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Environmental concern of university students in the federal education institute in rural Goiás, Brazil

Preocupação ambiental de estudantes universitários de instituto federal de educação da zona rural de Goiás, Brasil

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ABSTRACT

In this research the adaptation and validation of the Environmental Concern Scale (ECS) for Brazilian Portuguese and the environmental concerns of students were described. After being translated with the assistance of an expert teacher in Spanish language, the ECS was administered to two samples: one of university students (N=153) from Federal Institute of Education Goiano (IF GOIANO), Rio Verde campus, and another of public servants evaluators (N=13) from Federal Institute of Education, Science and Technology of Rondônia (IFRO), Colorado do Oeste campus. Content validity, reliability and construct validity were evaluated. Statistical properties obtained proved the quality of the measurement instrument of Environmental Concern. The agreement style of evaluators with the ECS admitted values for average central tendency, median and mode close to 4.00, in a scale of values from 1.00 to 5.00. The environmental concern of students was low.

Key words: graduation students, reliability, environmental concern scale.

RESUMO

No presente trabalho, foi descrita a adaptação e validação da Escala de Preocupação Ambiental (EPA) para o português brasileiro e a preocupação ambiental dos estudantes. Após ter sido traduzida e retrovertida, com a ajuda de um professor perito na língua espanhola, a EPA foi administrada a duas amostras: uma de estudantes universitários (N=153) do Instituto Federal de Educação Goiano (IF GOIANO), Campus Rio Verde, e outra de servidores públicos avaliadores (N=13) do Instituto Federal de Educação de Rondônia (IFRO), Campus Colorado do Oeste, e foi avaliada a validade de conteúdo, a confiabilidade e a validade de construto. As propriedades estatísticas encontradas atestaram a qualidade do instrumento de medição da Preocupação Ambiental. O estilo de concordância dos avaliadores com a EPA

admitiu valores para as medidas de tendência central média, mediana e moda próxima a 4,00, conforme escala de valores de 1,00 a 5,00. A preocupação ambiental dos estudantes foi considerada baixa.

Palavras-chave: estudantes de graduação, confiabilidade, escala de preocupação ambiental.

INTRODUCTION

The Brazilian Superior Education Census of 2008 showed that the growth rate of technological education courses was greater than that observed in 2007. Six hundred and fifty new courses in technological education were registered in Brazil (BRASIL, 2009). According to BRASIL (2008), Federal Institutes of Education, Science and Technology (IF), in the construction of its pedagogical proposal related to the provision of educational courses for Technological Education, should do it with the particularity that society is demanding and becoming instruments in tune with social, economic and cultural demands. The IF should emphasize cultural and environmental preservation issues. Technological Education courses grew between 2007 and 2008, when 4355 courses were registered.

According to STERN (1992) environmental concern can be define by four perspectives: ecological perspective with good

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examples of the New Environmental Paradigm (NEP) scale from DUNLAP & VAN LIERE (1978) and the Environmental Concern Scale from WEIGEL & WEIGEL (1978), used in a Spanish sample by ARAGONÉS & AMÉRIGO (1991); altruistic perspective, whereby environmental concerns are associated to disinterest, according theory showed by BLACK et al. (1985); selfish perspective, whereby environmental concern is a reflex of oneself well-being concern, and this would be a determinant factor for beliefs and pro environmental actions; ideological perspective, whereby environmental concerns are related to social and cultural values, underlying models socially accepted of relationship between people and nature (NEWMAN, 1989). Reliability and construct validity were evaluated, according to POLIT & HUGLER (1995) and STREINER & NORMAN (2003) theory. Reliability corresponded to the coherence level of the 17 items of ECS. So, the internal consistency of ECS by the total value of Cronbach's Alpha obtained from the sample (N=153) students were evaluated. Presented by CRONBACH (1951). Significant environmental concern was registered by the researches in Sweden (GOOCH, 1995) or in Spain, according to the ecological perspective (GARCIA, 2001).

According to GÜNTHER (2005), Environmental Psychology definition as a study of the interrelationship between psychological phenomena, represented by subjective states and behaviors and physical environmental variables implies that are dealing with three fields of study: psychology, on one side, and another, (a) construction of environments at several scales as studied by ergonomics, architecture, landscape and urban planning (b) natural environments such as those studied in zoology, biology, geology and forestry studies.

The objective of this research was to adapt the Environmental Concern Scale applied to Brazilians undergraduate students and analyze the environmental concern of these students.

MATERIAL AND METHODS

At first, the study was conducted with a sample of 13 servers with graduate degree from IFRO, Colorado do Oeste campus. For the ECSond sample, it was taken 153 undergraduate students randomly selected at IF Goiano, Rio Verde Campus.

Consensual validation was performed, as concepts proposed by FORTIN (1999), to determine the reliability or validity of content, obtained from thirteen (N=13) servers used as curriculum evaluators. The evaluators were a professor, Doctor

in Agricultural Engineering, five professors with Master degree in Agricultural Sciences and seven servants with graduate degree, experts in Social Sciences and linked to the educational environment of Colorado do Oeste Campus. All public servants evaluators analyzed and compared various versions of the ECS, on the semantic, idiomatic and conceptual content of the items. In cases where there was no consensus on the suggestions, the largest number of agreement between raters was chosen, resulting in the definitive version. From data obtained, measures of central tendency were calculated, represented by average, median and mode, as the theory proposed by ROSERO (2008). This way the inter experts reliability were obtained.

Reliability and construct validity were evaluated, according to POLIT & HUGLER (1995) and STREINER & NORMAN (2003) theory. Reliability corresponded to the coherence level of the 17 items of ECS. So, the internal consistency of ECS by the total value of Cronbach's Alpha obtained from the sample (N=153) students were evaluated. Presented by CRONBACH (1951), the Cronbach's Alpha coefficient is an estimate of the reliability of a questionnaire that applies in a research. It assesses the reliability of the research or of the analysis of items on measuring a same construct. The Cronbach's Alpha is a psychometric indicator (assessment of psychological variables by applying mathematical procedures) used to verify the reliability or internal validity of the instrument, which should present an alpha equal to 1. Thus, the closer it is that number, the better its accuracy.

The purpose of Varimax is to facilitate the reading of the factors, because the rotation makes factorial weights high in a factor and low in other factor defining the groups of variables that are part of a studied factor (PAES & SANTOS, 2010).

Construct validity was performed to obtain the results of variance analysis for the Bartlett's sphericity test, as theory proposed by BARTLETT (1954) and the index of Kaiser-Meyer-Olkin, according to theory proposed by KAISER (1970). The Bartlett's sphericity test estimates coefficients of the factor scores. The resulting scores are an average of 0.000. This value indicates that the correlations between variables are significant. Test the null hypothesis: the matrix of correlations fit among the variables. The determinant of the matrix is 1. When the null hypothesis is accepted ($p \geq 0.05\%$), means that the variables are not intercorrelated, and there is no sense to develop a factor analysis.

Data consistency can be measured by Kayser-Mayer-Olkin method, calculating the KMO

index. The result will be between 0 and 1 and the better index is that closer to 1 (MAROCO, 2007). It was necessary to examine whether there were significant differences detected in the Environmental Concern of students in the sample (N=153) and whether could be generalized to the reference population. To this was applied the one factor variance analysis (ANOVA) on the scores obtained by students depending on the independent variables gender and age of students. A multiple comparison test that allowed to analyze where the differences between population were possible, considering the independent variable of undergraduate students. According MAROCO (2007), the Scheffé test allows to examine pairs of sample averages simultaneously identifying which pairs show significant differences.

Public servants evaluators filled out a scale that included obtainment of information about the Environmental Concern Scale. This instrument consisted of 19 items which aimed to evaluate the quality of the Scale of Environmental Concern by the evaluators. For this, it was requested that the public servant evaluator manifested his level of agreement or disagreement on a Likert interval scale, as suggested by LIKERT (1932). The points on the scale ranged from 1 to 5, consisting of a series of sentences expressing the evaluation of the servers. Examples of items from the scale: (1) The ECS reports on environmental training at school; (2) Questions are precise and clear.

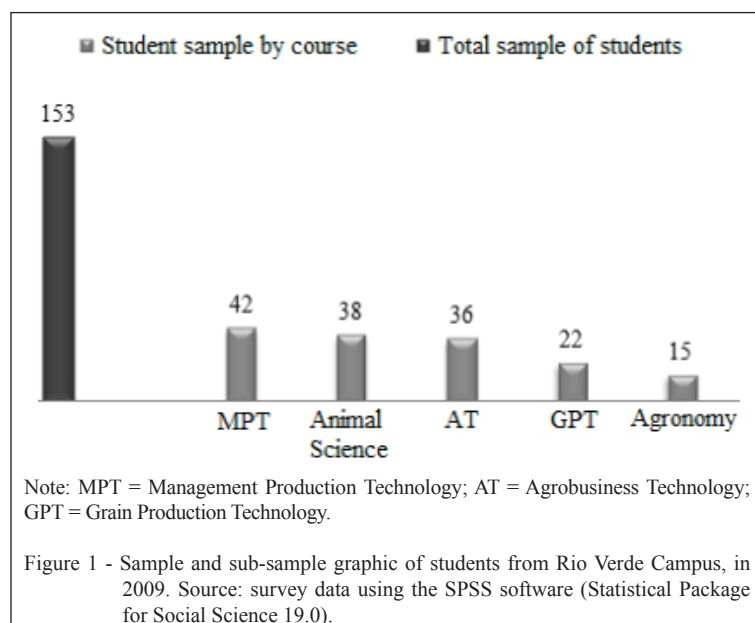
The questionnaire administered corresponded to the updated version of the ECS on an experimental basis, according to GARCÍA (2001).

This instrument consisted of 17 items which aimed to establish the valuation that the graduate student had about environmental concern. It was requested that the students expressed their level of agreement or disagreement on a Likert interval scale, as suggested by LIKERT (1932). The points on the scale ranged from 1 to 5. The ECS was composed by a series of statements which expressed the environment concern of the students.

Three modifications were done: simplification of the terminology, adaptation of the terminology to the population studied and translation of the scale into Brazilian Portuguese. The ECS reconstructed proposed a minimum score of 17 and maximum of 85 points. Examples of ECS items: (1) should not worry about removing wild animals because in the future the environment will stabilize; (2) It is unlikely that the contamination due to energy production is excessive. The government has control agencies. Data analysis was performed using a statistical package for Windows, SPSS® (Statistical Package for Social Science) version 19.0 (ARBUCKLE, 2010).

RESULTS AND DISCUSSION

The average age of the students was 23.01 years. The sample was mostly, 60.78%, male and 39.22% female. The variable age is related to people's behavior in relation to the power of choice by the consumer (ROBERTS, 1996). The student sample composition related to the independent variable undergraduate degree is specified in figure 1.



Average (4.12), median (4.05) and mode (4.10) indicated agreement with the ECS by the evaluators. This means they are in accordance with the construction of the ECS, because in the evaluation scale of 19 items with answer choices from 1 to 5, the most frequent value was close to 4.00.

The results revealed a Cronbach's alpha coefficient equal to 0.6118 for the whole ECS. Therefore, this indicates a fact that certifies adequate reliability of the measuring instrument of environmental concern. According to MALHOTRA (2001) scales that measure beliefs, attitudes and values need a Cronbach's alpha coefficient above 0.60. However, QUEIROGA et al. (2006), studying psychosocial functions on consumer behavior, found Cronbach's alpha of 0.51.

Construct validity was determined through principal components factor analysis followed by varimax orthogonal rotation. Using the criterion for retaining factors with minimum values of 0.40 it was verified a conceptual identity (SCHEIER et al., 1994). Clarification was obtained with a total of 56.132% of variance explained. This indicates the impact of correlations between groups of variables. The explained variance was higher in Factor 1 (17 variables = 15.53% of variance explained).

Values to variance analysis Varimax, KMO and Bartlett are specifically 56.132%, 0.633 and 0.000. The value Varimax of 56.132% is the sum of the impact of six factors and indicates the validity of the ECS. The number of Factors indicates groups of correlation between variables. A KMO index low (<0.5) indicates that the intercorrelation between variables is not great. The value 0.633 obtained indicated that the sample was adequate for data analysis (PASCUAL, 2000). The verification of the sampling adequacy to the Factor Analysis, assessed by the Bartlett test was upright ($P<0.000$). This value indicated that the correlations between variables were significant.

Data showed that AT students expressed the lowest environmental concern (49.6166 points),

followed by MPT (50.2142 points), Animal Science (50, 6052 points) and Agronomy (51.1333 points) students. At the other extreme, the group with the highest level of environmental concern was represented by Grain Production Technology students, with a score of 51.1363 points, thus meaning a difference of 1.52525 over the course of Agribusiness Technology. The score average obtained by students, according to the five undergraduate courses, was 50.5400 points, with the average standard deviation equal to 0.9525. This result indicated low environmental concern by undergraduate students and that they are not considered environmentally-friendly (low environmental concern), since to be considered environmentally-friendly the score should be at least 60.00 points. There are three levels of environmental concern, according to data from the ECS (Table 1). As the ECS has 17 items, if the student marks the option total disagreement (1.00), the minimum score is 17 points. If the student marks the option total agreement, the maximum score is 85 points.

The level of environmental concern of students in Rio Verde Campus showed clear differences when analyzing the variable gender. Female students scored lower than male students. Results will be employed in curricula and teaching strategies improvement. Significant differences were detected in the Environmental Concern and these could be generalized to the population of reference. ANOVA was applied on the scores obtained in function of gender. The result indicated that significant differences exist in four characteristics (dependent variables) of the environmental concern profile of students according to the independent variable gender (Table 2).

The authors BRAMSTON et al. (2011) adapted 16 questions that purportedly tap environmental stewardship motivation and administered them to a convenience sample of 318 university students and then to 88 people living in rural Australia, who were either active members of environmental groups or voiced concern about local environmental issues. Factor analyses support three relatively independent aspects

Table 1 - Environmental concern level for environment tendency.

Environmental concern level	Points to the environmental tendency
Low environmental concern	de 34.0 to 59.0 points = not environmentally-friendly
Medium environmental concern	de 60.0 to 69.0 points = environmentally-friendly
High environmental concern	de 70.0 to 80.0 points = environmentally-friendly

Source: García (2001).

Table 2 - Anova between dependent variables and students gender, Rio Verde Campus, in 2009.

Dependent variable	F	p(F)	Alpha
- Environmental contamination does not affect me.	6.383	0.013	0.05
- Compulsory education about environmental education in schools.	4.300	0.040	0.05
- The infection originated from the energy production is not exaggerated.	7.451	0.007	0.05
- I aim to allocate time and money to NGOs fight for environmental quality.	8.743	0.004	0.05

Note: F = F test; p (F) = significance level; alpha level = error.

Source: survey data using the SPSS software (Statistical Package for Social Science 19.0).

of environmental stewardship motivation: (a) developing a sense of belonging, (b) caretaking the environment, and (c) expanding personal learning. Scores on the scale were not strongly correlated with well-being, suggesting that the scale measures more than general feelings of positive affect.

The authors KOSTOVA et al. (2011) analyzed the historical development of worldviews on human-environment interrelationships, different environmental attitude measuring instruments and the properties of the New Ecological Paradigm Scale (NEPs). The NEP scale was considered a good and reliable attitude-measuring instrument and was employed for assessing environmental concern of students in a vocational school. Their trust in technological advancement and in human intellectual abilities to solve ecological problems was well expressed. A significant part of them (about one fifth) demonstrated uncertainty acting on the save side.

CONCLUSION

The ECS resulted can be understood as psychometrically adequate and legitimate. It is appropriate to be a tool for the diagnosis of environmental concern, since it has the ability to evaluate the dimensions of the construct safely. It could be identified the power of the Environmental Concern prognostic at the other four IF Goiano Campus, because studies about the relation between the Environmental Concern at Rio Verde Campus and the other four campi is nonexistent. The ECS described in this report was an adaptation. It was also revalued and had its reliability levels calculated. Due to the complexity of the concept of Environmental Concern, the considerations about this subject are far from being exhausted. This study can be helpful on the development and validation of psychological instruments in Environmental Psychology, because it linked theories of Environmental Concern and the accuracy of statistical procedures in their implementation.

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