Journal of Environmental Science and Engineering B 6 (2017) 484-488
doi:10.17265/2162-5263/2017.09.006

Holland's Method as a Material in Environmental Education

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Abstract: In this work, the Holland's methodology is modified for the categorization of human personalities by including queries (in the corresponding questionnaire that serves as an evaluation tool) investigating its responders' attitude as regards his/her willingness to be professionally engaged with the natural or/and anthropogenic environment. The population used as representative sample consisted of 250 students following courses at high school and university level. The quantitative methods used were descriptive statistics, parametric and non-parametric statistics hypothesis (on causal relations) testing, categorical semantics, ontological mapping fuzzy sets and interval algebra. The results obtained showed relative significant internal consistency at macro-level for almost half of the interviewees, but the dependence of answers to environmental queries on the rest responds to the rest queries was insignificant, indicating lack of specific knowledge and clarification of the corresponding concepts at micro-level.

Key words: Environmental education, Holland's theory, questionnaire design, hypothesis testing, vocational typology.

1. Introduction

The central hypothesis in Holland's theory is that the vocational interest is a key aspect of the individual. People can be described by their degree of resemblance to six theoretical personality types: Realistic (conforming, hard-headed, practical, inflexible and un-insightful), Investigative (independent, intellectual, precise, rational and reserved), Artistic (emotional, imaginative, introspective, nonconforming and sensitive), Social (cooperative, friendly, helpful, responsible and warm), Enterprising (agreeable, ambitious, energetic, extroverted and sociable) and Conventional (conforming, conscientious, efficient, obedient and practical) [1]. Each type is characterized by distinctive preferences, outlooks, competencies and self perceptions. In practical applications, information about a person's preferences, goals and self estimates is used to assess the degree to which an individual resembles each of the six personality types; these types are not always clear and pure and a variety of mixed personalities are not uncommon. At what level of the same kind of work will influence a person is determined by one's intelligence, self-knowledge and professional information/background [2].

Environmental attitudes are conceptualized in terms of behavioral theory as being composed of beliefs towards an object [3]. The environment as an object is difficult to define; it may be an attitude object which has been forced on the respondent by journalists and researchers, but it may not make sense to respondents who see the environment much more in terms of its component parts that they personally experience. The factors that may influence one's environmental attitudes are: knowledge, background, experience, perception, values and context. Environmental concern appears to be a specific belief which is largely embedded in cognitive structures and should be considered an opinion rather than an attitude. While changes in this opinion have been documented, it is not clear that environmental attitudes or values have shifted, although attitudes have most probably become more differentiated over the last decade.

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The investigation of the attitudes of young people is very important to environmental education, whose role is to shape positive behaviors towards the environment. Linking environmental and vocational type helps grouping of personalities. The psychometric tools available in the literature are in the form of census questionnaires used to assess job characteristics [1]. In this work, the Holland's methodology is modified for the categorization of human personalities by including queries (in the corresponding questionnaire that serves as an evaluation tool) investigating its responders' attitude as regards his/her willingness to be professionally engaged with the natural or/and anthropogenic environment.

2. Methodology

It is used Holland's methodology to develop a questionnaire with 42 Likert-type questions, grouped in seven to six clusters according to Holland's vocational types [3]. Each group includes questions of vocational interest and one or two of environmental interest. The interviewees were mainly students, aged between 15 and 24, of both sexes, interviewed in person. The sample includes students of technical vocational schools and high schools, as well as, by undergraduate and post-graduate university students. Respondents filled the questionnaire by themselves at class, at the presence of their teacher/lecturer for any clarification needed. Scoring followed the five-point scale, from 1 = strongly disagree to 5 = agree completely. At the end of each questionnaire, the student had to describe himself by ranking the six personality types with descending order of preference. That gave two sets of scores (i.e., the summation of the scores that each respondent gave to the questions) on occupational preferences, one from the responses to the questions and another from his ranking preferences (initial and final, respectively). The questionnaires data were registered in excel and processed with SPSS (Statistical Package for the Social Sciences)-Statistics, using R^2, weighted rank (r_T), Pearson's, Kendall's and Spearman's coefficient correlations [4, 5].

3. Results

The survey was conducted within 20/5/2011-20/6/2011, using the high school and technical vocational schools of Zografos (east suburb of Athens) and undergraduate and post-graduate students of the University of Piraeus. Some problems have been registered during the completion of questionnaires, mainly due to miscomprehension of the questions (especially at the lower levels of education), lack of time and the influence of the classmates. The study extends to the diversification of respondents according to age, sex and educational level. The students sample consisted of the 47% women and 53% men. The distribution according to the students' origin is 40% from technical vocational schools, 42% from high schools, 7% in undergraduate university courses and 11% in post-graduate courses. The age distribution is given in Fig. 1. As regards the personality types, 12.3% of respondents belong to type A, 17.5% are registered as type B, 15.8% fit in type C, 25.7% belong to type D, 10.5% are type E and 18.1% are assigned under type F.

The correlation of personality type with the degree of environmental awareness has been used herein as a tool to determine the approach (extend, intensity and depth) that environmental education should follow on each of the six Holland's types. The most friendly type to environment is type D (Social), followed closely by type C (Artistic), type E (Enterprising), type F (Conventional), type B (Investigative), whereas type A (Realistic) appears the least predisposed. The correlation between personality types and awareness of respondents on environmental issues (Fig. 2) showed that Social type is the most sensitive to environmental issues. The type of personality of each respondent was associated, as it is deduced from his/her answers, with his/her personal beliefs, as they

are derived from his/her ranking of types: the internal consistency of the first type selected is 43%, whereas the internal consistency between the first and second choice is 81%. Each type's environmental question with the other questions in the group was also associated. The results gave R^2 values between 0.71-0.95, indicating medium to high correlation between the average values of scores of all other questions and the score of question that measures the environmental sensitivity.

The top-down correlation analysis, considering the ranking score of the respondents and the classification chosen by the respondent, gave the weighted rank correlations, r_T: (i) for the technical vocational school students, the range is between -0.053 and +0.707, with an average value of 0.355 and a standard deviation of 0.78; (ii) for the undergraduate students, the range is between +0.159 and +0.771, with an average value of 0.482 and a standard deviation of 0.218. Evidently, there is significant agreement between the two rankings for the six personality types, at least for the higher values of correlation. The hypothesis for the Pearson's, the Kendall's and the Spearman's correlation coefficients was formed. H_0: if r = 0, then there is no correlation; and H_1: if r > 0 or r < 0, then there is correlation. The confidence level is a = 5%. Thus, if *p*-value (two-tailed) < 0.05, then H_0 is rejected and H_1 is accepted; If r > 0, there is a positive

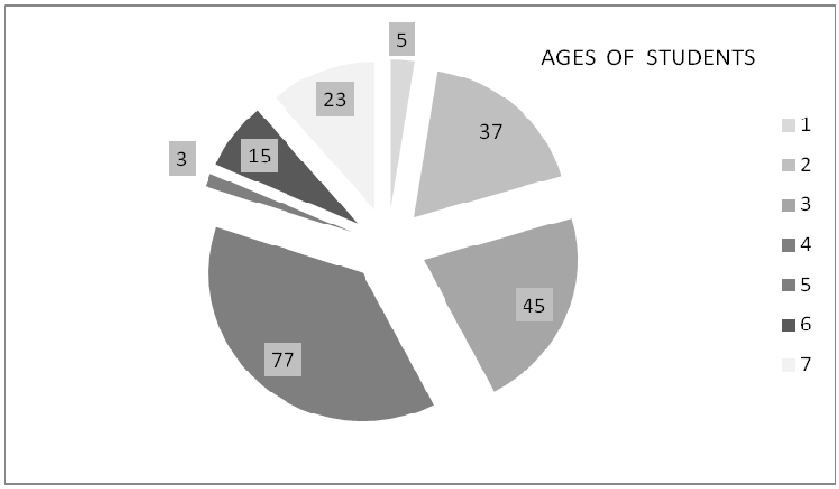

Fig. 1 Students' ages chart, where: 1 = 14; 2 = 15; 3 = 16; 4 = 17; 5 = 18; 6 = 22 and 7 = 24 years old.

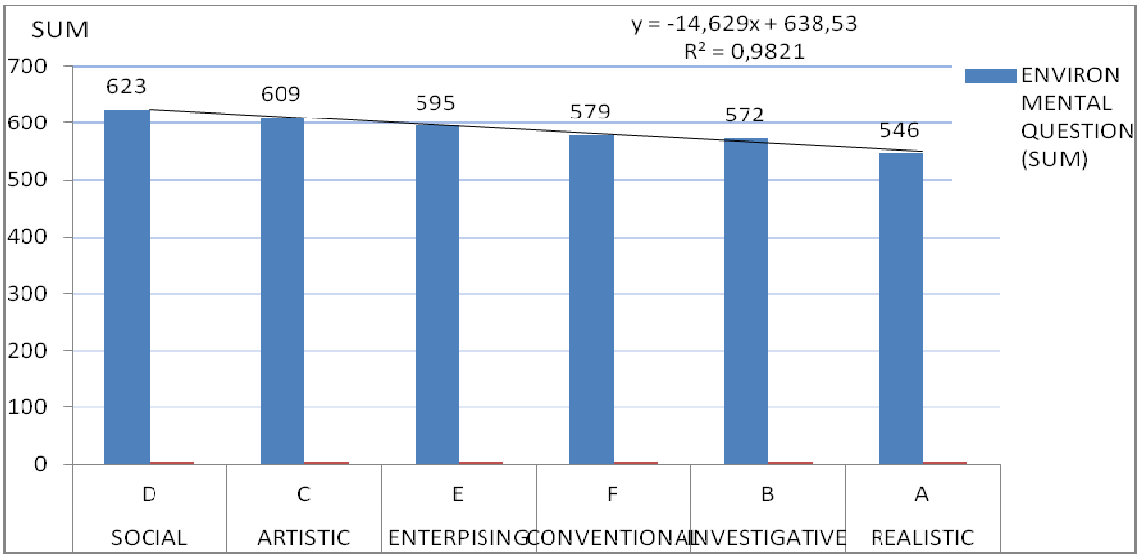

Fig. 2 Environmental question (SUM) of each type.

Table 1 Coefficients of correlation.

Holland's type	$r_{Pearson}$	$r_{Kendall}$	$r_{Spearman}$	Remarks
A	0.382	0.292	0.382	p (two-tailed) < 0.05
B	0.315	0.252	0.329	p (two-tailed) < 0.05
C	0.411	0.324	0.429	p (two-tailed) < 0.05
D	0.180	0.158	0.208	p (two-tailed) < 0.05
E	0.219	0.154	0.204	p (two-tailed) < 0.05
F	0.348	0.274	0.350	p (two-tailed) < 0.05

correlation whereas if $r < 0$, there is a negative correlation; in these cases, H_0 is accepted and H_1 is rejected. The results are presented in Table 1. As there is no linear relationship between variable "Initial Score" and "Final Score", the assumptions are based on Kendall' and Spearman' correlation coefficients.

4. Discussion

In Greek primary and secondary education, environmental education is included in the curriculum, yet it still depends on the educators' will to be applied. Administration bottlenecks, in addition to the uncertainty teachers are feeling concerning that their knowledge background on environmental issues, the lack of existence of a suitable educational or training material and the restriction of the school timetable usually hamper the environmental education course.

The theory of Holland's vocational personalities has been confirmed and validated by many researchers [6-10]. Using the modified questionnaire of personality types of Holland, without direct reference to them, this research has helped to elicit indirectly the views of students about the environment, so as to provide educators valuable information that they may use to formulate a proper educational material. Certain conclusions have been drawn at comparing personality types to environmental awareness, assigning a degree of environmental predisposition to each type.

Social is the first type of personality that is sensitive to environmental issues. The causal relationship that forms the Social type fully justifies this predisposition, as the main characteristics of the type are consistent with environmental sensitization: the Social type is friendly and responsible; he enjoys team work; he prefers educational activities; he cares for the public benefit and he tries to maximize social welfare. After all, the environment is a public good and its protection relies on willingness of the citizens.

The second type of personality that is sensitive to environmental issues is the Artistic one. This type develops positive feelings about the environment and is creative and unconventional. For this type, clean environment is a source of inspiration and creativity.

5. Conclusion

In conclusion, the modification of Holland's methodology for determining the degree of environmental awareness of young people has been proven suitable to evaluate attitudes and beliefs of students as regards their willingness to be actively engaged with the environment. The results obtained showed relative significant internal consistency at macro-level for almost half of the interviewees, but the dependence of answers to environmental queries on the rest responds to the rest queries was insignificant, indicating lack of specific knowledge and clarification of the corresponding concepts at micro-level.

References

[1] Holland, J. L. 1997. *Making Vocational Choices* (3rd Ed.). Odessa, FL: Psychological Assessment Resources.

[2] Gottfredson, G. D., and Holland, J. L. 1996. *Dictionary of Holland Occupational Codes*. Odessa, FL: Psychological Assessment Resources.

[3] Kyridis, A., Mavrikaki, E., Tsakiridou, H., Daikopoulos, J., and Zigouri, H. 2005. "An Analysis of Attitudes of Pedagogical Students towards Environmental Education in Greece." *Int. J. Sustain. Higher Edu.* 6 (1): 54-64.

[4] Zar, J. H. 1996. *Biostatistical Analysis*. USA*:* Prentice Hall International, 371-406.

[5] Bolton, B. 1985. Challenges of the Interface Data Analysis, *J. Voc. Behav.* 27: 210-7.

[6] Amundson, N. E., Harris-Bowlsbey, J., and Niles, S. G. 2008. *Essential Elements of Career Counseling: Processes and Techniques* (2nd Edition). Colombus Ohio, USA: Pearson Merrill Prentice Hall.

[7] Heberlein, T. A. 1985. "Environmental Attitudes." *Abhandlungen* ZfU 81: 241-70.

[8] Timmermans, H. 1984. "Decompositional Multiattribute Preference Models in Spatial Choice Analysis: A Review of Some Recent Developments." *Progress in Geography* 8 (2): 189-221.

[9] Greek Ministry of National Education and Religious Affairs and Pedagogical Institute, 2002. *Analytical Report on Education National Focal Point for Greece.* Athens, Greece.

[10] Dunlap, R. E., Van Liere, K. D., Mertig, A. G., and Jones, R. E. 2000. "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale." *Journal of Social Issues* 56 (3): 425-42.