II was intended to have the same format as the final PECM. An outline of the instrument is presented below (the complete instrument is provided in Appendix B).

Ins	trument Variable	Total Items
1.	Ecomanagement	30 IPC statements = 10 I + 10 P + 10 C
2.	Persuasive Action	30 IPC statements = 10 I + 10 P + 10 C
3.	Political Action	30 IPC statements = 10 I + 10 P + 10 C
4.	Economic Action	30 IPC statements = 10 I + 10 P + 10 C
5.	Legal Action	30 IPC statements = 10 I + 10 P + 10 C

Figure 3.2. Listing of the Five Instruments Used in Pilot Study I.

I. Introduction

II. Section I

A. Summary of an environmental issue

III. Section II

A. Definition of each environmental action category

B. Each definition precedes 15 IPC = 5I + 5P + 5C statements directed toward the particular environmental action defined

C. Total number of IPC statements in the instrument is 90 = 5 action categories x 15 statements per/category.

IV. Section III

Instruments in the above format were administered to two classes of undergraduate students at Michigan State University (MSU). The first class consisted of students enrolled in a course designed to survey environmental issues (N=91). The second class consisted of students enrolled in an introductory course in fisheries and wildlife management (N=29). Results of this study are presented in Chapter 4.

## Field Testing the PECM

The PECM developed from the two pilot studies was subjected to four field tests. The intent of these field tests was to assess instrument reliability and validity and to explore the relationships that might exist between perceived environmental action taking and L of C. This section presents descriptions of the final PECM(s),



the four groups it was administered to, and the research questions which were posed.

## Description of PECM

The PECM(s) used in the field tests were of a format similar to the longer instrument used in pilot study II. However, the final instrument(s) were only 45 IPC items rather than 75 and included demographic questions. Also, in one of the field tests, the effects of two different environmental issue summaries was investigated. The solid waste issue used in pilots I and II was given to half of a selected group, while the other half of the group received an acid rain issue summary (Appendix C).

## Sample Sources and Procedures for Data Collection

Field testing of the PECM involved collecting data from four groups of participants: 1) undergraduate students in an interdisciplinary environmental issues survey course; 2) undergraduate students in an introductory biology course for non-science majors; 3) members of the Central Michigan Sierra Club (MSU); and 4) a sample of K-5 teachers selected from 20 school districts in the Grand Rapids, Michigan area.

<u>Group I</u>: This group consisted of undergraduate students enrolled in a course entitled Resource Ecology and Man (N=85). The course presents a survey of environmental issues and may be taken as an elective to meet part of the basic natural science requirements of several programs at MSU. Students in the course represent freshman, sophomore, junior and senior levels as well as a variety of majors.

This class was chosen based on its large enrollment, students' diverse backgrounds and availability.

The PECM was administered to the group during their first week of classes (spring term). Students were given in-class time to fill out and return the instrument.

<u>Group II</u>: This group consisted of undergraduate students enrolled in an introductory biology course for non-science majors (N=78). Approximately two thirds of the class consists of education majors and the final third represents a variety of non-science majors. The group was chosen based on large enrollment and availability.

This group was divided into two subgroups. Half of the group (group II A) was given a PECM with the solid waste issue summary. The other half of the group (group II B) was given a PECM with the acid rain issue summary. Students were given in class time to fill out and return the instruments. To assure some randomness in distribution of the two issues they were handed out on an every-otherseat basis.

<u>Group III</u>: This group consisted of approximately 23 members of the Michigan State University/Central Michigan, Sierra Club who volunteered to participate. This membership is often involved in taking actions on various environmental issues. Individual members come from a variety of backgrounds.

The PECM was distributed at the Club's monthly meeting. Members were asked to fill out and return the instrument within seven days.

<u>Group IV</u>: This group consisted of a sample of K-5 teachers (N=159) selected from 20 school districts in the western Michigan area. The group was divided into two subgroups. Fifty-nine

of the teachers (group IV A) have worked with an area environmental education consultant and have implemented environmental education programs in their classrooms. The other 100 teachers (group IV B) represented the faculties of 10 schools selected randomly from a list of schools in the same area that have not worked with the environmental education consultants. The instrument was distributed by mail. Teachers were asked to fill out and return the instrument within seven days after receiving it.

#### Research Questions

The purpose of this study is to answer the following research questions. A series of the questions are followed by research hypotheses (i.e., questions 2, 3, 4, 5). These hypotheses are posed to test the PECM for evidence of construct validity. The remaining research questions are exploratory in nature.

<u>Research Question 1</u>. Can evidence of reliability and validity (content and construct) be established for an instrument developed to measure perceived L of C toward taking specific categories of environmental action in a stated situation?

<u>Research Question 2</u>. What relationship exists between scores on a measure of citizen action and total PECM scores within the environmental issues class, the Sierra Club group, each of the teacher subgroups and each of the introductory biology class subgroups? <u>Research Hypothesis 2.1</u>. A significant ( $p \le .05$ ) correlation will exist between scores on a measure of citizen action and total PECM within each of the selected groups.

<u>Research Question 3</u>. What relationship exists between scores on a measure of citizen action taking and total I, P, and C scores for the environmental issues class, the Sierra Club group, each of the teachers subgroups and each introductory biology class subgroup? <u>Research Hypothesis 3.1</u>. A significant negative correlation ( $p \le .05$ ) will exist between scores on a measure of citizen action and total I scores for each selected group.

Research Hypothesis 3.2. A significant negative correlation ( $p \le .05$ ) will exist between scores on a measure of citizen action and total P scores for each selected group.

<u>Research Hypothesis 3.3</u>. A significant negative correlation ( $p \le .05$ ) will exist between a measure of citizen action and total C scores for each selected group.

<u>Research Question 4</u>. What relationship exists between scores on a measure of citizen action and total I+P+C scores for each environmental action category within the environmental issues class, the Sierra Club group, each of the teachers subgroups and each of the introductory biology subgroups?

<u>Research Hypothesis 4.1</u>. A significant negative ( $p \le .05$ ) correlation will exist between scores on a measure of citizen action and total I+P+C scores for each environmental action category within each of the selected groups.

<u>Research Question 5</u>. What relationship exists between total I, P, and C scores within the environmental issues class, the Sierra Club group, each of the teachers subgroups and each of the introductory biology subgroups? <u>Research Hypothesis 5.1</u>. A significant positive ( $p \le .05$ ) correlation will exist between total I, P, and C scores within each of the groups selected (a relatively high I score refers to lack of belief in internal control.)

<u>Research Question 6</u>. Is there a significant difference between total I, P, or C scores within the environmental issues group, the Sierra Club group, each of the teacher subgroups and each introductory biology subgroup?

<u>Research Hypothesis 6.1</u>. A significant difference in mean I, P, and C scores will be determined within sample groups.

<u>Research Question 7</u>. Is there a significant difference  $(p \le .05)$ by sex, between environmental action category scores within the environmental issues group, the Sierra Club group, each teacher subgroup and each of the introductory biology subgroups?

<u>Research Question 8</u>. Do biology subgroups differ significantly ( $p \le .05$ ) on total PECM scores, I, P, C scores, total environmental action category scores and/or citizen action scores?

<u>Research Question 9</u>. Do teacher subgroups differ significantly  $(p \le .05)$  on total PECM scores, I, P, C scores, total environmental action category scores and/or citizen action scores?

<u>Research Question 10</u>. Does the environmental issues class and biology subgroup II A differ significantly ( $p \le .05$ ) with respect to total PECM scores and/or citizen action scores? <u>Research Question 11</u>. Based on total PECM scores and/or citizen action scores, do teachers as a group (groups IV A and B) differ significantly ( $p \le .05$ ) from college students administered the solid waste version of the PECM?

<u>Research Question 12</u>. Do total PECM scores and/or citizen action scores for the Sierra Club differ significantly ( $p \le .05$ ) from a combined sample of all other subjects who responded to the solid waste version of the PECM (i.e., groups I, II A, IV A, IV B)?

### Data Analysis

The Office of Research Consultation at Michigan State University aided in developing the analytical procedure, data preparation and computer programming. Analytical procedures were accomplished using the Statistical Packages for the Social Sciences (SPSS).

Various parametric statistics were utilized to examine the research questions posed in the previous section. The Likert-type scale, as employed in the PECM, is characterized as an interval scale (Tuckman 1978). Borg and Gall (1979) state that when data meet the assumption of being interval scores, it is advisable to use parametric statistics. When using interval scores, moderate departure from theoretical assumptions has been shown to have very little effect upon the value of parametric statistics.

Cronback's alpha reliability coefficients were calculated for the total PECM and for each of the various subscales. In addition, these coefficients were calculated independently for data collected from each teacher subgroup, the environmental issues class, the Sierra Club group and for each biology class subgroup.

Research questions 2-6 along with corresponding hypotheses are based on L of C/IPC theory and were tested to determine if the PECM exhibits evidence of construct validity. Research questions 7-12 were designed to further explore relationships that might exist between environmental action taking behavior and L of C beliefs.

Specifically, research questions 2-5 addressed an investigation of relationships between certain variables. A Pearson's product-moment correlation (Pearson's r) was employed for analysis. The Pearson's r can be used to determine the degree of relationship between two sets of scores (i.e., variables). Pearson's r is applicable to analyzing interval scores (Tuckman 1978) and/or continuous scores (i.e, when scores on one variable can theoretically occur at any point along a continuum) (Borg and Gall 1979). Both of these characteristics apply to the Likert-type scale used in the PECM. Significance of the various coefficients were determined at the .05 level.

Research questions 6-12 addressed an investigation of significant differences between certain scores. A series of analysis of variance programs was employed to explore these research questions. Specifically, if differences between environmental action category scores or IPC scores, by sex, or by group, were being examined an SPSS MANOVA Profile Analysis (repeated measures) program was employed. This program addresses three questions. First, are the population mean profiles similar, in the sense that line segments of adjacent tests are parallel?

Second, assuming parallelism, are the profiles of sample groups equal. Third, assuming parallelism, are the response means for the various tests equal.

If differences between total PECM scores or citizen action scores were being examined, a one-way analysis of variance was computed using SPSS MANOVA and Planned Contrasts when appropriate.

## Chapter 4

### RESULTS OF DATA ANALYSIS

The results of data analysis for the two pilot studies which were used to develop the final Perceived Environmental Control Measure (PECM) are presented in this chapter. In addition, the final PECM was subjected to a series of field tests. The intent of these field tests was to assess the instruments' reliability and validity and to further explore relationships that might exist between environmental action taking behavior and Locus of Control beliefs.

### Pilot Studies I and II Data Analysis Results

The primary objective of pilot study I was to select a relatively homogeneous group of items for pilot study II. Initially, an item pool of 150 PECM statements was developed and divided equally into five separate instruments (Figure 3.2). Each instrument was administered to a separate sample of college students (N > 50).

Criteria used for the retention of items for pilot study II were relatively high item totoal correlations (i.e., how well the item correlated with the other 29 items of the respective instrument) and relatively high item subscale correlations (i.e., how well the item correlated with the other items of the same L of C orientation, i.e., how well a C item correlated with the other nine C items of

the instrument). As discussed in Chapter 3, this method of item selection is recommended by Nunnally (1978), Tuckman (1978) and Oppenheim (1966).

Based on the preceding analysis, 15 items (5I, 5P, 5C) were selected from each of the five instruments. All items selected had a Pearson product moment correlation coefficient (Pearson's r) of greater than .50 with their respective total and subscale scores.

In all, a total of 90 items were selected from pilot study I and collapsed into one instrument for pilot study II. The second pilot study differed from the first in that a subject responded to all five categories of environmental action. This second pilot study also included a series of questions designed to assess an individual's previous use of political, persuasive, economic, ecomanagement, and legal actions (citizen action questions). These questions were included to test the PECM for evidence of construct validity (see discussion on validity Chapter 3).

Instruments were administered to two classes of undergraduate students at Michigan State University (MSU). The first class consisted of students enrolled in a course designed to survey environmental issues (N=91). The second class consisted of students enrolled in an introductory course to fisheries and wildlife management (N=29).

The first objective of pilot study II was to select a homogeneous set of items for the final PECM. Item selection was again based on item total and item subscale correlations. However, in this study "item subscale" refers to the I, P, and C scores totaled across all environmental action categories. In pilot study I "item subscale" referred to the I, P, and C scores within a given environmental action category. A total of 45 items (15I + 15P + 15C) were selected for the final PECM. All the 45 items had a Pearson's r of greater than .55 with their respective total and subscale scores.

A second objective of pilot study II was to determine reliability coefficients for the various scoring systems being considered. Cronback's alpha reliability coefficients (a measure of internal consistency) were calculated for all but one of the PECM scoring systems being considered. The reliability coefficient for the total score (i.e., combined I+P+C score summed across all environmental action categories) was not calculated due to an oversight in programming. However, this coefficient was determined in the final field testing of the PECM. Nunnally (1978, pp. 245) states that "in the early stages of research on predictor tests or hypothesized measures of a construct... reliabilities of .70 or higher will suffice." All of the reported reliabilities for pilot study II were above .84 (Table 4.1) which indicates that the various scoring systems being considered show evidence of high internal consistency (reliability).

A third objective of pilot study II was to test the various PECM scoring systems for evidence of construct validity. It was hypothesized that subjects who scored relatively internal on the PECM would also score high on citizen action questions.

To investigate the relationship between the various PECM scores and the citizen action question scores, a series of Pearson product-moment correlation coefficients (Pearson's r) were calculated. The Pearson's r can be used to determine the degree of relationship between two sets

Variables	Alpha
Total I, P, and C Scores	
Chance (C)	.95
Internal (I)	.96
Powerful Others (P)	.93
Total Action Category Scores	
Ecomanagement	.84
Economic	.95
Political	.93
Persuasive	.95
Legal	.96

Table 4.1 Pilot Study II Reliability Coefficients for PECM Scoring Variables.

of scores (i.e., variables). Pearson's r is applicable to analyzing interval scores (Tuckman, 1978) and/or continuous scores (i.e., when scores on one variable can theoretically occur at any point along a continuum; Borg and Gall, 1979). Both of these characteristics apply to the Likert type scale used in the PECM. Significance of the various coefficients were determined at or below the .05 level.

For each of the various PECM scoring systems being considered, a significant negative correlation ( $P \leq .05$ ) was achieved with citizen action question scores (Tables 4.2, 4.3, 4.4). Individuals with relatively internal scores (low IPC scores) perceived themselves to be taking more actions (high environmental action taking scores) than their comparatively external counterparts. This finding supports the proposed hypothesis and indicates evidence of construct validity for each of the PECM scoring systems used in pilot study II.

# Field Testing Data Analysis Results

Field testing of the PECM involved collecting data from four major groups of participants. Group I consisted of undergraduates enrolled in an introductory environmental issues course (N=85). Students were given time in class to fill out and return the instrument. A total of 81 usable instruments were returned.

Group II consisted of undergraduate students enrolled in an introductory biology course for non-science majors. This group was divided into two subgroups. A total of 40 students (subgroup II A) were given the PECM with the solid waste issue summary and a total of 41 students (subgroup II B) were given a PECM with the acid rain issue summary. The appropriate instruments were handed out during lab

Variables Correlated	Correlation Coefficient <u>r</u>	Significance Level P	Sample Size <u>N</u>
Total Internal (I)			
Scores/Citizen			
Action Scores	4342	.001*	116
Total Chance (C) Scores/Citizen Action Scores	4076	.001*	117
Total Powerful Others (P) Scores/ Citizen Action			
Scores	3418	.001*	117

Table 4.2. Pilot Study II, Pearson Product-Moment Correlation Coefficients for Total I, P, and C with Citizen Action Scores.

\* Significant Relationship (p  $\leq$  .005).

Variables			
Correlated	Correlation	Significance	Sample
with Citizen	Coefficient	Level	Size
Action Scores	<u>r</u>	P	<u>N</u>
Total Political	- 3816	001*	120
Action Scores	5010	.001	120
Total Persuasive	4571	001*	110
Action Scores	43/1	.001*	116
Total Eco-			
management Scores	2131	.010*	119
Total Economic			
Action Scores	3139	.001*	117
Total Legal			
Action Scores	3454	.001*	117

Table 4.3 Pilot Study II, Pearson Product-Moment Correlation Coefficients for Total Action Category Scores and Citizen Action Scores.

\* Significant relationship (p  $\leq$  .05).

Variables Correlated	Correlation Coefficient r	Significance Level P	Sample Size N
Total PECM Scores/Citizen Action Scores	3917	.001*	120

Table 4.4 Pilot Study II, Pearson Product-Movement Correlation Coefficient for Total PECM Scores and Citizen Action Scores.

\* Significant relationship (P  $\leq$  .05).

periods on an every-other-seat basis to provide some randomness in distribution. Students were given time in class to fill out the instruments. A total of 38 usable instruments were returned from subgroup II A and a total of 40 usable instruments were returned from subgroup II B.

Group III consisted of members from the Michigan State University/ Central Michigan Sierra Club. A total of 23 PECMs were distributed at a monthly meeting. Members were asked to fill out the instrument at home and return it by mail. A total of 14 instruments were returned. Ten of these instruments were usable. Four of the instruments were discarded because respondents were not Sierra Club members.

Group IV consisted of a sample of 159 K-5 teachers selected from 20 school districts in the western Michigan area. This group was divided into two subgroups. Fifty-nine of the teachers (subgroup IV A) have worked with an intermediate school district environmental education coordinator and are known to have implemented environmental education programs in their classrooms. The other 100 teachers (subgroup IV B) represented the faculties of ten schools selected from a list of area schools that did not utilize the environmental education coordinator. Instruments were distributed and returned by mail. Twenty-three usable instruments were returned from subgroup IV A. Twenty-eight usable instruments were returned from subgroup IV B. No follow-up of nonrespondents was attempted.

Results of data analysis utilized to explore research questions and hypotheses posed for data collection from groups I-IV are presented below.

Research Question 1

Can evidence of reliability and validity (content and construct) be established for an instrument developed to measure perceived L of C toward taking specific categories of environmental action in a stated situation?

Cronback's alpha reliability coefficients (a measure of internal consistency) were calculated for the total PECM and for each of the PECM subscales. In addition, these coefficients were calculated for data collected from each sample group.

Table 4.5 presents the alpha reliability coefficients for total PECM scores within each sample group. Coefficients for each group were above the .70 alpha recommended by Nunnally (1978). This would indicate that the measure taken as a whole exhibits evidence of high internal consistency (reliability).

Alpha reliability coefficients for total I, P, and C subscales per group are presented in Table 4.6. Across all sample groups and for each subscale acceptable alpha reliability coefficients were achieved (alpha > .70). These findings support evidence of high internal consistency for the I, P, and C subscales.

Table 4.7 presents alpha reliability coefficients determined for total action category subscales within each sample group. Again, all reliability coefficients for respective measures within each sample group were above a .70 alpha indicating that each of the five subscales exhibits evidence of high internal consistency.

Content validity of the PECM is based upon planned development of item content and upon a systematic selection of homogeneous items (see discussion on validity Chapter 3).

Grou	P	N	Variable *Total PECM <u>Alpha</u>
I	Env. Issues Class	73	.97054
II	Bio. Class		
	Group II A (Solid Waste Issue)	38	.95791
	Group II B (Acid Rain Issue)	37	.96075
III	Sierra Club	10	.98057
IV	Teachers		
	Group IV A (EE Group)	21	.98778
	Group IV B (Random Sample)	26	.97298

Table 4.5 Reliability Coefficients of Total PECM Scores for each of the Sample Groups.

\* Total items = 45

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				Variables	
Gro	up	+Approx. <u>N</u>	*Internal (I) <u>Alpha</u>	*Powerful Others (P) <u>Alpha</u>	*Chance (C) <u>Alpha</u>
I	Env. Issues Class	80	.91231	.93652	.92456
II	Bio. Class	3			
	Group IIA (Solid Waste Issu	38 1e)	.88252	.90099	.90888
	Group II B (Acid Rair Issue)	38 1	.88284	.89641	.92865
III	Sierra Club	10	.93343	.95259	.95394
IV	Teachers				
	Group IV A (EE Group)	23	.96652	.96231	.97333
	Group IV B (Random Sample)	27	.91485	.93101	.92596

Table 4.6.	Reliability	Coefficients of	Total	Ι,	Pa	and	С	Subscales
	for each of	the Sample Group	s.					

\* Total items = 9 per variable

+ Missing data caused N to vary slightly for some subscales

Reliability Coefficients of each Environmental Action Category Subscale for each of the Sample Groups. Table 4.7.

					Variables		
Grot	व	Approx.	*Political <u>Alpha</u>	*Persuasive Alpha	*Ecomanagement <u>Alpha</u>	*Economic <u>Alpha</u>	*Legal Alpha
н	Env. Issues Class	81	.92672	.91637	.92599	.95529	.93949
11	Bio. Class	38	.90156	.85962	.93053	.93863	.93720
	Group II A (Solid Waste Issue)						
	Group II B (Acid Rain Issue)	40	.92837	.90278	.87064	.95660	.95143
III	Sierra Club	10	.96094	.95020	.96003	.96907	.96241
IV	Teachers						
	Group IV A (EE Group)	23	.92880	.96750	.95443	.96607	.96807
	Group IV B (Random Sample)	28	.92706	.92207	.94448	.93453	.93849




Table 4.8 presents the corrected item total and respective item subscale correlation coefficients for the environmental issues class (group I). Generally, each item tends to correlate rather well with the total scale and/or with their respective subscales. These results seem to provide evidence that items are functioning in the manner prescribed by the objectives posed for item content development. Results of item analysis for data collected from the other groups did not vary substantially from the results reported for group I and therefore are not reported in tabular form.

Field study research questions two through six, along with corresponding hypotheses, are based on L of C/I,P,C theory and were tested to determine if the PECM exhibits evidence of construct validity. In order to clarify the analysis used to test the proposed hypothesis, descriptive statistics for each of the sample groups are presented in Tables 4.9 through 4.18.

Table 4.9 presents descriptive statistics for each sample group based on total PECM scores. All group means are located in the lower half (internal portion) of the possible range of scores (i.e., 45-270). A comparison of means to medians indicates that total PECM scores seem to approximate a normal distribution.

On a relative basis (comparison of sample groups), group III (Sierra Club) achieved the lowest mean score identifying it as the most internal of the groups. Group IV A (teachers with EE exposure) achieved the pair highest mean score identifying it as the most external of the groups.

Descriptive statistics for total I, P, and C scores per sample group are presented in Tables 4.10, 4.11, 4.12. All group means for each

Matrix of Corrected Item Total and Respective Corrected Item Subscale Correlations for the Environmental Issues Class (Group I). Table 4.8.

Item No.	PECM	I	Р	U	Political	Persuasive	Ecomanagement	Economic	Legal
Item No.	Scale	Scale	Scale	Scale	Scale	Scale	Scale	Scale	Scale
	ы	ы	ч	ы	T	ы	н	ы	ы
-	. 70882	ı	ı	.70564	.75373	ı	ı	ı	ı
2	.65287	.65524	ı	ı	.74050	ı	ı	ı	I
Э	.71862	ı	.71001	ı	.73140	ı	I	ı	I
4	.66894	.61111	I	ı	.66691	1	I	ı	ī
5	.61876	ı	ı	.57530	76669.	ı	ı	ı	ī
9	.76172	ı	.73619	ı	.80146	ī	I	ı	ī
7	.69597	.71381	ı	T	.72376	ī	I.	ı	ı
8	.74939	ı	.74057	ı	.78307	ī	1	ı	ı
6	.64390	ī	ı	.69303	.71499	I	I	ı	I
10	.48913	ı	ı	.52323	ı	.50595	ı	1	T
11	.69229	ı	.75766	,	1	.75699	ı	ı	ī
12	.65755	.70203	ı	ī	1	.62731	ı	ı	I
13	.74259	ı	.74345	ī	ı	.75724	1	I.	T
14	.77132	.74562	ı	ı	ī	.77739	ı	١	ı
15	.7334	ı	.69375	ı	T	.74725	1	1	ı
16	17729.	ı	1	.76291	T	.72505	ı	1	ı

(cont'd).	
4.8.	
Table	

Legal Scale	-1	I	I	I	ł	I	I	1	I	I	I	I	I	I	ł	ı	i	I	I
Economic Scale r		I	I	i	I	I	i	1	I	I	I	I	.83600	.70529	.77157	.81486	.81400	.73989	.76389
Ecomanagement Scale r		I	I	.73654	.71812	.78122	.79452	.68792	.74076	.76858	.71094	.67571	I	ı	I	I	I	I	I
Persuasive Scale r	4	.69706	.79224	ł	ł	i	I	I	I	I	I	I	I	ı	I	I	i	ł	I
Political Scale r	•	I	I	I	I	I	ł	I	i	I	I	I	I	I	I	I	I	I	I
C Scale r	1	-	.69272	I	.68472	I	.59231	I	1	I	.66804	i	.49980	ı	I	.56881	i	I	.65564
P Scale r		I	I	I	I	I	ŝ	.61483	I	.64345	I	.54211	I	.69356	I	I	I	.70753	I
I Scale r	1	.73265	I	.52751	I	.53346	I	I	.59174	I	I	I	I	I	.68710	ł	.70352	I	I
Total PECM Scale r	1	.69395	.68603	.49089	.64292	.53645	.62059	.58506	.53854	.60472	.62767	.52354	.58567	.65740	.58232	.56300	.58795	.69739	.57064
Item No.		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34

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conomic Legal			6113	13342 -	82492	69087	71969	77481	73749	77194	83075	74441	86471
Ecomanagement Ec	ucare		-	1	ı	ı	ı	ı	T	1	ı	T	T
Persuasive Scale	L I		ı	Ţ	ı	1	1	ı	ı	I	I	ŀ	I
Political Scale	L I		ı	I	I	T	I	T	ı	I	ī	ı	ı
C Scale	г		ı	I.	.69034	ı	.74340	ı		ī	.61078	ı	ī.
P Scale	ы		ı	.69987	ı	I	ı	.64389	.59558	.62430	ı	.57863	.66845
I Scale	ы	20103	/7100.	ı	ī	.49084	ı	I.	ı	ı	ī	ī	ī
Total PECM Scale	ы	66233	77/00.	.71418	.70935	.53359	.71706	.62459	.56880	.66769	.69058	.64761	.68365
	Item No	35	2	36	37	38	39	40	41	42	43	44	45

Range of Scores, Means, Medians and Standard Deviations of Total PECM Scores for each Sample Group. Table 4.9.

			*Ra	nge			
Grot	dr	N	High Score	Low Score	W	РМ	SD
н	Env. Issues Class	73	270 (n=1)	45 (n=1)	117.301	115.00	37.402
п	Bio. Class						
	Group II A (Solid Waste)	38	157 (n=1)	45 (n=1)	111.684	116.00	28.347
	Group II B (Acid Rain)	37	202 (n=1)	47 (n=1)	119.703	113.00	37.010
III	Sierra Club	10	159 (n=1)	54 (n=1)	99.700	93.500	30.616
IV	Teachers						
	Group IV A (Env. Ed.)	21	264 (n=2)	45 (n=1)	140.095	134.00	55.675
	Group IV B	26	192 (n=1)	54 (n=1)	119.769	118.500	41.095

Range of Scores, Means, Medians and Standard Deviations of Internal (I) Scores for each Sample Group. Table 4.10.

			*Ra	inge			
Grou	4	N	High Score	Low Score	м	РМ	SD
н	Env. Issues Class	80	63 (n=1)	15 (n=3)	36.600	36.500	11.657
II	Bio. Class						
	Group II A (Solid Waste)	38	49 (n=1)	15 (n=4)	34.500	35.250	8.831
	Group II B (Acid Rain)	38	67 (n=2)	16 (n=1)	40.974	38.500	12.725
III	Sierra Club	10	53 (n=1)	19 (n=1)	33.000	32.000	9.821
IV	Teachers						
	Group IV A (Env. Ed.)	23	90 (n=2)	15 (n=1)	45.217	44.000	17.459
	Group IV B (Random Sample)	27	57 (n=1)	15 (n=1)	35.926	33.333	11.961
*Po6	ssible Range of Sco Midpoint	res	15-90 52.5				

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Other	
Powerful	
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able 4.11.	

			*Ra	nge			
Grou	đ	N	High Score	Low Score	W	рм	SD
н	Env. Issues Class	77	90 (n=1)	15 (n=1)	42.221	41.000	14.632
11	Bio. Class						
	Group II A (Solid Waste)	38	62 (n=1)	15 (n=2)	41.395	42.350	11.360
	Group II B (Acid Rain)	39	69 (n=1)	15 (n=1)	42.128	40.000	13.324
III	Sierra Club	10	58 (n=1)	20 (n=1)	35.400	32.500	11.128
IV	Teachers						
	Group IV A (Env. Ed.)	21	84 (n=2)	15 (n=1)	48.109	46.000	18.920
	Group IV B (Random Sample)	28	72 (n=2)	17 (n=2)	45.071	44.500	16.629
*Pos	ssible Range of Scor Midpoint	es 15-90 52.5					

Range of Scores, Means, Medians and Standard Deviations of Total Chance (C) Scores for each Sample Group. Table 4.12.

			*Rang	še			
Grou	N dr		High Score	Low Score	W	РМ	SD
н	Env. Issues 78 Class	~	90 (n=1)	15 (n=3)	37.526	35.833	13.425
Π	Bio. Class						
	Group II A 38 (Solid Waste)	~	55 (n=1)	15 (n=2)	35.789	35.500	10.476
	Group II B 39 (Acid Rain)	-	85 (n=1)	16 (n=1)	38.795	36.000	15.407
III	Sierra Club 10	-	48 (n=1)	15 (n=1)	31.300	31.000	10.667
IV	Teachers						
	Group IV A 23 (Env. Ed.)	~	90 (n=2)	15 (n=1)	46.130	42.000	19.687
	Group IV B (Random Sample)		68 (n=1)	18 (n=2)	40.852	41.000	14.858
*Pot	ssible Range of Scores Midpoint	s 15-90 52.5					

subscale are located in the lower half (internal portion) of the possible range of scores (15-90). Based on a mean and median comparison scores seem to approximate a normal distribution.

On a relative basis, group III scored lowest (most internal) and group IV A scored the highest (most external) on each of the three subscales.

In comparing I, P, C scores within each sample group, no substantial differences seem apparent between I and C scores. However, P scores are consistently higher than I or C scores for each of the sample groups.

Tables 4.13 through 4.17 present descriptive statistics for each sample group based on total environmental action category scores. All group means for each subscale are located in the lower half (internal portion) of the possible range of scores (i.e., 9-54). Subscale scores for each of the groups also seem to approximate normal distributions.

The Sierra Club (Group III) scored the most internal across all subscales and group IV A (teachers with EE exposure) scored most external on all five subscales. Another notable trend was for all groups to generally score legal action lower (more internal) than other actions.

Table 4.18 presents the means and standard deviations of citizen action scores for each group. Members of the Sierra Club (Group III) reported more action taking than other groups. The environmental issues class reported the least amount of citizen action taking.

### Research Question 2

What relationship exists between scores on a measure of citizen action and total PECM scores within the environmental issues class, the Sierra Club group, each of the teachers subgroups and each of the introductory biology subgroups?

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Scores		SD	
Action			
Persuasive		PW	
Total			
eviations of		Ж	
Standard D		re	
is and	ge	Lor Sco	
Median	*Ran	igh ore	
Means, roup.		Sc	
Scores, Sample G		Z	
Range of for each			
Table 4.13.		Group	•

			*Rai	nge			
Grot	đi	N	High Score	Low Score	W	РМ	SD
г	Env. Issues Class	79	54 (n=1)	9 (n=1)	22.848	22.000	8.843
11	Bio. Class						
	Group II A (Solid Waste)	38	37 (n=2)	9 (n=2)	22.816	23.500	6.829
	Group II B (Acid Rain)	40	45 (n=3)	9 (n=2)	24.900	23.000	9.486
III	Sierra Club	10	33 (n=1)	15 (n=3)	19.400	17.000	6.168
IV	Teachers						
	Group IV A (Env. Ed.)	23	53 (n=2)	9 (n=1)	28.174	27.000	11.827
	Group IV B (Random Sample)	27	46 (n=1)	9 (n=2)	24.556	24.250	9.881
*Pot	ssible Range of Sco Midpoint	res 9-54 31.5					

Range of Scores, Means, Medians and Standard Deviations of Total Political Action Scores for each Sample Group. Table 4.14.

			*Ra	nge			
Grou	đ	N	High Score	Low Score	ж	PM	SD
н	Env. Issues Class	81	54 (n=1)	9 (n=2)	23.358	22.000	9.344
	Bio. Class						
	Group II A (Solid Waste)	38	39 (n=1)	9 (n=1)	22.132	21.500	7.641
	Group II B (Acid Rain)	40	52 (n=1)	10 (n=1)	25.875	24.000	10.711
III	Sierra Club	10	33 (n=2)	10 (n=1)	18.000	15.500	7.303
IV	Teachers						
	Group IV A (Env. Ed.)	23	49 (n=2)	9 (n=1)	27.000	25.000	11.070
	Group IV B (Random Sample)	28	48 (n=1)	9 (n=1)	26.250	24.500	10.362

\*Possible Range of Scores 9-54 Midpoint 31.5

Range of Scores, Means, Medians and Standard Deviations of Total Ecomanagement Action Scores for each Sample Group. Table 14.15.

			*Ra	nge			
Grou	đ	z	High Score	Low Score	¥	рм	SD
н	Env. Issues Class	78	54 (n=1)	9 (n=4)	24.231	23.750	9.150
H	Bio. Class						
	Group II A (Solid Waste)	38	41 (n=2)	9 (n=3)	23.237	23.500	166.7
	Group II B (Acid Rain)	39	45 (n=2)	9 (n=2)	24.128	23.333	8.591
III	Sierra Club	10	33 (n=1)	9 (n=1)	23.000	23.500	8.138
IV	Teachers						
	Group IV A (Env. Ed.)	23	54	6	28.304	26.250	10.649
	Group IV B (Random Sample)	27	45 (n=1)	9 (n=3)	25.444	29.000	10.577

Range of Scores, Means, Medians and Standard Deviations of Total Economic Action Scores for each Sample Group. Table 4.16.

			*Rai	nge			
Grou	đ.	N	High Score	Low Score	W	РМ	SD
н	Env. Issues Class	79	54 (n=1)	6 (9=u)	25.291	25.375	9.570
п	Bio. Class						
	Group II A (Solid Waste)	38	38 (n=1)	9 (n=3)	22.500	23.500	7.146
	Group II B (Acid Rain)	40	52	6	24.500	22.167	11.175
Η	Sierra Club	10	32 (n=1)	10 (n=1)	20.500	19.000	7.634
IV	Teachers						
	Group IV A (Env. Ed.)	23	54 (n=2)	9 (n=1)	29.826	28.000	12.018
	Group IV B (Random Sample)	27	43 (n=1)	9 (n=3)	22.964	21.500	10.079
*Pos	sible Range of Scor Midpoint	es 9-54 31.5					

			*Ra	nge			
Grou	đi	z	High Score	Low Score	W	РМ	SD
н	Env. Issues Class	80	54 (n=1)	9 (n=8)	20.462	18.500	8.865
11	Bio. Class						
	Group II A (Solid Waste)	38	43 (n=1)	9 (n=3)	21.000	22.000	7.864
	Group II B (Acid Rain)	38	54 (n=1)	9 ( h=4 )	23.658	22.000	11.241
III	Sierra Club	10	31 (n=1)	10 (n=1)	18.800	18.500	7.036
IV	Teachers						
	Group IV A (Env. Ed.)	21	54 (n=2)	9 (n=2)	25.857	26.000	12.411
	Group IV B (Random Sample)	28	51 (n=1)	9 (n=3)	23.286	21.500	10.427
*Pos	ssible Range of Scc Midpoint	ores 5	9-54 31.5				

Table 4.17. Range of Scores, Means, Medians and Standard Deviations of Total Legal Action Scores for

Grou	ıp	N	<u>M</u>	<u>SD</u>
I	Env. Issues Class	81	13.827	11.175
II	Bio. Class			
	II A (Solid Waste)	38	14.394	11.068
	II B (Acid Rain)	40	15.850	13.284
III	Sierra Club	10	44.900	15.242
IV	Teachers			
	IV A (Env. Ed.)	28	15.087	11.036
	IV B (Random Sample)	28	24.6429	16.5981

4.18. Means and Standard Deviations of Citizen Action Scores for Each Sample Group.

Possible Range of Scores 0-121

### Research Hypothesis

 A significant (p ≤ .05) negative correlation will exist between scores on a measure of citizen action and total PECM scores within each of the selected groups.

Correlational statistics were utilized to investigate research questions two through five. A Pearson's r was calculated for the variables identified in each question. Rationale for use of the Pearson's r is the same as that provided in the discussion of pilot study II analysis.

Results of the Pearson's r between total PECM scores and citizen action scores for each sample group are presented in Table 4.19. With the exception of groups II B and IV B, significant negative correlations ( $p \leq .05$ ) were obtained. These significant correlations support the proposed hypothesis (2.1) and indicate that, for each group, as total PECM scores increase citizen actions reported decrease.

Groups II B and IV B did not yield significant results although the correlations are in the hypothesized direction. In summary, total PECM scores for each group tend to correlate negatively with citizen action scores and the majority (4 out of 6) of correlations were significant.

With the exception of subgroup II B, all groups were administered the PECM with the solid waste issue summary. As a further check on construct validity data from the five groups were collapsed and a Pearson's r was calculated between total PECM scores and citizen action scores (Table 4.19). Again, a significant negative correlation was achieved.

### Research Question 3

What relationship exists between scores on a measure of citizen action taking and total I, P, and C scores for the environmental issues

		Total PECM Sc	ores/Citizen Action	Scores
<u>.</u>		Correlation Coefficient	Significance Level	Sample Size
Grou	1p	<u>r</u>	P	<u>N</u>
I	Env. Issues Class	3391	.001*	81
	Ria Class			
11	Group II A (Solid Waste)	5958	.001*	38
	Group II B (Acid Rain)	0.2086	.098	40
III	Sierra Club	6320	.025*	10
IV	Teachers			
	Group IV A (Env. Ed.)	4843	.013*	21
	Group IV B (Random Sample)	2318	.127	26
All (Exc	Groups Combined cept II B)	3451	.001*	168

Table 4.19: Pearson Product-Moment Correlations for Total PECM Scores with Citizen Action Scores for each of the Sample Groups and for Sample Groups Responding to the Solid Waste Issue Combined.

class, the Sierra Club group, each of the teachers subgroups and each introductory biology subgroup?

#### Research Hypotheses:

- 3.1. A significant negative correlation (p ≤ .05) will exist between scores on a measure of citizen action and total I scores for each selected group.
- 3.2. A significant negative correlation (p ≤ .05) will exist between scores on a measure of citizen action and total P scores for each selected group.
- 3.3. A significant negative correlation (p ≤ .05) will exist between a measure of citizen action and total C scores for each selected group.

Results of Pearson's r correlations between citizen action scores and I, P, C scores are presented in Tables 4.20 through 4.22. With the exception of group II B and IV B, significant negative correlations were obtained between I, P, and C scores and citizen action scores. Significant findings support research hypotheses 3.1, 3.2 and 3.3 and indicate that as I, P, or C scores increase, citizen action reporting decreases.

A significant negative correlation was determined for group II B on the C subscale but not on the I and P subscales. No significant correlations were achieved for groups IV B on the I, P, and C subscales. However, nonsignificant correlations for groups II B and IV B were all in the hypothesized direction. Thus, all I, P, C subscale scores for each sample group correlated negatively with reported citizen action taking.

		Internal (I) S	cores/Citizen Acti	on Scores
Grou	ıp	Correlation Coefficient <u>r</u>	Significance Level P	Sample Size <u>n</u>
I	Env. Issues Class	3614	.001*	80
II	Bio. Class			
	Group II A (Solid Waste)	5927	.001*	38
	Group II B (Acid Rain)	2673	.052	38
III	Sierra Club	6361	.024*	10
IV	Teachers			
	Group IV A (Env. Ed.)	4908	.009*	23
	Group IV B (Random Sample)	2925	.069	27

Table 4.20. Pearson Product-Moment Correlation for Total Internal (I) Scores with Citizen Action Scores for each of the Sample Groups.

Grou	.p	Chance (C) S Correlation Coefficient <u>r</u>	cores/Citizen Action Significance Level P	Scores Sample Size <u>n</u>
I	Env. Issues Class	2827	.006*	78
II	Bio. Class			
	Group II A (Solid Waste)	.5447	.001*	38
	Group II B (Acid Rain	3223	.023*	39
III	Sierra Club	5650	.024*	10
IV	Teachers			
	Group IV A (Env. Ed.)	4777	.011*	23
	Group IV B (Random Sample)	2808	.078	27

Table 4.21. Pearson Product-Moment Correlation for Total Chance (C) Scores with Citizen Action Scores for each of the Sample Groups.

\* Significant relationship (p  $\leq$  .05)

-

Grou	p	Powerful Others (P) Correlation Coefficient <u>r</u>	Scores/Citizen Significance Level P	Action Scores Sample Size <u>N</u>
I	Env. Issues Class	2719	.008*	77
II	Bio. Class			
	Group II A (Solid Waste)	5238	.001*	38
	Group II B (Acid Rain)	2094	.100	39
III	Sierra Club	6358	.024*	10
IV	Teachers			
	Group IV A (Env. Ed.)	3984	.037*	21
	Group IV B (Random Sample)	1361	.245	28

Table 4.22. Pearson Product-Moment Correlation for Total Powerful Others (P) Scores with Citizen Action Scores for each of the Sample Groups.

\*Significant relationship (p  $\leq$  .05)

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Research Question 4

What relationship exists between scores on a measure of citizen action and total I+P+C scores for each environmental action category within the environmental issues class, the Sierra Club group, each of the teachers subgroups, and each of the introductory biology subgroups?

#### Research Hypothesis:

4.1. A significant negative ( $p \le .05$ ) correlation will exist between scores on a measure of citizen action and total I+P+C scores for each environmental action category within each of the selected groups.

Results of Pearson's r correlations between total environmental action category scores and citizen action scores are presented in Tables 4.23 through 4.27. Significant coefficients ( $p \le .05$ ) support hypothesis 4.1 and indicate that as the respective environmental action category score increases the amount of reported citizen action decrease.

The ecomanagement subscale (Table 4.25) provided the fewest number of significant negative correlations (3 out of 6) across groups. Alternatively, the persuasive action (Table 4.23) subscale provided the largest number of significant negative correlations (5 out of 6).

Although analysis of some group data did not yield significant results for a particular subscale, overall correlations were in the hypothesized direction.

Grou	P .	Total Persuasive Correlation Coefficient <u>r</u>	Action Scores/Citizen Significance Level P	Action Scores Sample Size <u>N</u>
I	Env. Issues Class	3038	.003*	79
II	Bio. Class			
	Group II A (Solid Waste)	3996	.001*	38
	Group II B (Acid Rain)	3090	.026*	40
III	Sierra Club	7027	.012*	10
IV	Teachers			
	Group IV A (Env. Ed.)	3929	.032*	23
	Group IV B (Random Sample)	1518	.225	27

Table 4.23. Pearson Product-Moment Correlations for Total Persuasive Action Scores with Citizen Action Scores for each of the Sample Groups.

Grou	ıp	Total Political Correlation Coefficient <u>r</u>	Action Scores/Citizen Significance Level P	Action Scores Sample Size <u>N</u>
I	Env. Issues Class	3489	.001*	81
II	Bio. Class			
	Group II A (Solid Waste)	4244	.004*	38
	Group II B (Acid Rain)	2982	.031*	40
III	Sierra Club	7576	.006*	10
IV	Teachers			
	Group IV A (Env. Ed.)	3393	.057	23
	Group IV B (Random Sample)	0944	.316	28

Table 4.24. Pearson Product-Moment Correlations for Total Political Action Scores with Citizen Action Scores for each of the Sample Groups.

Grou	1	Total Ecomanageme Correlatio Coefficien	nt Action Scores/Citize n Significance t Level	en Action Scores Sample Size N
0100	P	<u>+</u>	. <u>P</u>	<u><u>n</u></u>
I	Env. Issues Class	1702	. 1702	78
II	Bio. Class			
	Group II A (Solid Waste)	3439	.017*	38
	Group II B (Acid Rain)	1390	.199	39
III	Sierra Club	1926	.297	10
IV	Teachers			
	Group IV A (Env. Ed.)	4280	.021*	23
	Group IV B (Random Samp)	3968 le)	.020*	27

Table 4.25.	Pearson	Produ	ct-Mor	ment Cor	relation	ns for	Total	Econ	nana	igemer	۱t
	Action	Scores	with	Citizen	Action	Scores	for	each	of	the	
	Sample	Groups									

		Total Economic Action Correlation Coefficient	Scores/Citizen Significance Level	Action Scores Sample Size
Grou	ıp	<u>r</u>	P	<u>n</u>
I	Env. Issues Class	2644	.009*	79
II	Bio. Class			
	Group II A (Solid Waste)	5240	.001*	38
	Group II B (Acid Rain)	2658	.049*	40
III	Sierra Club	4789	.081	10
IV	Teachers			
	Group IV A (Env. Ed.)	4478	.016*	21
	Group IV B (Random Sample)	2730	.080	. 28

Table 4.26. Pearson Product-Moment Correlations for Total Economic Action Scores with Citizen Action Scores for each of the Sample Groups.

Grou	p	Total Legal Action Correlation Coefficient <u>r</u>	Scores/Citizen Significance Level <u>P</u>	Action Scores Sample Size <u>n</u>
I	Env. Issues Class	2158	.027*	80
II	Bio. Class Group II A (Solid Waste)	4760	.001*	38
	Group II B (Acid Rain)	1856	.132	38
III	Sierra Club	6052	.032*	10
IV	Teachers Group IV A (Env. Ed.)	5305	.007*	21
	Group IV B (Random Sample)	0520	.396	28

Table 4.27. Pearson Product-Moment Correlations for Total Legal Action Scores with Citizen Action Scores for each of the Sample Groups.

## Research Hypothesis:

5.1. A significant positive (p < .05) correlation will exist between total I, P, and C scores within each of the groups selected (a relatively high I score refers to lack of belief in internal control).

A Pearson's r was used to calculate correlations between I, P, and C scores within each of the sample groups (Table 4.28). Significant positive correlations, which support hypothesis 5.1, were determined between I, P, and C scores within each of the sample groups.

To interpret these results clearly it should be reiterated that I item scoring is reversed from P and C item scoring. A relatively high score on the I items will reflect a low belief in that orientation (external control). A relatively high score on the P or C items will reflect a high belief in those orientations. Alternatively, relatively low scores on the I items will reflect a high belief in that L of C orientation; whereas a relatively low score on P and C items reflects a lack of belief in those orientations.

Thus, correlations in Table 4.28 indicate that as respondents agree or disagree with the P orientation, they respectively agree or disagree with the C orientation. However, as respondents agree with the I orientation (personal control), they tend to disagree with P and C orientations.

## Research Question 6

Is there a significant difference between total I, P, or C scores within the environmental issues group, the Sierra Club group, each of the teachers subgroups and each introductory biology subgroup?

Grou	p	P/C <u>r</u>	Variables Correlated P/I <u>r</u>	C/I <u>r</u>
I	Env. Issues Class	.8502* n=74	.8068* n=76	.8187* n=77
II	Bio. Class Group II A (Solid Waste)	.7661* n=38	.7108* n=38	.8747* n=38
	Group II B (Acid Rain)	.8559* n=38	.7461* n=38	.7886* n=37
III	Sierra Club	.8994* n=10	.9131* n=10	.9079* n=10
IV	Teachers			
	Group IV A (Env. Ed.) Group IV B (Random Sample)	.9521* n=21 .9400* n=27	.8609* n=21 .7532* n=27	.8102* n=23 .8125*

Table 4.28.	Pearson Product-Moment Correlation for Total I, P, and C
	Scores within each Sample Group.

\* Significant relationship (p  $\leq$  .05)

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# Research Hypothesis:

6.1. A significant difference  $(p \le .05)$  in mean I, P, and C scores will be determined within sample groups.

Research questions 6 and 7 were posed to investigate the possibility of significant differences between selected subscale scores, by sex within each sample group. The SPSS MANOVA Profile Analysis program was employed for analyses.

Results in Tables 4.29 through 4.34 denote that within each sample group there was no indication of significant interactions between sex and I, P, C subscales. In addition, with the exception of the environmental issues class, no significant ( $p \le .05$ ) difference in response by sex was found.

A significant difference in response by sex was discovered for the environmental issues class (Table 4.29). Based on a breakdown by sex of mean total PECM scores (males: M=129.700, Females: M=99.857) and on a lack of interaction between sex and measures it can be assumed that females scored significantly lower (internal) on all three measures than did males of the same group.

To determine differences between measures, I, P, and C means for each group were rank ordered (high to low). Results for the environmental issues class (Table 4.29) indicate that P scores were significantly higher (p=.00002) than C scores and I scores did not differ significantly from C scores at the .05 level. Because mean scores were rank ordered, the following assumption for P vs I scores can logically be applied; If P>C and C=I, then it is assumed P>I. In summary, within female and

	TOTAL PECM				
Sex	N	М	SD		
Male	40	129.700	37.799		
Female	28	99.857	29.431		

Table 4.29.	Repeated Measures Analysis of Variance for I, P, C Scores
	by Sex for the Environmental Issues Class (Group I).

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ANOVA Summary
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		Multivariate	Univaria	te
Variables	df	F	F	Р
Interaction between sex and measures	2,65	(approx. F) .3089		.73534
Difference by sex	1, 66		12.2378	.00084*
Difference between measures	2,66	(approx. F) 13.9000		.00001*
+ P vs C	1, 67		21.44	.00002*
+ C vs I	1, 67		.6063	.43892
P vs I	Assumption:	If P>C and C= assumed P>I	I, then it	is

\* Significant relationship  $(p \le .05)$ 

+ Means were rank ordered from high to low prior to analysis

Sex	N	TOTAL PECM M	1	SD	
Male	6	104.166	5 32	.811	
Female		113.093	3 27	27.793	
	ANC	WA Summary			
Variables	٩f	fultivariate F	Univariate F	Р	
Interaction between sex and measures	2, 35	(approx. F) .5994		.55467	
Difference by sex	1, 36		.4942	.48657	
Difference between measures	2, 36	(approx. F) 13.876		.00003*	
+ P vs C	1, 37		21.145	.00005*	
C vs I	1, 37		2.441	.12673	
Pvs I Ass	umption: If as	P>C and C=I, sumed P>I.	then it is		

Table 4.30. Repeated Measures Analysis of Variance for I, P, C Scores by Sex for the Biology Group (II A) Assigned the Solid Waste Issue.

\* Significant relationship (p  $\leq$  .05)

+ Means were rank ordered from high to low prior to analysis.

		Total PEC	M		
Sex	N	М	5	SD	
Male	10	120.100	53.3	175	
Female	26	122.346	28.1	28.168	
	A	NOVA Summary			
		Multivariate	Univariate		
Variables	df	F	F	P	
Interaction between sex and measures	2, 33	(approx. F) .7313		.48894	
Difference by sex	1, 34		.0303	.86294	
Difference between measures	2, 34	(approx. F) 6.1569		.00522*	
+ P vs I	1, 35		.53277	.47030	
I vs C	1, 35		4.20623	.04782*	
P vs C	Assumption:	If P=I and I>C, assumed P>C.	then it is		

Table 4.31. Repeated Measures Analysis of Variance for I, P, C Scores by Sex for the Biology Group (II B) Assigned the Acid Rain Issue.

\* Significant relationship (p  $\leq$  .05)

+ Means were rank ordered from high to low prior to analysis.

		Total PEC	M	
Sex		N M		SD
Male		7 97.571	3	7.216
Female		3 104.661	1.	5.176
		ANOVA Summary		
		Multivariate	Univariat	e
Variables	df	F	F	Р
Interaction between sex and measures	2,7	(approx. F) .7047		.52621
Difference by sex	1, 8		.1015	.75817
Difference between measures	2,8	(approx. F) 3.12621		.09927
+ P vs I	1, 9		2.781	.12973
I vs C	1, 9		1.444	.26031
P vs C	Assumption:	If P=I and I=C t assumed P=C.	hen it is	

Table 4.32.	Repeated Measures Analysis of Variance for I, P, C Scores
	by Sex for the Sierra Club Membership (Group (III).

+ Means were rank ordered from high to low prior to analysis.


		Total PECM So	cores		
Sex	N	М	5	SD	
Male	4	123.500	61.2	235	
Female	17	144.000	55.	556	
	AN	IOVA Summary			
		Multivariate U	Univariate		
Variables	df	F	F	P	
Interaction between sex and measures	2, 18	(approx. F) .8262		.45364	
Difference by sex	1, 19		.4264	.52157	
Difference between measures	2, 19	(approx. F) 1.14575		.33900	
+ P vs C	1, 20		1.65919	.21242	
C vs I	1, 20		.20581	.65495	
P vs I	Assumption:	If P=C and C=I assumed P=I.	, then it is	s	

Table 4.33. Repeated Measures Analysis of Variance for I, P, C Scores by Sex for the Teachers Group Utilizing the Environmental Education Consultant (Group IV A).

+ Means were rank ordered from high to low prior to analysis.

		Total	PECM	
Sex	N	1	М	SD
Male	6	132.	.500	55.207
Female	19	116.	315	
		ANOVA Summary		
		Multivariate	Univariate	
Variables	df	F	F	P
Interaction between sex and measures	2, 22	(approx. F) 1.0472		.36776
Difference by sex	1, 23		.6716	.42091
Difference between measures	2, 23	(approx. F) 8.7299		.00151*
+ P vs C	1, 24		11.911	.0028*
C vs I	1, 24		5.848	.02355*
P vs I	Assumption:	if P>C and C>I, assumed P>I.	, then it is	

Table 4.34. Repeated Measures Analysis of Variance for I, P, C Scores by Sex for the Teachers Subgroup not Utilizing the District Environmental Education Consultant (Group IV B).

\* Significant relationship (p < .05)

+ Means were rank ordered from high to low prior to analysis.

male groups of the environmental issues class P scores were significantly greater than I and C scores. However, I, P, and C scores were significantly lower for females as compared to males.

Excluding differences by sex, the biology class exposed to the PECM containing the solid waste issue displayed results similar to that of the environmental issues class (Table 4.30). P scores were significantly greater (p=.00005) than C scores and again I scores did not differ significantly from C scores. It was assumed P scores were greater than I scores.

Data analysis for the biology group exposed to the acid rain issue (Table 4.30) indicates that P scores were not significantly different from I scores. However, I scores were significantly higher than C scores so it was logically assumed that P scores were significantly higher than C scores.

Analysis of data for the Sierra Club (group III) and the teachers group utilizing the environmental education consultant yielded no significant differences at the .05 level between the respective subscales. For the teacher group not utilizing the environmental education consultant (group IV B) significant differences between all three measures was found (Table 4.34).

In general findings support hypothesis 6.1 because significant differences were found between I, P, and C scores within select groups.

Research Question 7

Is there a significant difference ( $p \leq .05$ ), by sex, between total environmental action category scores within the environmental issue

group, the Sierra Club group, each teacher subgroup and each of the introductory biology subgroups?

Tables 4.35 through 4.40 present the results of a profile analysis program calculated for each sample group. Results indicate there were no interactions between sex and measures within any of the groups. In addition, with the exception of the environmental issues class, no group exhibits a difference by sex of a difference between measures.

Data from the environmental issues group produced both a difference by sex and a difference between measures (Table 4.35). Based on a breakdown by sex of mean total PECM scores (males; M-129.700, Females; M-99.857) and on the lack of interaction between sex and measures, it can be assumed that females scored significantly lower (i.e., more internal) on all five subscales.

Subscale scores were again rank ordered (high to low) to determine specific differences between measures. Results indicate that legal scores were significantly lower (p=.00329) than other scores. No other measures differed significantly from one another. Thus, within female and male groups of the environmental issues class, legal scores were significantly lower than the other four environmental action category scores. However, all environmental action category scores were significantly lower for females as compared to males.

#### Research Question 8

Do biology subgroups differ significantly ( $p \le .05$ ) on total PECM scores, I, P, C scores, total environmental action category scores and/or citizen action scores?

		Total PE	CM	
Sex	N	М		SD
Male	40	129,700		37.799
Female	28	99.857		29.431
		ANOVA Summary		
		Multivariate	Univariat	e
Variables	df	F	F	Р
Interaction between sex and measures	4,63	(approx. F) .8856		.47784
Difference by sex	1, 66		12.2378	.00084*
Difference between measures	4, 64	(approx. F) 5.8397		.00045*
+Econ. vs Ecomgmt.	1, 67		.5456	.46269
Ecomgmt. vs Pol.	1, 67		.7780	.38090
Pol. vs Persuasive	1, 67		.2283	.63431
Persuasive vs Legal	1, 67		9.29636	.00329*

Table 4.35. Repeated Measures Analysis of Variance for Total Action Category Scores by Sex for the Environmental Issues Class (Group 1).

\* Significant relationship (p  $\leq$  .05)

+ Means were rank ordered from high to low prior to analysis.

		Total PEC	CM	
Sex	N	М		SD
Male	6	104.166		32.811
Female	32	113.093 27.793		
	AN	OVA Summary		
		Multivariate	Univariate	2
Variables	df	F	F	Р
Interaction between sex and measures	4, 33	(approx.F) 2.25392		.08439
Difference by sex	1, 36		.49424	.48657
Difference between measures	4, 34	(app <b>rox.</b> F) .74665		.57607

Table 4.36. Repeated Measures Analysis of Variance for Total Action Category Scores by Sex for the Biology Class (Group II A) Assigned the Solid Waste Issue.

	· · · · · · · · · · · · · · · · · · ·				
		Total PECM	Ĩ		
Sex	N	М		SD	
Male	10	120.10	53	.175	
Female	26	122.346	28	28.168	
		ANOVA Summary			
		Multivariate	Univariate	1	
Variables	df	F	F	P	
Interaction between sex and measures	4, 31	(approx. F) 1.8416		.14598	
Difference by sex	1, 34		.0303	.86294	
Difference between measures	4,24	(approx. F) .7372		.57351	

Table 4.37. Repeated Measures of Analysis of Variance for Total Action Category Scores by Sex for the Biology Class (Group II B) Assigned the Acid Rain Issue.



		Total PE	CM	
Sex	N	М		SD
Male	7	97.571		36.216
Female	3	104.661		15.176
		ANOVA Summary		
		Multivariate	Univariate	
Variables	df	F	F	P
Interaction between sex and measures	4,5	(approx. F) 3.8371		.08637
Difference by Sex	1, 8		.1015	.75817
Difference between measures	4,6	(approx. F) 1.1510		.41711

Table 4.38. Repeated Measures Analysis of Variance for Total Action Category Scores by Sex for the Sierra Club Membership (Group III).

		Total PECM	[	
Sex	N	М		SD
Male	4	123.500		61.235
Female	17	144.000		55.556
		ANOVA Summary		
		Multivariate	Univariate	:
Variables	df	F	F	Р
Interaction between sex and measures	4, 16	(approx. F) 2.17761		.11803
Difference by sex	1, 19		.42642	
Difference between measures	4, 17	(approx. F) 2.2097		.11128

Table 4.39. Repeated Measures Analysis of Variance for Total Action Category Scores by Sex for the Teacher Group Utilizing the Environmental Education Consultant (Group IV A).

		Total PEC	м	
Sex	N	М		SD
Male	6	132.500		55.207
Female	19	116.315		37.761
		ANOVA Summary		
		Multivariate	Univariat	2
Variables	df	F	F	Р
Interaction between sex and measures	4, 20	(approx. F) 1.3494		.28658
Difference by sex	1, 23		.61716	.42091
Difference between measures	4, 21	(approx. F) 2.6094		.06485

Table 4.40. Repeated Measures Analysis of Variance for Total Action Category Scores by Sex for the Teachers Group Not Utilizing the Environmental Education Consultant (Group IV B). A one-way analysis of variance was calculated to determine if the two biology subgroups differed significantly on total PECM scores. Results in Table 4.41 indicate that no significant differences exist between the two groups at the .05 level.

To determine if the two biology groups differed on I, P, C scores, the SPSS MANOVA Profile Analysis program was employed. Results (Table 4.42) indicated a significant interaction between groups and measures. It was further determined that the I subscale was the only subscale that issued a significant differential effect.

With respect to differences on total action category scores between the two groups, it was inferred based on related analysis, that the two subgroups did not differ significantly. Data in Tables 4.35 and 4.36 show that environmental action category scores do not differ significantly from one another within each of the subgroups. In addition, there were no significant differences between the two groups with respect to total PECM scores (Table 4.41). As a result of these two findings, it was inferred that the biology subgroups did not differ significantly on total action category scores.

Table 4.43 presents the results of a one-way analysis of variance based on citizen action scores. No significant difference between scores on citizen actions was determined at the .05 level.

#### Research Question 9

Do teacher subgroups differ significantly ( $p \le .05$ ) on total PECM scores, I, P, C scores, environmental action category scores and/or citizen action scores?



		Total PECM	Score	
Group	N	М		SD
Bio. Class II A (Solid Waste)	38	111.684		28.347
Bio. Class II B (Acid Rain)	37	119.918		37.138
		ANOVA		
Source	df	SS	F	Р
Between	1	1271.213	1.1687	.28317
Within	73	79384.967		

Table 4.41. One-Way Analysis of Variance Between Biology Subgroups II A and II B with Respect to Total PECM Scores.

Table 4.42.	Repea Biolo	ted Measu gy Subgro	res Analysis ups (Subgrou	s of Variance ips II A and	e with Respect II B).	to I, P, C	Scores betwee	an the Two
		Innrox	Inter	nal	P-0th	ers	Chanc	e
Group		N N	ΣI	<u>SD</u>	۶I	<u>SD</u>	ΣI	<u>SD</u>
Bio. Class I (Solid Waste	A U	38	34.500	8.831	41.395	11.360	35.789	10.467
Bio. Class I (Acid Rain)	I B	40	38.500	12.725	42.128	13.324	38.795	15.407
				ANO	VA Summary			
Variables			df	Multi	ivariate <u>F</u>	Univariat	ð	   
Interaction groups and	between measure	a a	2, 72	(app 4.	лож. F) 63922	I		.01273*
Differential	Effec	L						
P vs C			1, 73		1	1.05812		.30704
C vs I			1, 73		1	6.27002		.01451*

		Citiz	en Action Score	
Group	N		М	SD
Bio. Class II A (Solid Waste)	3	8	14.394	11.069
Bio. Class II B (Acid Rain)	4	0	13.284	13,285
		ANOVA		
Source	df	SS	F	Р
Between	1	41.270	.27474	.60169
Within	76	11416.179		

Table 4.43.	One-Way Analysis of Variance between Biology Subgroups
	II A and II B with Respect to Citizen Action Scores.

As part of a SPSS MANOVA Special Contrasts program, a one-way analysis of variance was employed to test for a difference between teacher subgroups with respect to total PECM scores. Results (Table 4.44) indicated no significant difference between subgroups at the .05 level.

To determine if teacher subgroups differed on I, P, C scores or environmental action category scores, the SPSS MANOVA Profile Analysis program was employed. Results (Table 4.45) indicated there was no significant interaction between groups and I, P, C measures. In addition, there was no difference between groups with respect to these measures.

It was inferred from related analysis, that teacher subgroups did not differ significantly on environmental action category scores. Tables 4.37 and 4.38 indicated that environmental action category scores did not differ from one another within each of the subgroups. In addition, there were no significant differences between the two groups with respect to total PECM scores (Table 4.42). Based on these two findings, it was assumed that teacher subgroups did not differ significantly on total action category scores.

To determine differences between teacher subgroups with respect to citizen action scores, an analysis of variance was calculated (i.e., as part of a Special Contrasts program). Results (Table 4.46) indicated a significant difference between the two subgroups. Thus, the random sample of teachers reported taking more citizen actions than did the teachers utilizing the environmental education consultant.

Grou	P	N	М	SD
I	Env. Issues Class	73	117.301	37.401
II	Intro. Bio. Class (A - Solid Waste)	38	111.684	28.347
III	Sierra Club Members	10	99.700	30.616
IV	Teachers (A - EE Teachers) (B - Random Sample)	21 26	140.095 119.769	55.674 41.095

Table 4.44. Analysis of Variance (Planned Contrasts) Based on Total PECM Scores between Sample Groups Administered the Solid Waste Issue Summary.

		ANOVA		
Groups	SS	df	F	P
Within Cells	243104.105			
III <b>vs</b> I, II A, IV A & B	4697.894	1	3.1499	.07780
I, II A vs IV A & B	6493.872	1	4.3541	.03848*
I vs II A	285.931	1	,19172	.66202
IV A vs IV B	3748.482	1	2.5733	.11482

\* Significant relationship (p  $\leq$  .05).

Teac	cher Subgro	ups (Subgrou	ips IV A and	IV B).			
	Annrov	Inter	nal	P-0th	lers	Chan	e
Group	N	W	<u>SD</u>	۶I	SD	Ы	SD
EE Teachers	23	45.217	17.459	48.109	18.130	46.130	19.687
Non-EE Teachers	27	35.926	11.961	45.071	16.629	40.852	14.858
			ANO	VA Summary			
			Multiv	ariate	Univaria	ite	- - - -
Variables		<u>df</u>		F	<b>Ъ</b>		4
Interaction betwe	en		(app	rox. F)			
groups and measu	ITes	2,44	•	22595	I		.22595
Difference by gro	dno	1, 45		I	2.0724	5	.15690

Table 4.45. Repeated Measures Analysis of Variance with Respect to I, P, C Scores between the Two

Group		N	М	SD
Ŧ		01	13 897	11 174
T	Env. Issues class	01	13.027	11+1/4
II	Intro. Bio. (A - Solid Waste)	38	14,394	11.068
III	Sierra Club	10	44.900	15.242
IV	Teachers			
	(A - EE Teachers)	23	15.086	11.036
	(B - Random Sample)	28	24.642	16.598
			4NOVA	

Table 4.46.	Analysis of Variance (Planned Contrast) based on Citizen
	Action Scores between Sample Groups Administered the
	Solid Waste Issue Summary.

Groups	SS	df	F	P
Within Cells	26731.813			
III vs I, II A, IV A & B	7256.344	175	47.503	.0001*
I, II A vs IV A & B	1710.9003	1	11.200	.00100*
I vs II A	279.228	1	1.827	.17811
IV A vs IV B	1282.663	1	8.396	.00424*

\* Significant relationship (p  $\leq$  .05).

Research Question 10

Do the environmental issues class and biology subgroup II A differ significantly (p  $\leq$  .05) with respect to total PECM scores and/or citizen action scores?

Differences between total PECM scores and citizen action scores were determined as part of a Special Constrasts program. Results in Table 4.44 indicate no significant difference between the two groups with respect to total PECM scores. Results of citizen action scores analysis (Table 4.46) also indicated no significant difference between groups.

Research Question 11

Based on total PECM scores and/or citizen action scores, do teachers as a group (groups IV A and B) differ significantly ( $p \le .05$ ) from college students administered the solid waste version of the PECM?

Differences between teachers and college students with respect to total PECM scores and/or citizen action scores was determined as part of a Special Contrasts program.

The combined sample of college students scored significantly lower (more internal) total PECM scores than did the combined teachers group (Table 4.44). Teachers also reported taking significantly more citizen actions than the combined sample of college students (Table 4.46).

#### Research Question 12

Do total PECM scores and/or citizen action scores for the Sierra Club differ significantly (p  $\leq$  .05) from a combined sample of all

other subjects who responded to the solid waste version of the PECM (i.e., groups I, II A, IV A, IV B)?

Results of a Planned Contrast program (Table 4.44) indicate that the Sierra Club members did not score significantly different on total PECM scores from a combined sample of subjects responding to the solid waste version of the PECM. Although differences were not significant, it should be noted that the obtained F value (F-3.1499) closely approaches significance (i.e., p=.07780) at the .05 level. An obvious limitation of this analysis was the small sample (N-10) collected for the Sierra Club.

Analysis of citizen action scores (Table 4.45) revealed that Sierra Club members reported taking significantly more actions than the combined sample of subjects.

### Chapter 5

# DISCUSSION OF FINDINGS AND RECOMMENDATIONS

This chapter first reports findings as they relate to each research question. In a second section implications of findings and recommendations for further research are presented.

# Discussion of Findings

<u>Research Question 1</u>. Can evidence of reliability and validity (content and construct) be established for an instrument developed to measure perceived L of C toward taking specific categories of environmental action in a stated situation?

The PECM is an instrument designed to measure a person's perceived L of C toward taking specific categories of environmental action in a given situation. Consistently high alpha coefficients (alpha > .85) were achieved for total PECM scores and for each of the subscales (i.e., I, P, C - Economic, Ecomanagement, Persuasive, Political and Legal subscales). These findings indicate that the PECM exhibits strong evidence of internal consistency or reliability.

Content validity of an instrument ultimately rests upon appeals to reason regarding the adequacy with which important content has been sampled and on the adequacy with which content has been cast into test items (Nunnally 1978). It is assumed the systematic procedures utilized to develop and select PECM items substantiates evidence of the instrument's content validity.

Initially, an item pool was developed based on objectives wellgrounded in L of C and environmental action theory. Item analysis and selection were made using data collected in two pilot studies. Criteria for item retention after each pilot study was relatively high item total and respective item subscale correlations. Final PECM items did yield substantial correlations with their respective subscales and/ or with the total scale supporting the assumption of evidenced content validity.

In this study construct validity is defined as the extent to which an instrument can be shown to perform in a manner prescribed by a particular construct. Construct validity cannot be claimed simply on the results of one study. An accumulation of supporting results is necessary to provide only evidence of construct validity. A number of findings in this study contribute to the support of construct validity for the PECM. These findings are discussed on the following pages and summarized following the discussion of research question 6.

Generally, mean and median PECM scores for each sample group were in the lower half of the possible range of scores. This was true for total PECM scores, I, P, C subscale scores and for environmental action category subscale scores. These findings seem consistent with past L of C research. Levenson (1972a) found that very few of her subjects felt their lives were controlled by chance or powerful others to the extent that they felt they controlled their own lives. Levenson goes on to cite a number of researchers who confirm her findings (i.e., Harrow and Ferrante 1969; Hersch and Scheibe 1967; Lefcourt 1967; Rotter 1966).



This tendency for people to evaluate internal attributes in a more favorable light than external attributes seems to be a socially desirable response style that is inherent in L of C measurement (Phares 1976; Lefcourt 1976).

Given that the PECM may be influenced by social desirability, the question becomes: Is the instrument contaminated to a point that its potential predictive capacity, as prescribed by the respective construct (i.e, construct validity) is seriously affected? The following discussion of research questions 2-12 will provide some evidence that the PECM, regardless of the underlying effect of social desirability, is functioning in accordance with L of C/IPC theory.

<u>Research Question 2</u>. What relationship exists between scores on a measure of citizen action and total PECM scores within the environmental issues class, the Sierra Club group, each of the teacher subgroups and each of the introductory biology subgroups?

Research Hypothesis:

2-1. A significant negative correlation ( $p \le .05$ ) will exist between scores on a measure of citizen action and total PECM scores within each of the selected groups.

<u>Research Question 3</u>. What relationship exists between scores on a measure of citizen action taking and total I, P, and C scores for the environmental issues class, the Sierra Club group, each of the teacher subgroups and each introductory biology subgroup?

Research Hypothesis:

3-1. A significant negative correlation  $(p \le .05)$  will exist between scores on a measure of citizen action and total I scores for each selected group.

- 3-2. A significant negative correlation ( $p \le .05$ ) will exist between scores on a measure of citizen action and total P scores for each selected group.
- 3-3. A significant negative correlation ( $p \le .05$ ) will exist between a measure of citizen action and total C scores for each selected group.

<u>Research Question 4</u>. What relationship exists between scores on a measure of citizen action and total I+P+C scores for each environmental action category within the environmental issues class, the Sierra Club group, each of the teacher subgroups, and each of the introductory biology subgroups?

Research Hypothesis:

4-1. A significant negative ( $p \le .05$ ) correlation will exist between scores on a measure of citizen action and total I+P+C scores for each environmental action categories within each of the selected groups.

Past research using relatively generalized L of C instruments has given some indication of a relationship between internality and taking environmental action (Chapter 2). Theoretically, similar findings should be realized with the PECM. Thus, it was hypothesized (preceding research questions) that total PECM scores and the various subscale scores would correlate significantly with the amount of civil actions a person reports to have taken. Civil actions are actions that encompass procedures synomymous with those found in the five environmental action categories.

Because the total PECM and its various subscales are scored in the external direction (i.e., higher the score the more external) it was hypothesized that significant negative correlations would be achieved between the various PECM scores and citizen action scores.

It should also be mentioned that two different versions of the PECM were administered. All groups, with the exception of subgroup II B, received a version with a solid waste issue summary. Subgroup II B received a version with an acid rain issue summary.

Pearson r correlations between total PECM scores and citizen action scores were consistently negative for the five groups administered the solid waste version (solid waste groups) of the PECM. In addition, a majority (four out of five) of the correlations were significant at the .05 level. Also, when data from the five solid waste groups were collapsed, analysis again produced a significant negative correlation between the two variables.

Significant findings support the proposed hypothesis (2-1) and indicate that, as total PECM scores move in the external direction, there was a significant drop in citizen actions reported.

The one exception among solid waste groups was subgroup IV B (the random sample of teachers). Although the correlation between PECM scores and citizen action scores was not significant (F=.23 8, p=.127), it was in the hypothesized direction and therefore provides a consistent trend for overall findings related to research question two.

Correlations between total PECM scores and citizen action scores were not significant for biology subgroup II B (received the acid rain version of the PECM). However, the correlation coefficient was in the hypothesized direction (r=.2086, p=.098). Since the acid rain version of the PECM was not administered to other groups, no additional data is available to confirm or disclaim that the acid rain version is

functioning as hypothesized. Thus, it is difficult to determine whether results are a function of group characteristics or instrumentation. . These results also raise questions as to the score of environmental issues to which the PECM can be applied.

The total PECM is made up of a number of underlying subscales. Theoretically each of these subscales should show some degree of construct validity for it to be included in the instrument. The pattern of correlations for I, P, and C subscales was similar to that of the total PECM scores. That is, the same four out of five solid waste groups exhibited significant negative correlations between the I, P, C subscales and citizen action taking scores. Significant correlations indicate that as I, P, or C scale scores move toward the external direction (high scores), citizen actions reported decrease. Alternatively, as I, P, or C scores move toward the internal direction (low scores) reported citizen action taking increases.

While findings for subgroup IV B were not significant, all correlation coefficients were in the hypothesized direction with the I and C scales falling very close to significance (respectively p=.069 and p=.078). The P scale produced a p value of .245 which was a substantial distance from the .05 significance level. Overall, correlations for all solid waste groups were in the hypothesized direction adding some consistency to findings.

With respect to the acid rain group, only the C subscale scores produced a significant negative correlation with citizen action scores. This might be an indication that the C scale shows some predictive potential over the P and I scale with reference to the acid rain issue and/or this particular group. Similarly, Levenson (1972a) found that

only the C scale discriminated between males involved in anti-pollution activities and those not involved (i.e., those involved did not feel chance controlled their lives to the extent that those uninvolved did).

Although the I and P scales did not achieve significance, the correlation coefficients were in the hypothesized direction. However, non-significant findings again raise the questions about the PECM effectiveness with different types of issues (e.g., local vs national).

When the solid waste version of the PECM was broken down and analyzed, according to environmental action category subscales, evidence supporting construct validity was still present. Across the five solid waste groups each of the subscales (i.e., persuasive, political, economic, ecomanagement, legal) produced a majority (at least 3 out of 5) of significant correlations. Subscales not achieving significance differ from group to group. However, even non-significant coefficients all fall in the hypothesized direction and many approach the .05 significance level. Since each of the five subscales show some evidence of supporting hypothesis 4-1 and thus show some evidence of construct validity, retention of each subscale within the PECM seems justified.

Data analysis from the acid rain group (group II B) produced significant negative correlation coefficients for all but the legal and ecomanagement subscales. This may indicate that the other three subscales have some degree of predictive potential over the legal and ecomanagement subscales, at least with reference to the acid rain issue and/or group II B.



Research Question 5. What relationship exists between total I, P, and C scores within the environmental issues class, the Sierra Club group, each of the teachers subgroups and each of the introductory biology subgroups?

Research Hypothesis:

5.1 A significant positive  $(p \le .05)$  correlation will exist between total I, P, and C scores within each of the groups selected (a relatively high I score refers to lack of belief in internal control).

Theoretically the I, P, and C subscales all measure the same underlying construct. That is, they each measure a belief in internal or external control. Based on this assumption and since all three subscales are scored in the negative direction, it was hypothesized that significant ( $p \leq .05$ ) positive correlations between the three subscales would be achieved. For all groups, I, P, and C subscales scores achieved positive and significant correlation coefficients. These findings indicate that for all groups as subjects increasingly agreed with personal control (I), their belief in powerful others and/or chance control decreased.

<u>Research Question 6</u>. Is there a significant difference between total I, P, or C scores within the environmental issues group, the Sierra Club group, each of the teacher subgroups and each introductory biology subgroup?

Research Hypothesis:

6.1 A significant difference  $(p \le .05)$  in mean I, P, and C scores will be determined within sample groups.

The PECM was divided into I, P, and C statements based on the theory that the three subscales tap different dimensions of the same construct. If this theory were to hold true for the PECM, the diagnostic potential might be improved by interpreting individual I, P, C scores as opposed to total PECM scores.

It was assumed that if significant differences among the three subscales were discovered within groups, it would indicate that the subscales are possibly measuring different L of C belief dimensions (Hypothesis 6.1).

Findings indicated no significant interaction between sex and measures for any of the groups sampled. Literature on past I, P, C research neither confirms nor refutes this finding. For the environmental issues class, a significant F value (F=12.2379, p=.00084) indicated that females scored lower or more internal than males. Since I, P, C scores add up to make the total PECM score it is inferred that for the environmental issues group females also scored lower than males on total PECM scores. Similarly, Miller (1980; see Chapter 2 of this study), using Levenson's I, P, C scale found that within a sample of Youth Conservation Corps participants, females scored significantly lower (more internal) on P and C scales and although not significant, I scale showed a similar trend. Levenson (1972a) also found in her early studies that females differed significantly from males on the P scale with males believing more in control by powerful others than females. Phares (1976) speculated that males may have more of an external orientation than females because the cultural pressures for success are greater for the male and thus the male protects himself from failure by recourse to external attributions.

No differences by sex was obtained from analysis of other solid waste group data. However, it should be noted that the relatively large sample of the envionrmental issues group included an approximately equal representation of males and females. Other sample groups were considerably smaller and male to female ratios were quite unequal which could have had an effect on findings.

Analysis for differences between I, P, and C subscale scores within sample groups yields some indication that the P subscale statements introduce a L of C dimension that may be perceived differently from the I and/or C subscales. With the exception of group IV B (random sample of teachers), no significant difference was found between I and C subscale scores within solid waste groups. However, for three of the solid waste groups, P scores were significantly higher than C and/or I scores.

To interpret these results, I, P, and C scores are compared to each other with respect to positioning on the I-E continuum in Figures 5.1, 5.2, 5.3. All three subscale statements contain a personal control component. The I scale places a subject in the position of either agreeing (internal) or disagreeing (external) that he/she has some personal control over the issue. The P scale introduces the option of agreeing (external) or disagreeing (internal) that powerful others exercise more control over the issue than personal control. The chance scale provides the option of agreeing (external) or disagreeing (internal) that chance exercises more control over the issue than personal control. For all solid waste groups the low I subscale means appear to indicate that subjects attribute more control over the issue Midpoint = 52.5

\*No significant difference between I and C scores for both groups.

<sup>+</sup>P scores were significantly higher than I or C scores for both groups.

Figure 5.1. Pattern of I, P, C Scores for Groups I and II A on the Internal/External Continuum.



Midpoint = 52.5

\* No significant difference between I, P, or C scores.

Figure 5.2. Pattern of I, P, C Scores for Groups III and IV A on the Internal/External Continuum.

I I \*C <sup>+</sup>P E

Midpoint = 52.5

\* C scores were significantly higher than I scores

"P scores were significantly higher than I or C scores.

Figure 5.3. Pattern of I, P, C Scores for Group IV B on the Internal/ External Continuum.
to personal abilities than to control by powerful others or chance (Figures 5.1, 5.2, 5.3). Low responses on the C scale items showed little difference when compared to results of I scale responses, with the exception of group IV B (Figure 5.3). For this group subjects exhibited a belief in some degree of chance control over the issue (external orientation), as indicated by a significant difference between I and C subscale means.

Low mean scores on the powerful others scale also agreed with strong personal control beliefs for two of the five groups (Figure 5.2). However, for three of the groups subjects exhibited a significant difference between I and P scores. This indicates a belief in some degree of control by powerful others as well as a belief in some personal control of the issue (Figures 5.1, 5.3)

In summary, some subjects in the solid waste groups did seem to perceive powerful others control differently from chance (C) and on strictly internal (I) control. This finding supports Levenson's original reasoning for dividing the external scale into P and C dimensions.

With reference to group II B, P and I scores did not differ significantly and C scores were significantly lower than P and I scores (Figure 5.4). Again, for this group, generally low I, P, and C scores indicate more control over the issue attributed to personal abilities than to powerful others or chance. Again, the difference between P and C supported Levenson's tripartite analysis.







\* I and P scores were equal but significantly higher than C scores.

Figure 5.4. Pattern of I, P, C scores for Group II B on the Internal/ External Continuum. Summary of Findings Which Support Construct Validity

Below is a summary of findings for reseach questions 1 through 6. The majority of findings seem to support evidence of construct validity.

- 1 ....correlations between total PECM scores and citizen action score were consistently negative - and for four of the five solid waste groups correlations were significant at the .05 level (Acid Rain Group p=.098).
- 2 ....correlations between I, P, or C subscale scores and citizen action scores were consistently negative - and for four of the five solid waste groups correlations were significant at the .05 level. (Acid Rain Group I, p=.052 -- P, p=.100 -- C, p=.023)
- 3 ....correlations between environmental action category subscale scores and citizen action scores were consistently negative and for three to four out of the five solid waste groups correlations were significant at the .05 level. (Acid Rain Group, Persuasive, p=.026 -- Political, p=.031 -- Ecomanagement, p=.199 -- Economic, p=.049 -- Legal, p=.132).
- 4 ....significant positive ( $p \le .05$ ) correlations were determined between I, P, and C subscale scores within each of the sample groups.
- 5 ....I, P, and C subscale scores were shown to differ significantly from each other within certain sample groups.

<u>Research Question 7</u>. Is there a significant difference ( $p \le .05$ ), by sex, between total action category scores within the environmental

issues group, the Sierra Club group, each teacher subgroup and each of the introductory biology subgroups?

The environmental issue summaries that accompanied the PECM were designed to make it possible for an individual to apply any or all categories of environmental action to the situation. It was not hypothesized whether sample groups would feel relatively more or less external about use of a particular action in the stated situations. However, data was analyzed to explore the possibility of differences as stated in research question 7.

A difference between sexes was again determined only for environmental issues class with females scoring significantly lower on all scales than males (see discussion research question 6). Also, the environmental issues class was the only group for which a difference between subscales was determined. For this group, legal action scores were significantly lower (more internal) than other subscale scores. In fact, the trend for all groups was to score legal action relatively low. The only groups not scoring legal action lowest were the biology group exposed to the acid rain issue and the random sample of teachers. These two groups scored the legal category second to the lowest.

The significant finding for the environmental issues group and the consistent trend for other groups to score legal action low indicates that subjects in this study believe they have more personal control through the use of legal action. These findings would seem to conflict with the results of research conducted by Peyton (1977). This researcher found that when a sample of teachers were asked to

provide examples of the five environmental action categories they provided the least for legal action. In addition, when asked to evaluate their own ability to prepare and teach environmental education units based on the environmental actions they felt least competent in the area of legal action. This suggests the interesting possibility that what individuals perceive they <u>know</u> about an action is not related to their perceived ability to <u>exert</u> influence by using that action. This possibility should be further investigated. It also indicates that at least some differential effect between certain environmental action categories does exist which adds to the increased diagnostic potential of the PECM.

<u>Research Question 8</u>. Do biology subgroups differ significantly  $(p \le .05)$  on total PECM scores, I, P, C scores and/or on total action category scores?

The major difference between the acid rain issue summary and the solid waste issue summary was that the prior issue could be identified as a problem of national origin and the latter as a problem of local origin. It was speculated that these issues might have some differential effect on various PECM scores (research question 8). The two versions were randomly distributed to equal numbers of students in the introductory biology class.

Analysis indicated that both versions of the PECM (i.e., acid rain and solid waste) exhibited substantial evidence of internal consistency (reliability) and content validity. The solid waste version also showed evidence of construct validity. Questions as to the strength

of evidenced construct validity for the acid rain version were raised and since no other data is available on this version the following discussion of findings should be considered tentative.

Analysis of citizen action scores showed no significant difference existed between the two groups with respect to total PECM scores, environmental action category subscale scores or citizen action scores. These findings confirm some degree of homogenity between the two groups. A significant interaction between groups and I, P, C measures was discovered. This interaction was attributed to a significant differential effect of I subscale scores. Mean I scores for the acid rain group were substantially higher (more external) than mean I scores for the solid waste group. It should also be noted that the total PECM scores and all environmental action category subscale scores were higher (although not significantly) for the acid rain group.

This consistency in differences between scores for the two groups would seem to indicate a feeling of less personal control over the broad based acid rain issue as compared to the more local based solid waste issue. This inference would in turn appear to add support to the assertion that L of C beliefs are situational.

<u>Research Question 9</u>. Do teacher subgroups differ significantly ( $p \le .05$ ) on total PECM scores, IPC scores, total action category scores and/or citizen action scores?

Teacher subgroups were different in that one (group IV) represented a population that had utilized an area environmental education consultant and the other (group IV B) represented a population of the

same area that had not utilized the environmental education consultant. It was speculated that differential exposure to the consultant and environmental education experiences might have an effect on PECM scores.

Analysis indicated that the only significant difference between the two groups was with respect to civil actions reported. The random sample of teachers reported more action taking than the environmental education teachers. Another noticeable trend was that the random sample scored relatively lower total PECM scores and subscale scores. However, due to the large variance in responses, this trend was not statistically significant.

It is not immediately obvious why the random sample should have reported taking more action or why they should have even exhibited a consistent trend to score more relatively internal. It should be kept in mind that these data were based on voluntary returns of the instrument (i.e., by mail). There is evidence to suggest that internals would be more likely to return the questionnaire than would external individuals. Thus, internality may have been selected for in each of the samples, making them more similar than the original populations actually may have been. There is sufficient evidence of differences between the two groups to suggest the need for further investigation into the impact of environmental education experiences on teachers Locus of Control.

<u>Research Question 10</u>. Do the environmental issues group and biology subgroup II A differ with respect to total PECM scores?

<u>Research Question 11</u>. Based on total PECM scores and/or citizen action scores, do teachers as a group differ from college students administered the solid waste version of the PECM?

An investigation of research question ten indicated no significant difference between biology group II A and the environmental issues class (both groups responded to the solid waste version of the PECM). This finding was not unexpected since both groups had a similar makeup. That is, both groups consisted primarily of undergraduate nonscience majors seeking to fulfill a general science requirement of the university.

Since these two groups did not differ significantly on total PECM scores, it was decided to combine them into a "college student group" and compare them to combined teacher groups who also did not differ significantly on total PECM scores (i.e., research question 11). Because of present age and/or experiences in life it was speculated that there might be a differential effect on total PECM scores.

Analysis indicated teachers scored significantly higher than college students on both citizen action scores and on total PECM scores. This finding indicates that teachers in this study took more action than college students but scored relatively more external. More action taking by teachers may be explained by the fact that age and experience has allowed them more opportunity to get involved. To explain the more external orientation of the teacher group, this researcher would suggest that teachers might have gained a more realistic perspective on solutions to the stated issue through experience, more conservatively. Students who have had less experiences may have a more idealistic perspective on personal control of the issue. Phares (1976) states that in early I-E research, a similar trend for college students to score relatively internal was apparent.

<u>Research Question 12</u>. Do total PECM scores and/or citizen action scores for the Sierra Club differ significantly ( $p \le .05$ ) from a combined sample of all other groups who responded to the solid waste version of the PECM (i.e., groups I, II A, IV A, IV B)?

Because the Sierra Club consists of individuals often identified with taking action on environmental issues it was considered that they might score differently from other groups in the study on total PECM scores and/or citizen action scores.

Indeed, analysis showed that the Sierra Club membership reported taking significantly more actions than a combined group of all other subjects administered the solid waste version of the PECM. Differences between total PECM scores were not significant at the .05 level but were very close to significance (i.e., p=.07780). A review of total and subscale PECM scores for the various groups (Tables 4.9 through 4.17) shows that the Sierra Club group scored consistently and substantially lower than all groups on all measures. This trend to score substantially more internal than other groups in the study would seem to lend some support to the predictive potential of the PECM.

Obviously a limitation of this study was the small sample size of the Sierra Club group. A larger sample would have allowed for more extensive analysis and more reliable findings. At the very least, present findings should provide incentive for further research on activist groups to establish normative data with the PECM.

#### Implications and Recommendations

Early in this study it was stated that the ultimate goal of environmental education is to develop a citizenry that is both able and willing to take responsible action toward the remediation of environmental issues. It was further suggested that to pursue this goal effectively, researchers and/or educators must make a concerted effort to better understand the interacting personality variables that impinge upon an individual's willingness and ability to take responsible environmental actions.

This study presented an effort to develop an instrument that can be used to investigate one of the many variables that seem to have an effect on environmental action taking behavior. The instrument is intitled the Perceived Environmental Control Measure (PECM) and it specifically attempts to measure the degree to which a person perceives that the solution to an environmental issue may be achieved partially as a result of action(s) he/she personally pursues.

The PECM has shown initial evidence of reliability, content validity and, in a seemingly successful quest for evidence of construct validity, it has added further substance to the proposed relationship between Locus of Control (L of C) and environmental action taking behavior.

In addition to the above, the PECM provides some evidence that the majority of subjects perceived themselves as having some personal control over the stated issues. However, to some extent chance and, to a larger extent, powerful others have been identified as agents also having some control over the outcome of the issues. These findings seem to endorse the assertation that the Internal/External (I-E)<sup>°</sup>

construct functions as a multi-dimensional construct, at least with respect to the stated environmental issues used in this study. Results also provide evidence that subjects perceived themselves to have more personal control over the issue with the "take it to court" or legal action process.

Finally, it seems that sex, age, and/or occupational background may have some relationship to perceived control of environmental issues (i.e., at least with respect to the solid waste issue used in this study). Analysis of data from the largest sample group in the study (N=81) indicated that males scored significantly higher (more external) than females reported by Miller (1980) and Levenson (1972b). Also, it was discovered that teachers and college students of this study had differing degrees of perceived personal control over the solid waste issue. College students scored significantly lower (more internal) than teachers.

Ultimately, the above findings have many implications for environmental education researchers and/or educators. Results of this study endorse the suggested relationship between L of C and environmental action taking behavior and lend credence to a further consideration and/ or investigation of the inferred relationships between internality and environmental action taking as proposed by Peyton and Miller (1980, page of this study).

This study has provided an instrument that can potentially be used to investigate the inferred relationship of L of C to environmental action taking behavior. The PECM as a whole has shown evidence of reliability, content validity and construct validity. In addition, it contains a set of subscales (showing evidence of reliability and

validity) which have potential for diagnosing the environmental action taking behavior of individuals and/or groups.

Although the preceding discussion places the PECM in a favorable light, it is admitted by this researcher that there are many limitations involved with its development and use. It is proposed that further refinement of the PECM be considered in future research. Small sample sizes and general lack of random sampling are perceived as severe limitations of this study. Ultimately, larger sample sizes selected randomly from a variety of populations would provide a more credible test of the PECM.

The PECM is presented as a situation specific measure and indeed it was designed especially to address environmental issues as a situation(s). However, this is no indication that the PECM will provide substantially more or less information than a more generalized L of C instrument (e.g., Levenson's IPC instrument). It has not been established that the PECM is applicable to a variety of environmental issues. In this study the PECM showed investigative potential when used with the solid waste issue. Testing with the acid rain issue was minimal and questions of validity as used in this case were raised. It is recommended that the PECM be tested against a more generalized instrument and that both instruments be tested with variety of issues (situations). This will help determine if the PECM has potential diagnostic advantage over other L of C instruments and whether it is applicable to a variety of issues.

Predictive validity of an instrument is defined as the degree to which the predictions made by a test are confirmed by the latter

behavior of the subject (Borg and Gall 1979). This study did not specifically consider the predictive validity of the PECM but, rather only considered its potential for such a function. Given its intended use, that is, to aid in the investigation of environmental action taking behavior, it would be pertinent to subject the PECM to a study that tests or provides evidence of its predictive validity. The question might be posed: Do people who score relatively internal (i.e., on the PECM) about taking action on a specific issue actually take action when the opportunity is provided?

Predictive validity also related to another limitation of this study. Subjects were presented with a hypothetical environmental issue. That is, it was implied in the issue summary that the outcome would directly have an effect on the quality of the respondent's life. Alternatively, responses of individuals actually confronting a similar real-life situation may be substantially different from those responding to a hypothetical situation. To infer credibility of the PECM, an investigation into these possible response differences should be conducted.

That the human personality is a complex multi-dimensional entity hardly needs substantiation. The PECM is concerned with assessing only one personality dimention (i.e., L of C) that may interact with a number of other variables to promote or inhibit the environmental action taking behavior of an individual. Locus of Control or perceived reinforcement is portrayed by its initiator(s) as only one of three equally weighted variables that interact to affect the social behavior of an individual (see pp.19). Similarly, in their model "Anatomy of

an Environmental Behavior" (see pp.38), Peyton and Miller present L of C as only one variable interacting with many to effect a specific behavior.

The interaction of personality variables was only slightly considered in this study. For example, it was assumed that subjects recognize that the outcome of the issue would impact on their valued lifestyle. Also, it was assumed that the issue summary and the environmental action definitions would provide a rather homogeneous knowledge base for expressing L of C beliefs toward the issue. It is possible that differing values of reinforcement and/or differential levels of knowledge about the issue or actions could have come into play to effect L of C beliefs towards the issue(s). A simultaneous assessment of these variables and possibly others could provide a clearer picture of the role L of C may play in affecting environmental action taking behavior.

## Summary of Recommendations

- Results of this study support the proposed relationship between Locus of Control (L of C) and environmental action taking behavior. Based on these results it is recommended that further research in this area be continued. Specifically, the inferred relationships between internality and environmental action taking behavior as proposed by Peyton and Miller (1980, see pp. of this study) could be addressed in further research.
- 2. The Perceived Environmental Control Measure (PECM) has shown potential for determining relationships between L of C and environmental action taking behavior. It is recommended that further research be conducted with the PECM in an attempt to refute or further confirm its investigative abilities. It is also recommended that future research consider an analysis of total PECM scores in addition to the various subscale scores. Such an analysis enhanced the findings of this study.
- 3. Field testing of the final PECM was limited by small sample sizes and/or lack of random sampling. It is recommended that similar field testing be conducted with larger samples collected from a variety of populations.

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- 4. It is recommended that the PECM be correlated with results from a more generalized L of C instrument administered to the same sample. Such testing might help determine if the PECM has a potential diagnostic advantage over a generalized instrument with respect to environmental actions.
- It is recommended that the PECM be applied to a variety of environmental issues. Such testing would help to determine the flexibility and/or generalizability of the instrument and results.
- 6. Given the PECM's intended use (i.e., to aid in explaining environmental action taking behavior) it would be pertinent to subject the PECM to a study that tests or provides evidence of its predictive validity.
- 7. Locus of Control is only one variable that may interact with others to promote or inhibit the environmental action taking behavior of an individual. A simultaneous assessment of L of C along with other interacting variables (i.e., value of reinforcement, knowledge of issue) may provide an enhanced perspective on environmental action taking behavior.

APPENDICES



APPENDIX A

Rotter's Internal - External (I-E) Locus of Control Scale



## Appendix A.

The Rotter internal-external L of C instrument is a 23-item forced choice questionnaire with 6 filler items. It is scored in the external direction, that is, the higher the score the more external the individual.

#### Introduction

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered <u>a</u> or <u>b</u>. Please select the one statement of each pair (and only one) which you more strongly <u>believe</u> to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief, obviously there are no right or wrong answers.

Please answer these items <u>carefully</u> but do not spend too much time on any one item. Be sure to find an answer for <u>every</u> choice. For each numbered question make an X on the line beside either the <u>a</u> or <u>b</u>, whichever you choose as the statement most true.

In some instances you may discover that you believe both statements or neither one. In such cases, be sure to select the one you more strongly believe to be the case as far as you're concerned. Also try to respond to each item <u>independently</u> when making your choice; do not by influenced by your previous choices.

Remember ...

Select that alternative which you <u>personally believe to be more true</u>. I more stronaly believe that:

- \_\_\_\_\_a. Children get into trouble because their parents punish them too much.
  - \_\_\_\_\_ b. The trouble with most children nowdays is that their parents are too easy with them.
- \_\_\_\_\_a. Many of the unhappy things in people's lives are partly due to bad luck.
  - b. People's misfortunes result from the mistakes they make.
- \_\_\_\_\_a. One of the major reasons why we have wars is because people don't take enough interest in politics.
  - b. There will always be wars, no matter how hard people try to prevent them.
- a. In the long run people get the respect they deserve in this world.
  - \_\_\_\_\_ b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
- 5. a. The idea that teachers are unfair to students is nonsense.
  - \_\_\_\_\_ b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
- 6. a. Without the right breaks one cannot be an effective leader.
  - b. Capable people who fail to become leaders have not taken advantage of their opportunities.
- 7. \_\_\_\_\_ a. No matter how hard you try some people just don't like you.
  - b. People who can't get others to like them don't understand how to get along with others.
- a. Heredity plays the major role in determining one's personality.
  - \_\_\_\_\_ b. It is one's experiences in life which determine what they are like.
- 9. \_\_\_\_\_a. I have often found that what is going to happen will happen.
  - \_\_\_\_\_b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

- 10. \_\_\_\_\_a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
  - b. Many times exam questions tend to be so unrelated to course work that studying is really useless.
- 11. \_\_\_\_\_a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
  - b. Getting a good job depends mainly on being in the right place at the right time.
- 12. \_\_\_\_\_ a. The average citizen can have an influence in government decisions.
  - \_\_\_\_\_b. This world is run by the few people in power, and there is not much the little guy can do about it.
- a. When I make plans, I am almost certain that I can make them work.
  - b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
- 14. a. There are certain people who are just no good.
  - b. There is some good in everybody.
- 15. \_\_\_\_\_a. In my case getting what I want has little or nothing to do with luck.
  - \_\_\_\_\_ b. Many times we might just as well decide what to do by flipping a coin.
- 16. \_\_\_\_\_a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
  - \_\_\_\_\_b. Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.
- 17. \_\_\_\_\_a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
  - b. By taking an active part in political and social affairs the people can control world events.
- a. Most people can't realize the extent to which their lives are controlled by accidental happenings.
  - b. There really is no such thing as "luck."
- a. One should always be willing to admit his mistakes.
  b. It is usually best to cover up one's mistakes.



- 20. \_\_\_\_\_a. It is hard to know whether or not a person really likes you.
   b. How many friends you have depends upon how nice a person you are.
- 21. \_\_\_\_\_a. In the long run the bad things that happen to us are balanced by the good ones.
  - \_\_\_\_\_b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
- 22. a. With enough effort we can wipe out political corruption.
  - b. It is difficult for people to have much control over the things politicians do in office.
- a. Sometimes I can't understand how teachers arrive at the grades they give.
  - \_\_\_\_\_ b. There is a direct connection between how hard I study and the grades I get.
- 24. \_\_\_\_\_ a. A good leader expects people to decide for themselves what they should do.
  - b. A good leader makes it clear to everybody what their jobs are.
- 25. \_\_\_\_\_a. Many times I feel that I have little influence over the things that happen to me.
  - b. It is impossible for me to believe that chance or luck plays an important role in my life.
- 26. a. People are lonely because they don't try to be friendly.
  - b. There's not much use in trying too hard to please people, if they like you, they like you.
- a. There is too much emphasis on athletics in high school.
  - b. Team sports are an excellent way to build character.
- a. What happens to me is my own doing.
  - b. Sometimes I feel that I don't have enough control over the direction my life is taking.
- 29. \_\_\_\_\_a. Most of the time I can't understand why politicians behave the way they do.
  - b. In the long run the people are responsible for bad government on a national as well as on a local level.

# APPENDIX B

Pilot Study II

PERCEIVED ENVIRONMENTAL CONTROL MEASURE (PECM)

#### MICHIGAN STATE UNIVERSITY

DEPARTMENT OF FISHERIES AND WILDLIFE NATURAL RESOURCES BUILDING (517) 355-4477 EAST LANSING · MICHIGAN · 48824

Dear Participant,

This is not a test. This project is intended to collect information concerning public opinions about certain aspects of social issues. The information you provide is vital to our continuing efforts to design effective environmental education programs for citizens. Your honesty in responding to the questions will be deeply appreciated. All of your responses will be kept confidential.

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There are three sections to this questionnaire. At the beginning of each section, you will find instructions on how to complete that section.

We know that your time is very valuable and we would like to express our thanks for your cooperation on this project.

Sincerely,

R Ben Piyton

R. Ben Peyton Assistant Professor Environmental Education

Randy Champeau Graduate Teaching Assistant Environmental Education

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#### SECTION I

### Instructions

You are asked to read the following summary of an environmental issue. Please consider the situation as though it were a real part of your life and you were involved in this issue.

After you have read the summary, please respond to the questions in Section II.

The Issue

The city you are a resident of has a population of about 50,000. You live in a small house just within the city limits. Adjacent to your backyard, the city owns 150 acres of vacant farmland. You find your home and the area you live in to be quite safe, comfortable and aesthetically pleasing.

The city has developed a solid waste management problem. At present, the city dump or landfill is the exclusive means of waste disposal for the city. Recently, the city council was informed that the landfill site is filling up at an increasing rate and there is only enough available space at the site to last two more years.

The city council employed a consulting firm to identify alternative solid waste management plans for the city. The consulting firm report indicated four possible alternatives; continue landfilling at another site, resource recovery (recycling), incineration, or shipping to another city for handling. The report further suggested the use of the vacant farmland adjacent to your land as one of two "adequate" landfill sites. The site near you, it was reported, "could have potential groundwater contamination problems but it is close to - and already owned by - the city." Thus, it would be a more economical choice that the other site, if the landfill alternative was selected.

After a preliminary vote, the city council, by a slim margin, elected to draw up possible plans for the development of the landfill near you. One of the council members who voted for the landfill alternative said "it seemed to be the least burdensome for citizens of the community. All the other alternatives would substantially increase time and/or money input required from each citizen." He also stated that "this was only a preliminary vote and a final confirmation vote will have to be taken after the preliminary plans are in the public input is received."

Some civic groups, environmental groups and a few politicians openly oppose the landfill alternative. Many of these people point out that tragic health and environmental problems have been associated with landfills.

Obviously, whatever the outcome of this situation, it will have an effect on the quality of your life.

#### SECTION II

# INSTRUCTIONS

In this section you will find the definitions (in italics) of five approaches that might be used to solve the problem that has been described.

Following each of the five definitions is a series of questions regarding your use of each approach. Read each statement and carefully circle the number at the left of each statement which best indicates how strongly you agree or disagree with the statement. Please respond to every statement.

	H DISAGTEE STTONGLY N DISAGTEE SOMEWHAT	ω Disagree slightly	Agree slightly	u Agree somewhat	o Agree strongly	POLITICAL ACTION: An effort aimed at persuading an electorate, a legislator (or legislature), or execu- tive governmental agency to conform to the values held by the person or persons taking that action, e.g., lobbying, voting, campaigning for candidates, etc.	
	2	3	4	5	6	<ol> <li>Probably fate, more than any political action I could take, will determine the outcome of this situation.</li> </ol>	
1	2	3	4	5	6	<ol> <li>I believe I can be effective in determining the outcome of this situation through the use of political action.</li> </ol>	
	1 2	3	4	5	6	3. My ability to identify and utilize political actions in this situation matters little because the final outcome will be determined by a few people who will be unconcerned or unaffected by my use of such actions.	
	L 2	3	4	5	6	<ol> <li>By participating in some type of political action, I can play an effective role in determining the outcome of this situation.</li> </ol>	
	L 2	3	4	5	6	<ol> <li>It would only be a coincidence if I participated in some political action related to this situation, and the situation turned out the way I felt it should.</li> </ol>	
	L 2	3	4	5	6	6. If I receive training in the identification and use of political actions relevant to this situation, I could be effective in using those skills to influence the final outcome of this situation.	

- Disagree strongly	∾ Disagree somewhat	ω Disagree slightly	♣ Agree slightly	u Agree somewhat	o Agree strongly		POLITICAL ACTION (continued)
1	2	3	4	5	6	7.	How this situation turns out will be determined by people above me who would be unaffected by any political action I could employ.
1	2	3	4	5	6	8.	I can implement some type of political action which would directly or indirectly influence the outcome of this situation.
1	2	3	4	5	6	9.	The political action I could take in relation to this situation would be of little or no value because it would not have an effect on the people who really decide on how this situation will turn out.
1	2	3	4	5	6	10.	If I were trained in the identification and use of political actions, I could not use those skills to influence the final outcome of this situation because it is probably uncontrollable.
1	2	3	4	5	6	11.	Even with training in the identification and use of political actions, I could not use those skills to influence the outcome of this situation because the outcome will be determined by certain people who will be unaffected by my use of such actions.
1	2	3	4	5	6	12.	I believe that what is going to happen in this situation will happen regardless of any political action I take.
1	2	3	4	5	6	13.	If I were educated in the identification and use of political actions, I could utilize that knowledge to influence the final outcome of this situation.
1	2	3	4	5	6	14.	If this situation turns out the way I believe it should, it would be the result of luck more than the result of any political action I could participate in.

	Disagree strongly	Disagree somewhat	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly		POLITICAL ACTION (continued)
L	1	2	3	4	5	6		
	1	2	3	4	5	6	15.	The political action I could take in this situation would be of little value in determining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.

PERSUASIVE ACTION: An effort to verbally motivate human beings to take positive environmental action as a function of modified values, e.g., argumentation, debate, speech making, letter writing, etc.

1	2	3	4	5	6	1.	By practicing some type of persuasive action, I could play an effective role in determing the outcome of this situation.
1	2	3	4	5	6	2.	My ability to identify and utilize persuasive actions in this situation matters little because the final ourcome will be determined by a few people who will be unaffected by my use of such actions.
1	2	3	4	5	6	3.	If I were experienced in the use of persuasive action techniques, it would be useless to apply those skills to this situation because the final outcome is predetermined by fate anyway.
1	2	3	4	5	6	4.	How this situation turns out will be determined by people above me who would be unaffected by any persuasive action I could take.

The second se
- Disagree strongly	<ul> <li>Disagree somewhat</li> </ul>	u Disagree slightly	> Agree slightly	л Agree somewhat	Agree strongly		PERSUASIVE ACTION (continued)			
1	4	5	4	5	0					
1	2	3	4	5	6	5.	I believe that what is going to happen in this situation will happen regardless of any persuasive action I take.			
1	2	3	4	5	6	6.	I believe I can be effective in determining the outcome of this situation through the use of persuasive action.			
1	2	3	4	5	6	7.	If I were trained in the identification and use of persuasive actions, I could not use those skills to influence the final outcome of this situation because it is probably uncontrollable.			
1	2	3	4	5	6	8.	Given experience in the use of persuasive action techniques, I could utilize that experience to help determine the final outcome of this situation			
1	2	3	4	5	6	9.	I believe the outcome of this situation will be influenced by what people in high social position: already think, more than by any persuasive action I could take.			
1	2	3	4	5	6	10.	Fate, more than any persuasive action I could take, will determine the outcome of this situation			
1	2	3	4	5	6	11.	I can implement some type of persuasive action which would directly or indirectly in- fluence the outcome of this situation.			
1	2	3	4	5	6	12.	It would be a coincidence if I participated in some persuasive action related to this situation, and the situation turned out the way I felt it should.			
1	2	3	4	5	6	13.	The persuasive action I could take in this situation will be of little value in deter- mining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.			

- Disagree strongly	∾ Disagree somewhat	ω Disagree slightly	Agree slightly	u Agree somewhat	o Agree strongly		PERSUASIVE ACTION (Continued)
1	2	3	4	5	6	14.	I believe I can acquire the ability to identify and utilize persuasive actions that would influence the outcome of this situation.
1	2	3	4	5	6	15.	Even with training in the identification and use of persuasive actions, I could not use those skills to influence the outcome of this situation because the outcome will be determined by certain people who are unaffected by my use of such actions.

ECOMANAGEMENT: Any physical action taken by an individual or a group aimed directly at maintaining or improving the existing ecosystems, e.g., recycling, reforestation, erosion control, conservative use of resources, land use management, etc.

-						
1	2	3	4	5	6	<ol> <li>I believe I can be effective in determining the outcome of this situation through the use of ecomanagement practices.</li> </ol>
1	2	3	4	5	6	<ol> <li>As far as I am concerned, good or bad luck will determine how this situation turns out re- gardless of my ability to identify and practice relevant ecomanagement.</li> </ol>
1	2	3	4	5	6	<ol> <li>I can implement some type of ecomanagement strategy which would directly or indirectly influence the outcome of this situation.</li> </ol>

⊢ Disagree strongly	∾ Disagree somewhat	ω Disagree slightly	♣ Agree slightly	u Agree somewhat	o Agree strongly		ECOMANAGEMENT (continued)
1	2	3	4	5	6	4.	The ecomanagement activities I could practice in this situation would be of little value in determining the outcome, because the outcome will mostly be influenced by the actions of a few key individuals.
1	2	3	4	5	6	5.	Given experience in the identification and practice of ecomanagement techniques, I could utilize that experience to help determine the outcome of this situation.
1	2	3	4	5	6	6.	It would be a coincidence if I practiced some ecomanagement related to this situation, and the situation turned out the way I felt it should
1	2	3	4	5	6	7.	How this situation turns out will be determined by people above me, more than by any eco- management strategies I could practice.
1	2	3	4	5	6	8.	I can have a direct or indirect effect on the quality of the environment and thus on the out- come of this situation, through the use of ecomanagement practices.
1	2	3	4	5	6	9.	The ecomanagement strategies I could practice in this situation would be of little or no value because they would not override the influence more important people than I will have on the outcome of this situation.
1	2	3	4	5	6	10.	I believe that what is going to happen in this situation will happen regardless of any ecomanagement I practice.
1	2	3	4	5	6	11.	I believe the outcome of this situation will be influenced by what people in high social positions think and do, more than by any ecomanagement strategies I could practice.

Disagree strongly	Disagree somewhat	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly	ECOMANAGEMENT (continued)		
1	2	3	4	5	6			
1	2	3	4	5	6	12. Even with training in the use of ecomanagement skills, I could not use those skills to influence the final outcome of this situation because it is probably uncontrollable.		
1	2	3	4	5	6	13. Even with training in the use of ecomanagement, I could not use those skills to influence the final outcome of this situation because the outcome will be determined more by the de- cisions and actions of other people in key positions.		
1	2	3	4	5	6	14. I believe I can acquire the ability to identify and practice ecomanagement strategies that would influence the outcome of this situation.		
1	2	3	4	5	6	15. If this situation turns out the way I believe it should, it would be the result of luck more than the result of any ecomanagement I could practice.		
-						ECONOMIC ACTION: Constitutes an action similar to one of the following: a) boycotting; b) selective consumption of goods and services, e.g., purchase of recycled materials; c) mometary contribution to an individual or organization that actively works for a position supported by the contributor, e.g., donations to environmental causes, member- ship fees paid to environmental activist organizations, etc.		
1	2	3	4	5	6	<ol> <li>How this situation turns out will be determined by people above me who would be unaffected by any economic action I could take.</li> </ol>		

- Disagree strongly	∾ Disagree somewhat	w Disagree slightly	Agree slightly	u Agree somewhat	o Agree strongly		ECONOMIC ACTION (continued)
1	2	3	4	5	6	2.	I believe I can be effective in determining the outcome of this situation through the use of economic actions.
1	2	3	4	5	6	3.	Even with training in the identification and use of economic actions, I could not use those skills to influence the outcome of this situation because it will be determined by people who will be unaffected by my use of such actions.
1	2	3	4	5	6	4	It would only be a coincidence if I participated in some economic action related to this situation, and the situation turned out the way I felt it should.
1	2	3	4	5	6	5.	I believe the outcome of this situation will be influenced by what people in high social positions already think, more than by any economic action I could take.
1	2	3	4	5	6	6.	In this situation, I can employ some type of economic action which will have a direct or indirect effect on the final outcome.
1	2	3	4	5	6	7.	I believe that what is going to happen in this situation will happen regardless of any economic action I take.
1	2	3	4	5	6	8.	If I were to implement some type of economic action in this situation, I am sure it would have an effect on the final outcome.
1	2	3	4	5	6	9.	If I were experienced in the use of various economic actions, it would be rather useless to apply those skills to this situation because the outcome is predetermined by fate anyway.
1	2	3	4	5	6	10.	Given the experience in the identification and use of economic actions, I could utilize that experience to help determine the final outcome of this situation.

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-	_	_	_	_	-	-	_	
	Disagree strongly	Disagree somewhat	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly		ECONOMIC ACTION (continued)
	1	2	3	4	5	6		
	1	2	3	4	5	6	11.	The economic action I could take in relation to this situation would be of little or no value because it would not have an effect on the people who really decide how this situation will turn out.
	1	2	3	4	5	6	12.	As far as I am concerned, good or bad luck will determine how this situation turns out re- gardless of my ability to identify and practice relevant economic actions.
	1	2	3	4	5	6	13.	If I were educated in the identification and use of economic actions, I could use this knowledge to influence the final outcome of this situation.
	1	2	3	4	5	6	14.	The economic action I could take in this situation would be of little value in determining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.
	1	2	3	4	5	6	15.	The outcome of this situation will be determined by good or bad luck, regardless of my ability to identify and utilize some type of economic action.
						7		LEGAL ACTION: Any legal/judiciary action taken by an individual and/or organization which is aimed at some aspect of environmental law enforcement or, a legal restrain preceding some environmental behavior perceived as undestrable, e.g., law suits, injunctions, etc.
	1	2	3	4	5	6	1.	If this situation turns out the way I believe it should, it would be the result of luck more than the result of any legal action I could pursue.

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- Disagree strongly	N Disagree somewhat	ω Disagree slightly	Agree slightly	u Agree somewhat	o Agree strongly		LEGAL ACTION (continued)
1	2	3	4	5	6	2.	The legal action I could take in this situation would be of little value in determining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.
1	2	3	4	5	6	3.	If I were trained in the identification and use of legal actions, I could not use those skills to influence the final outcome of this situation becuase it is probably uncontrollable.
1	2	3	4	5	6	4.	If I receive training in the identification and application of legal actions relevant to this situation, I could be effective in using those skills to influence the final outcome of this situation.
1	2	3	4	5	6	5	I believe the outcome of this situation will be influenced by what people in high social positions already think, more than by any legal action I could take.
1	2	3	4	5	6	6.	I believe I can be effective in determining the outcome of this situation through the use of legal actions.
1	2	3	4	5	6	7.	Even with training in the identification and application of legal actions, I could not use those skills to influence the outcome of this situation, because the outcome will be de- termined by certain people who will be unaffected by my use of such actions.
1	2	3	4	5	6	8.	I can implement some type of legal action which would directly or indirectly influence the outcome of this situation.
1	2	3	4	5	6	9.	My ability to identify and utilize legal actions in this situation matters little because the final outcome will be determined by a few people who will be unconcerned or unaffected by my use of such actions.

- Disagree strongly	N Disagree somewhat	ω Disagree slightly	Agree slightly	u Agree somewhat	o Agree strongly		LEGAL ACTION (continued)
1	2	3	4	5	6	10	It would only be a spinoideness if I surged
T	۷	J	4	J	0	10.	some legal action related to this situation, and the situation turned out the way I felt it should.
1	2	3	4	5	6	11.	The legal action I could pursue in this situation would have a direct or indirect effect on the final outcome.
1	2	3	4	5	6	12.	The legal action I could take in relation to this situation would be of little or no value because it would not have an effect on the people who really decide how the situation will turn out.
1	2	3	4	5	6	13.	If I were experienced in the identification and application of legal actions, it would be useless to apply those skills to this situation because the outcome is predetermined by fate anyway.
1	2	3	4	5	6	14.	By pursuing some type of legal action, I could play an effective role in determining the outcome of this situation.
1	2	3	4	5	6	15.	I believe that what is going to happen in this situation will happen regardless of any legal action I take.

Continue to Section III

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# SECTION III

# INSTRUCTIONS

In this section you are presented with a series of questions that deal with your actual use of some problem solving actions.

Please answer all the questions as completely and honestly as you can.

HOW MANY TIMES DURING THE PAST TWO (2) YEARS HAVE YOU ...

1... paid membership dues to an organization because you thought they would take positive action on some issue for which you have concerns.

\_\_\_\_ (no. of memberships)

(Please list up to three (3) such organizations below)

(1)	
(2)	·
(3)	

2... donated money (other than membership fees) to support some project related to a concern you had for an issue.

(no. of memberships)

(Please list up to three (3) such projects below)

(1) _	 	 	
(2)	 	 	
(3)			

3... avoided doing business with a company or refused to buy their product(s) in order to bring economic pressure to bear on some issue about which you have concerns.

\_\_\_\_ (no. of times) (Please list up to three (3) such companies or products below)

- (1) \_\_\_\_\_
- (2)
- (3)

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IOW 1	MANY TIMES IN THE LAST TWO (2) YEARS HAVE YOU
	reported to the proper authorities illegal actions taken or about to be taken by a person, group or organization.
	(no. of times)
	(Please list up to three (3) such illegal actions below)
	(1)
	(2)
	(3)
	been involved in filing a lawsuit or filing for an injunction concerning some issue.
	(no. of times)
	(Please list up to three (3) topics of such injunctions/lawsuits)
	(1)
	(1)
	(2)
	(3)
	participated in rallies, marches or demonstrations with the intent of persuading others to support your beliefs or actions regarding certain issue.
	(no. of times)
	(Please list below up to three (3) causes for such rallies, marche or demonstrations)
	(1)
	(2)
	•••••••••••••••••••••••••••••••••••••••
	(3)

the second se

HOW MANY TIMES IN THE LAST TWO (2) YEARS HAVE YOU ...

 signed or distributed a petition which encourages a person, group or organization to take action on an issue about which you have concerns.

(no. of times)

(Please list below up to three (3) causes of such petitioning)

- (1) \_\_\_\_\_(2) \_\_\_\_\_
- (3) \_\_\_\_\_
- 8... distributed or presented information/literature to the public about an issue for which you have concerns.

(no. of times)

(Please list below  $\underline{up}$  to three (3) issues of such information/literature distribution)

(1)	
(2)	
(3)	

9... contacted a politician to express your support or opposition to a bill they have introduced or are considering for passage.

(no. of times)

(Please list up to three (3) titles or topics of such bills below)

- (1)
- (2)
- (3)
- 10... How many candidates have you given of your time to campaign for over the last 5 years?

\_\_\_\_ (no. of candidates)

11... Have you used your right to vote in an attempt to improve situations (issues) about which you are concerned?

\_\_\_\_Yes \_\_\_\_No

- 12... Please place a check mark () in front of each activity you have participated in over the last two (2) years.
  - 1. \_\_\_\_ I have picked up litter and/or organized a litter campaign.
  - 2. \_\_\_\_ I have taken steps to reduce energy consumption.
  - 3. \_\_\_\_ I have avoided the purchase of a product because of its negative effect on the environment.
  - 4. I have taken steps to reduce my water consumption.
  - 5. I have recycled paper, glass, metals and/or organic refuse.
  - I have participated in a habitat improvement project (e.g., planting shrubs for wildlife, putting up birdhouses, stream renovation).



# APPENDIX C

Field Study (Final)

PERCEIVED ENVIRONMENTAL CONTROL MEASURE (PECM) WITH BOTH ENVIRONMENTAL ISSUE SUMMARIES



# MICHIGAN STATE UNIVERSITY

DEPARTMENT OF FISHERIES AND WILDLIFE NATURAL RESOURCES BUILDING (517) 355-4477 EAST LANSING · MICHIGAN · 48824

Dear Participant,

This is not a test. This project is intended to collect information concerning public opinions about certain aspects of social issues. The information you provide is vital to our continuing efforts to design effective environmental education programs for citizens. Your honesty in responding to the questions will be deeply appreciated. All of your responses will be kept confidential.

There are three sections to this questionnaire. At the beginning of each section, you will find instructions on how to complete that section.

We know that your time is very valuable and we would like to express our thanks for your cooperation on this project.

Sincerely,

R Ben Piyton

R. Ben Peyton Assistant Professor Environmental Education

Randy Champeau

Randy Champeau Graduate Teaching Assistant Environmental Education

### SECTION I

### INSTRUCTIONS

You are asked to read the following summary of an environmental issue. Please consider the situation as though it were a real part of your life and you were involved in this issue.

After you have read the summary, please respond to the questions in Section II.

The Issue

You are a resident of the United States and have a small summer cottage on a lake in Ontario, Canada. You have just been informed by local authorities that the quality of the lake water is being threatened by increased acidity. The increased acidity is due to a phenomenon called "Acid Rain." Some research into the matter leaves you with the following information:

It is generally agreed upon by researchers that "Acid Rain" is increasingly becoming a national and international problem. Acid rain is caused when sulfur oxides and nitrogen oxides -- widely recognized as among the major man-made pollutants - react with moisture in the air to form acids. Thus, when it rains, it rains a solution of water, sulfuric acid and nitric acid.

Acid rain has been shown to have direct and indirect adverse effects on humans. It has been associated with decreased productivity of several natural and cultivated plant species, toxic contamination of drinking water, increased corrosion of natural and human built structures, and increased acidity of lakes, streams, and rivers. In some cases, acidity has resulted in damage to aquatic organisms and even in the complete elimination of all aquatic life.

The pollutants that cause acid rain are by-products of coal, gasoline and other fossil fuel combustion. The major sources of this combustion include industry, coal-fired power plants and the automobiles. Actually, the more fossil fuel burned the greater the amounts of pollutants discharged into the air and the more severe are the potential effects of acid rain. In addition, acid rain knows no boundaries. It may fall to the ground hundreds or even thousands of miles from its initial source of production, which has caused interstate and international tension.

Lines of battle are being drawn for a major conflict between those who want immediate action on acid rain and those who feel such action would block the economic growth of certain states and the nation. Legislation which calls for stricter air pollution control on industry, power plants and automobiles has been proposed in the national and several state legislatures.

Obviously, whatever the outcome of this situation, it will have a direct or indirect effect on the quality of your life and possible on that of future generations. the second se

#### SECTION I

#### INSTRUCTIONS

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After you have read the summary, please respond to the questions in Section II.

### The Issue

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Obviously, whatever the outcome of this situation, it will have a direct or indirect effect on the quality of your life and possible on that of future generations.

SECTION II

# INSTRUCTIONS

In this section you will find the definitions (in italics) of five approaches that might be used to solve the problem that has been described.

Following each of the five definitions is a series of questions regarding your use of each approach. Read each statement and carefully circle the number at the left of each statement which best indicates how strongly you agree or disagree with the statement. Flease respond to every statement.

Disagree strongly	Disagree somewhat	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly	POLITICAL ACTION: An effort aimed at persuading an electorate, a legislator (or legislature), or escative governmental agency to conform to the values held by the person or persons taking that action, e.g., lobbying, voting, campaigning for candidates, etc.
1	2	3	4	5	6	<ol> <li>I believe that what is going to happen in this situation will happen regardless of any political action I take.</li> </ol>
1	2	3	4	5	6	<ol> <li>By participating in some type of political action, I can play an effective role in determining the outcome of this situation.</li> </ol>
1	2	3	4	5	б	<ol> <li>The political action I could take in this situation would be of little value in deter- mining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.</li> </ol>
1	2	3	4	5	6	<ol> <li>I can implement some type of political action which would directly or indirectly influence the outcome of this situation.</li> </ol>
1	2	3	4	5	6	<ol> <li>If this situation turns out the way I believe it should, it would be the result of luck more than the result of any political action I could participate in.</li> </ol>
1	2	3	4	5	6	6. The political action I could take in rela- tion to this situation would be of little or no value because it would not have an effect on the people who really decide on how this situation will turn out.

	Disagree somewhat	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly	POLI	TICAL ACTION (Continued)
	. 2	3	4	5	6	7.	I believe I can be effective in determining the outcome of this situation through the use of political action.
	L 2	3	4	5	6	8.	How this situation turns out will be deter- mined by people above me who would be unaffected by any political action I could employ.
-	1 2	3	4	5	6	9.	It would only be a coincidence if I partici- pated in some political action related to this situation, and the situation turned out the way I felt it should.

PERSUASIVE ACTION: An effort to verbally motivate human beings to take positive environmental action as a function of modified values, e.g., argumentation, debate, speech making, letter writing, etc.

1	2	3	4	5	6	10.	Fate, more than any persuasive action I could take, will determine the outcome of this situation.
1	2	3	4	5	6	11.	I believe the outcome of this situation will be influenced by what people in high social positions already think, more than by any persuasive action I could take.
1	2	3	4	5	6	12.	I believe I can be effective in determining the outcome of this situation through the use of persuasive action.
1	2	3	4	5	6	13.	How this situation turns out will be deter- mined by people above me who would be unaffected by any persuasive action I could take.



Disagree strongly	Disagree somewhat	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly	PERSUASIVE ACTION (Continued)
1	2	3	4	5	6	14. By practicing some type of persuasive action, I could play an effective role in determining the outcome of this situation.
1	2	3	4	5	6	15. The persuasive action I could take in this situation will be of little value in deter- mining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.
1	2	3	4	5	6	16. It would be a coincidence if I participated in some persuasive action related to this situation, and the situation turned out the way I felt it should.
1	2	3	4	5	6	<ol> <li>I can implement some type of persuasive action which would directly or indirectly influence the outcome of this situation.</li> </ol>
1	2	3	4	5	6	<ol> <li>I believe that what is going to happen in this situation will happen regardless of any persuasive action I take.</li> </ol>
-						ECOMANAGEMENT: Any physical action taken by an individual or a group aimed directly at maintain- ing or improving the existing accessens, e.g., recycling, reforestation, erosion control, conserva- tive use of resources, land use management, pollu- tion control, etc.
1	2	3	4	5	б	<ol> <li>I can implement some type of ecomanagement strategy which would directly or indirectly influence the outcome of this situation.</li> </ol>
1	2	3	4	5	6	<ol> <li>It would be a coincidence if I practiced some ecomanagement related to this situation, and the situation turned out the way I felt it should.</li> </ol>

Disagree strongly	Disagree somewhat	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly	ECOM	ANAGEMENT (Continued)
1	2	3	4	5	б	21.	I can have a direct or indirect effect on the quality of the environment and thus on the outcome of this situation, through the use of ecomanagement practices.
1	2	3	4	5	6	22.	I believe that what is going to happen in this situation will happen regardless of any ecomanagement I practice.
1	2	3	4	5	6	23.	I believe the outcome of this situation will be influenced by what people in high social positions think and do, more than by any ecomanagement strategies I could practice.
1	2	3	4	5	6	24.	I believe I can be effective in determining the outcome of this situation through the use of ecomanagement practices.
1	2	3	4	5	6	25.	The ecomanagement strategies I could practice in this situation would be of little or no value because they would not override the influence more important people than I will have on the outcome of this situation.
1	2	3	4	5	6	26.	If this situation turns out the way I believe it should, it would be the result of luck more than the result of any ecomanagement I could practice.
1	2	3	4	5	6	27.	The ecomanagement activities I could practice in this situation would be of little value in determining the outcome, because the out- come will mostly be influenced by the actions of a few key individuals.
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Disagree strongly	Disagree somewhat	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly	ECONOMIC ACTION: Constitutes an action similar to one of the following: a) boycotting; b) selective consumption of goods and services, e.g., purchase of recycled materials; o) a monetary contribution to an individual or organisation that actively works for a position supported by the contributor, e.g., donations to environmental causes, membership fees paid to environmental activist organisations, etc.
1	2	3	4	5	6	28. I believe that what is going to happen in this situation will happen regardless of any economic action I take.
1	2	3	4	5	6	29. I believe the outcome of this situation will be influenced by what people in high social positions already think, more than by any economic action I could take.
1	2	3	4	5	6	30. In this situation, I can employ some type of economic action which will have a direct or indirect effect on the final outcome.
1	2	3	4	5	6	31. If this situation turns out the way I believe it should, it would be the result of luck more than the result of any economic contri- bution I could make.
1	2	3	4	5	6	32. I believe I can be effective in determining the outcome of this situation through the use of economic actions.
1	2	3	4	5	6	33. How this situation turns out will be deter- mined by people above me who would be unaffected by any economic action I could take.
1	2	3	4	5	6	34. It would only be a coincidence if I partici- pated in some economic action related to this situation, and the situation turned out the way I felt it should.
1	2	3	4	5	6	35. If I were to implement some type of economic action in this situation, I am sure it would have an effect on the final outcome.
1	2	3	4	5	6	36. The economic action I could take in this situation would be of little value in deter- mining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.

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Disagree strongly	Disagree slightly	Agree slightly	Agree somewhat	Agree strongly	LEGA by a aime ment envi e.g.	L ACTION: Any legal/judiciary action taken n individual and/or organization which is at some aspect of environmental law enforce- or, a legal restraint preceding some ronmental behavior perceived as undesirable, , law suits, injunctione, etc.
1 2	3	4	5	6	37.	If this situation turns out the way I believe it should, it would be the result of luck more than the result of any legal action I could pursue.
1 2	3	4	5	6	38.	I believe I can be effective in determining the outcome of this situation through the use of legal actions.
1 2	3	4	5	6	39.	It would only be a coincidence if I pursued some legal action related to this situation, and the situation turned out the way I felt it should.
1 2	3	4	5	6	40.	I believe the outcome of this situation will be influenced by what people in high social positions already think, more than by any legal action I could take.
1 2	3	4	5	6	41.	I can implement some type of legal action which would directly or indirectly influence the outcome of this situation.
1 2	3	4	5	6	42.	The legal action I could take in relation to this situation would be of little or no value because it would not have an effect on the people who really decide how the situation will turn out.
1 2	3	4	5	6	43.	I believe that what is going to happen in this situation will happen regardless of any legal action I take.
1 2	3	4	5	6	44.	The legal action I could pursue in this situation would have a direct or indirect effect on the final outcome.
1 2	3	4	5	6	45.	The legal action I could take in this situa- tion would be of little value in determining the outcome, because the outcome will mostly be influenced by a few people who already have their own ideas about the situation.

SECTION III

	INSTRUCTIONS
	In this section you are presented with a series of questions that deal with your actual use of some problem solving actions.
	Please answer all the questions as completely and honestly as you can.
HOW.	MANY TIMES DURING THE PAST TWO (2) YEARS HAVE YOU

46 ... paid membership dues to an organization because you thought they would take positive action on some issue for which you have concerns?

(no. of memberships)

47 ... (Please list up to three (3) such organizations below)

(1)		
(2)	 	
(3)		

48 ... donated money (other than membership fees) to support some project related to a concern you had for an issue:

(no. of donations)

49 ... (Please list up to three (3) such projects/donations below)



HOW MANY TIMES IN THE LAST TWO (2) YEARS HAVE YOU ...

50	avoided doing business with a company or refused to buy their product(s) in order to bring economic pressure to bear on some issue about which you have concerns.
	(no. of times)
51	(Please list up to three (3) such companies or products below) $% \left( \left( {{{\boldsymbol{x}}_{i}}} \right) \right)$
	(1)
	(2)
	(3)
50	
52	reported to the proper authorities illegal actions taken or about to be taken by a person, group or organization.
	(no. of times)
53	(Please list up to three (3) such illegal actions below)
	(1)
	(2)
	(3)
= 1	
54	been involved in filing a lawsuit or filing for an injunction concerning some issue.
	(no. of times)
55	(Please list up to three (3) topics of such injunctions/lawsuits)
	(1)
	(2)
	(3)

HOW MANY TIMES IN THE LAST TWO (2) YEARS HAVE YOU ...

56	participated in rallies, marches or demonstrations with the intent of persuading others to support your beliefs or actions regarding a certain issue.									
	(no. of times)									
57	(Please list below up to three (3) causes for such rallies, marches or demonstrations)									
	(1)									
	(2)									
	(3)									

58... signed or distributed a petition which encourages a person, group or organization to take action on an issue about which you have concerns.

(no. of times)

59... (Please list below up to three (3) causes of such petitioning)

(1) \_\_\_\_\_(2) \_\_\_\_\_(3) \_\_\_\_\_(3)

60... distributed or presented information/literature to the public about an issue for which you have concerns.

(no. of times)

61... (Please list below up to three (3) issues of such information/literature distribution)

(1)	
(2)	
(3)	

HOW MANY TIMES DURING THE PAST TWO (2) YEARS HAVE YOU ...

62... contacted a politician to express your support or opposition to a bill they have introduced or are considering for passage.

(no. of times)

63... (Please list up to three (3) titles or topics of such bills below)



64. How many candidates have you given of your time to campaign for over the last 5 years?

\_\_\_\_ (no. of candidates)

65. Have you used your right to vote in an attempt to improve situations (issues) about which you are concerned?

\_\_\_\_yes \_\_\_\_no

- 66. Please place a check mark (✓) in front of each activity you have participated in over the last two (2) years.
  - I have picked up litter and/or organized a litter campaign.
  - 2. I have taken steps to reduce energy consumption.
  - I have avoided the purchase of a product because of its negative effect on the environment.
  - 4. \_\_\_\_ I have taken steps to reduce my water consumption.

à.....

- I have recycled paper, glass, metals and/or organic refuse.
- I have participated in a habitat improvement project (e.g., planting shrubs for wildlife, putting up birdhouses, stream renovation).
| 67. | Sex: Male           | Female |
|-----|---------------------|--------|
| 68. | Age:                |        |
| 69. | Occupation:         |        |
| 70. | Level of education: |        |

71. How long have you been a member of Sierra Club

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67. Sex: Male \_\_\_\_\_ Female \_\_\_\_\_

68. Grade level you teach: \_\_\_\_\_

69. Number of years you have taught school \_\_\_\_\_

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67. Sex: Male \_\_\_\_ Female \_\_\_\_ 68. Major in College: \_\_\_\_\_ 69. Year in College: \_\_\_\_\_ Freshman \_\_\_\_\_ Sophomore \_\_\_\_\_ Junior \_\_\_\_ Senior \_\_\_\_\_

Grad \_\_\_\_\_

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LIST OF REFERENCES



## LIST OF REFERENCES

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