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CHARACTERISTICS OF EDUCATORS AND THEIR VIEWS ON THE WORK OF THE ENVIRONMENTAL EDUCATION CENTER OF SOUFLI

1. Introduction

Environmental Education Centers (E.E.C.) were instituted very recently and are included among the most significant statutory requirements of the Ministry of National Education and Religious Affairs in support of Environmental Education (E.E.). The institutional requirement for an E.E. director in each prefecture and the incorporation of an Environmental Science course in the high school curriculum are other significant initiatives of this ministry. The first E.E.C. operated as a pilot project in 1994 in Kleitoria in the Achaia prefecture, whereas by 2005 there were 41 E.E.Cs operating over the country [Tsaliki, 2005]. In the founding decision C2/3219/11-5-95, the goals to be achieved by E.E.Cs are described as follows:

– Sensitization of young people to environmental issues, in order to develop responsible attitudes and participation that would contribute to the protection of the ecological balance and quality of life and promote sustainable development.

– Realization of E.E. programs of one to six hours daily for primary and secondary education schools, but also of non-formal, out-of-school, environmental education programs.

– Support of the E.E. programs of the schools which belong to their district in collaboration with the E.E. prefecture heads.

– Production of educational material (printed, audiovisual etc.) and pilot program guides for schools.

– Collaboration with scientific institutions at local, national and international level backed up by the creation and operation of data bases which promote scientific research, documentation and the development of educational programs.

– Organization and realization of E.E. training seminars for educators and adults in collaboration with other governmental and non-governmental organizations. The collaboration with such organizations may be expanded beyond training purposes if such an initiative contributes to E.E.C. goals.

– Promotion of E.E. research.

Evaluation is an issue that concerns any educational procedure and therefore the activities of the centers. One of the most common forms of evaluation for certain activities, such as programs for the students who visit the center, is the completion of questionnaires at the end of the visit, one by the students and one by the educators who accompany the students. Questionnaires are also handed to the educators who participate in training seminars organized by the E.E.C. Another kind of evaluation is carried out by the educators who staff the pedagogic group of the E.E.C. when discussing their experiences of the realization of programs or when they report after the completion of a seminar with the aim of improving such activities. Meetings with educators or environmental education directors can also be regarded as a form of formative evaluation and feedback with the aim of discovering how the activities of a center could meet the needs of the educational community. Furthermore, we could also mention the joint meetings of all E.E.Cs that take place at the end of each school year, where the Centers' educators get the opportunity to exchange viewpoints on their work, share ideas and think critically about their work [Tsaliki, 2005].

The present study analyzes a questionnaire filled in by 229 educator supervisors in the E.E.C. of Soufli during the period of 2000–2005. This questionnaire contains some characteristics of these educators and their views on the work of the E.E.C. of Soufli.

2. Research methods

The present research was carried out in the E.E.C. of Soufli, which has operated since 1996, but started realizing environmental education programs in 2000. During the last five years of operation (2000–2005), 59 programs were realized and were in total attended by 81 schools, including 25 primary schools and 56 secondary schools. Altogether 2 360 students accompanied by 229 educators visited the E.E.C. of Soufli and after the end of the program they filled in a questionnaire, analyzed in the present study. At first, stratified random sampling was applied, but then loglinear analysis was thought to be more meaningful to analyze the following variables: "realization of E.E. program," "attendance of E.E. meetings" and "attendance of E.E. seminars" that concern

the trainees' data in the first part of the questionnaire, together with analysis of homogeneity for certain variables in the second part of the questionnaire related to the E.E.C. of Soufli, in particular: "evaluation of reception at the centre," "extent to which the E.E.C. of Soufli met the expectations of the educator supervisors," "evaluation regarding the organization of the program," "degree of student enthusiasm," "overall impression of students" and "importance of the visit for involvement in other E.E. programs."

Prior to the carrying out of loglinear analysis, it was decided to examine the expected frequencies in the contingency table [Siardos, 1999]. A large number of expected frequencies (more than 20%) of less than 5, but not lower than 1, possibly leads to a loss in the effectiveness of the applied analysis [Tabachick and Fidell, 1989]. This examination is carried out through control of bivariate contingency tables [Norusis, 1994; Frangos, 2004].

Classes were grouped together in order to satisfy the above criterion. Our data are classified in accordance with 3 criteria and expressed in terms of frequencies.

The null hypothesis, Ho, is that the 3 criteria are fully independent from each other.

It is unlikely that this hypothesis will be confirmed, but the analysis will give information on the strength of various interrelations and this will be included in a model that expresses the interrelations between the data [Frangos, 2004].

In order to estimate the degree of correspondence between the model and the data, statistical tests of optimum adjustment is used. The X2 test of independence is applied [Howitt and Gramer, 2003]. Loglinear analysis forms a special case of multiple regression analysis illustrating which variables relate to others within the framework of a multidimensional contingency table. Finally, in order to interpret the model of optimum adjustment, we present the data in the form of one or two – dimensional tables [Howitt and Gramer, 2003].

Homogeneity analysis is then applied, which, using the technique of minimum squares, quantifies any variable category with excellent precision so that categories of each variable have a maximum dispersion width. Analysis of homogeneity is a way of analysing the principal components of nominal data. This analysis quantifies the original categoric values and, following this analysis, principal components analysis is carried out [Leeuw and Rijckevorsel, 1980; Nishisato, 1980; Young, 1981; Meulman, 1982; Greenacre, 1984; Lebart et al., 1984; Tenenhaus and Young, 1985; Gifi, 1990; Siardos, 1999]. Analysis of homogeneity is applied to the resulting data obtained from the closed question questionnaires [Behrakis, 1999].

The goal of analysis of homogeneity is to describe the relationships between two or more nominal variables in a low-dimensional space containing the variable categories, as well as the objects in those categories. Objects within

the same category are plotted close to each other, whereas objects in different categories are plotted far apart. The SPSS Statistical Package was used to analyze the data.

3. Results

The results of stratified random sampling, loglinear analysis and analysis of homogeneity are given separately. These three methods are complementary to one another and in this way help us to better understand the educators' viewpoint concerning the issues we deal with:

– **Stratified random sampling.** Two out of three teachers – educators who accompanied the students in the E.E.C. of Soufli belong to the secondary education system (68.1%), whereas the rest belong to the primary education system (31.9%). Primary education is mostly staffed by teachers who form 29.3% of the visiting educators. Secondary educators consist of teachers with various specializations, such as: philologists (18.3%), physicists (10%), mathematicians (7%), English teachers (6.6%), physical education teachers (5.2%) and other specializations (altogether 22). Their participation in environmental education programs forms a complementary educational activity within the framework of the wider educational system. Their participation was not only significant in the first two years of E.E.C. operation (34 and 32 people, respectively), but also in subsequent years, since their participation increased (56, 58 and 49 people, respectively). Women were more common respondents (55%) than men (45%) and it is very possible that women show higher sensitivity towards environmental issues, although this may be due to there simply being more female teachers. Service time ranges from 1 to 34 years, with an average of 15.53 years. Hence, we have participating educators of all ages. After grouping the data into classes, 16.4% of the educators had a service time from 1 to 5 years, 17.9% from 6 to 10 years, 17.5% from 11 to 15 years, 16.2% from 16 to 20 years, 14.4% from 21 to 25 years and 16.2% over 25 years. Educators who visit the E.E.C. of Soufli are positively predisposed to the institution of the E.E.C. and environmental education. So, 60.7% of the educators had already taken part in the realization of one or more programs (up to 70), with an average of 4.04 and more than half (55.9%) realized an E.E. program within the year they visited the E.E.C. of Soufli. Furthermore, 63.8% had attended from 1 to 150 meetings related to E.E., with an average of 4.5 and 46.3% of the educators had attended from 1 to 20 seminars, with an average of 2.51. Only 30 educators (13.1%) participated as instructors in either meetings or seminars: from 1 to 12 presentations, with an average of 2.44.

In the second part of the questionnaire concerning how educators look at the E.E.C. of Soufli, we may say, judging from their answers, that the programs

of the E.E.C. of Soufli have been very successful, since 78.2% of the educators stated that, in regard to their expectations, the program was "highly satisfactory," 16.2% thought that it was "very satisfactory" and 5.7% "satisfactory". Concerning the evaluation of the reception by the centre, 75.5% of the educators found it excellent, 21.4% very good and 3.1% good. More specifically, the organization of the program was characterized as excellent by 68.1%, very good by 28.8% and good by 3.1% of the educators; as far as the program's content was concerned, 82.1% of the educators found it very interesting, 17.5% interesting and only one person (0.4%) found it of minor interest; finally regarding the activities which accompanied the program, 76.9% of the educators found them very interesting, 17.5% interesting and one person (0.4%) found them of minor interest.

According to the views of the educators, 45.4% stated that the students' enthusiasm for the program was very high, 36.2% high and 18.3% acceptable. Regarding the teachers' assessment of the students' impression, approximately half of them (50.2%) thought that it is was excellent, 45.4% very good and 4.4% good. Therefore, in accordance with this data, we could come to the conclusion that the contribution of the E.E.C. of Soufli in the environmental education of the students of both primary and secondary education is significant, since the program is accepted by the students, their interest is maintained and participation gained. When the educators were asked if they would like to revisit the E.E.C. of Soufli, the majority (97.2%) gave an affirmative answer. Most of them (86%) would like to participate in another program and only a small percentage (16.2%) would like to repeat the same program. Therefore, the necessity of constantly searching for new topics and the creation of new programs by the E.E.C. staff is clearly stated.

Finally, regarding the question of how important this visit to the E.E.C. was in relation to their engagement with other environmental education programs in the future, 42.8% answered highly important, 43.2% very important, 13.5% important and 0.4% gave no answer. This may imply that the E.E.C.'s do not activate people only in the direction of the students' environmental education, but also in the direction of educator involvement in environmental issues.

– **Loglinear analysis.** Prior to the application of loglinear analysis, we examined the contingency table (Table 1) and observed that the only expected frequency lower than 5 is 1.9. Therefore, no expected frequency is lower than 1 and only one is lower than 5. Hence, there exists no problem with low expected frequencies. We further observed that there is a disparity between the observed and the expected frequencies. This indicates that the assumption of the full independence of these three criteria is incorrect.

Applying hierarchical loglinear analysis, it was established that the most appropriate model was the one which included the interaction of pairs of variables. The interaction of 3 variables is eliminated, because the X^2 statistic for

Table 1. Cross-tabulation of the three variables

Attendance At E.E. seminars				Realization of E.E. program		Total
				Yes	No	
Yes	Attendance at E.E. meetings	Yes	Count	81	15	96
			Expected Count	77.9	18.1	96.0
		No	Count	5	5	10
			Expected Count	8.1	1.9	10.0
	Total		Count	86	20	106
			Expected Count	86.0	20.0	106.0
No	Attendance at E.E. meetings	Yes	Count	33	17	50
			Expected Count	21.5	28.5	50.0
		No	Count	20	53	73
			Expected Count	31.5	41.5	73.0
	Total		Count	53	70	123
			Expected Count	53.0	70.0	123.0

Source: authors' own research.

the Pearson test is 0.0038 and the p-value is 0.951. This is confirmed by the "null" controls for the interaction of k terms and terms of higher degree, as well as the "null" controls for the interaction of k terms [Norusis, 1994]. As shown in Table 2, there are no interactions of 3rd order, since the p-value is 0.9511. However, there exists a 2nd order interaction (p-value < 0.05). There exists a significant dependency between the following three variable pairs: "realization of E.E. program – attendance at E.E. meetings," "realization of

Table 2. Null controls

Tests that K-way and higher order effects are zero						
K	DF	L.R. Chisq	Prob	Pearson Chisq	Prob	Iteration
3	1	0.004	0.9511	0.004	0.9511	5
2	4	127.463	0.0000	149.504	0.0000	2
1	7	156.850	0.0000	170.057	0.0000	0
Tests that K-wey effects are zero						
K	DF	L.R. Chisq	Prob	Pearson Chisq	Prob	Iteration
1	3	29.387	0.0000	20.553	0.0000	0
2	3	127.459	0.0000	149.500	0.0000	0
3	1	0.004	0.9511	0.004	0.9511	0

Source: authors' own research.

E.E. program – attendance at E.E. seminars," "attendance at E.E. meetings – attendance at E.E. Seminars. The observed and expected frequencies according to the hierarchical loglinear analysis are presented in Table 3.

Table 3. Observed and forecasted frequencies based on hierarchical loglinear analysis

Attendance at E.E. seminars	Attendance at E.E. meetings		Realization of E.E. program	
			Yes	No
Yes	Yes	Count	81	15
		Expected Count	80.9	15.1
	No	Count	5	5
		Expected Count	5.1	4.9
No	Yes	Count	33	17
		Expected Count	33.1	16.9
	No	Count	20	53
		Expected Count	19.9	53.1

Source: authors' own research.

In order to interpret the interactions, we should first present all the data in the form of three two-dimensional tables (Crosstabs). From Table 4 we see that educators, who had realized environmental education programs in the school they work in, had also attended relevant meetings, whereas the ones who had no involvement with the realization of environmental education programs had never attended a relevant meeting.

Table 4. Cross-tabulation of "realization of E.E. program" and "attendance at E.E. meetings"

Realization of E.E. program		Attendance at E.E. meetings		Total
		Yes	No	
Yes	Count	114	25	139
	Expected Count	88.6	50.4	139.0
	Residual	25.4	–25.4	
No	Count	32	58	90
	Expected Count	57.4	32.6	90.0
	Residual	–25.4	25.4	
Total	Count	146	83	229
	Expected Count	146.0	83.0	229.0

Source: authors' own research.

In Table 5 we see that educators who had realized environmental education programs had also attended a seminar relevant to this subject, whereas no involvement in the first also meant a lack of participation in the second. Finally, the third pair, presented in Table 6, reveals that educators who had attended meetings relevant to E.E. had also attended relevant seminars and vice versa, and no participation in the first also meant no attendance in the second.

Table 5. Cross-tabulation of "realization of E.E. program" and "attendance at E.E. seminars"

Realization of E.E. program		Attendance at E.E. meetings		Total
		Yes	No	
Yes	Count	86	53	139
	Expected Count	64.3	74.7	139.0
	Residual	21.7	–21.7	
No	Count	20	70	90
	Expected Count	41.7	48.3	90.0
	Residual	–21.7	21.7	
Total	Count	106	123	229
	Expected Count	106.0	123.0	229.0

Source: authors' own research.

Table 6. Cross-tabulation of "attendance at E.E. meetings" and "attendance at E.E. seminars"

Attendance at E.E. meetings		Attendance at E.E. meetings		Total
		Yes	No	
Yes	Count	96	50	146
	Expected Count	67.6	78.4	146.0
	Residual	28.4	–28.4	
No	Count	10	73	83
	Expected Count	38.4	44.6	83.0
	Residual	–28.4	28.4	
Total	Count	106	123	229
	Expected Count	106.0	123.0	229.0

Source: authors' own research.

– **Analysis of Homogeneity.** The convergence criterion for the program carrying out the analysis of homogeneity was fulfilled after 10 iterations (results to 3 decimal places). The largest two roots of the characteristic equation were $\lambda_1 = 0.518$ and $\lambda_2 = 0.329$, which means that 51.8% of the variation of the

numerical measures describing the categorical variables is explained by the first dimension and 32.9% by the second one.

Descriptive statistics for both these dimensions, corresponding to load analysis of the principal components, are presented in Table 7, where the variables "evaluation regarding reception by the centre," "extent to which expectations were met," "evaluation regarding the organization of the program," "overall impression of students" and, to a lesser degree, the variables "degree of student enthusiasm," "importance of visit for involvement in other E.E. programs" present a distinctive signature in the first dimension. The variables reported as "extent to which expectations were met" and "evaluation regarding the organization of the program" present a distinctive signature in the second dimension.

Table 7. Distribution of categorical variables

Variable	Dimension 1	Dimension 2
Evaluation regarding reception by the centre	0.493	0.368
Extent to which expectations were met	0.612	0.481
Evaluation regarding organization of program	0.608	0.511
Degree of student enthusiasm	0.435	0.115
Overall impression of students	0.553	0.331
Importance of visit for involvement in other E.E. programs	0.410	0.167

Source: authors' own research.

Quantified values of the categorical variables are presented in Table 8. The diagram of category dispersion is based on these coordinates (Figure 1). Categories containing a high degree of identical subjects are close to each other. Therefore, with the aid of this analysis we may highlight two main groups.

Respondents consistently gave a response of "excellent" to the following questions: "evaluation regarding reception by the center," "evaluation regarding the organization of the program" and "overall impression of students," together with a response of "highly satisfactory" to the question on the "extent to which expectations were met," a response of "very high" to the question on the "degree of student enthusiasm" and a response of "highly important" to the question on the "importance of visit for involvement in other E.E. Programs." This set of answers characterize the first group of respondents.

The second group consists of respondents who gave a response of "very good" to the questions on "evaluation regarding reception by the centre," "evaluation regarding organization of program" and "overall impression of students," together with a response of "very satisfactory" to the question on the "extent to which expectations were met," a response of "high" to the question on the

Table 8. Quantitative measures of categorical variables

Variable/Category	Dimension 1	Dimension 2
Evaluation regarding reception by the centre		
Excellent	–0.346	–0.110
Very good	0.799	0.777
Good	2.945	–2.742
Extent which expectations were met		
Highly satisfactory	–0.355	–0.073
Very satisfactory	0.755	1.122
Satisfactory	2.724	–2.194
Evaluation regarding organization of program		
Excellent	–0.469	–0.196
Very good	0.785	0.795
Good	3.029	–3.147
Degree of student enthusiasm		
Very high	–0.661	–0.326
High	0.290	0.429
Acceptable	1.059	–0.044
Overall impression of students		
Excellent	–0.688	–0.391
Very good	0.572	0.578
Good	1.953	–1.531
Importance of visit for involvement in other E.E. programs		
Highly important	–0.655	–0.254
Very important	0.285	0.451
Important	1.187	–0.618

Source: authors' own research.

"degree of student enthusiasm" and a response of "very important" to the question on the "importance of visit for involvement in other E.E. programs."

The first group includes educators who are very positive towards the E.E.C. of Soufli, whereas the second group is composed of educators who, while still being positive towards the efforts of the E.E.C. of Soufli, are more reserved in their praise. In fact, the groups are not highly differentiated, but educators who visit the E.E.C. of Soufli tend to be positively predisposed to the institution of the E.E.C., otherwise they would not visit it in the first place. Furthermore, we see that the educators in the first group are much more aware of the necessity of environmental education in schools compared to those in the second

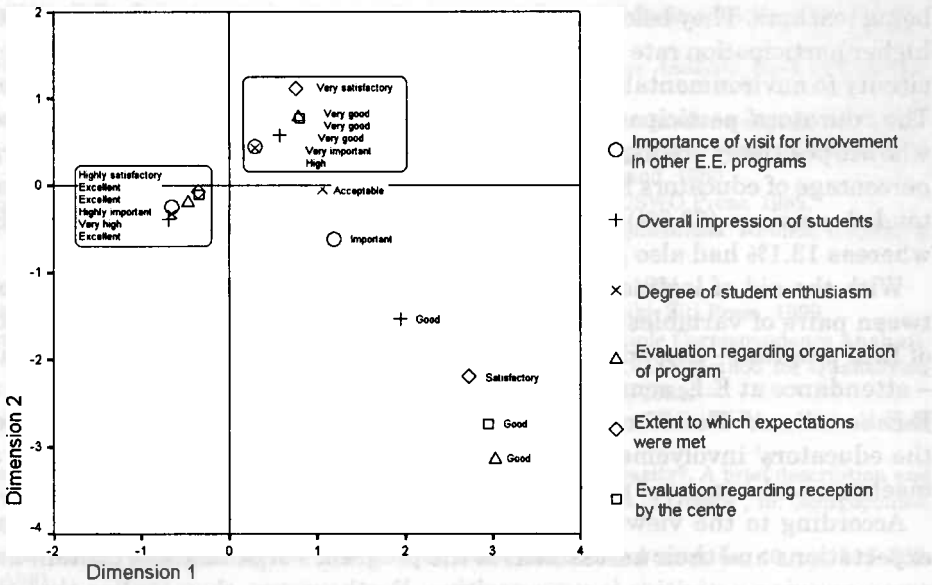

Fig. 1. Distribution of categorical variables

Source: authors' own research.

group, due to the fact that besides their much more positive approach to the institution of the E.E.C., their attitude towards future involvement with E.E. programs in the schools they work is also very positive.

A third group includes the respondents who gave a response of "satisfactory" to the question on the "extent to which expectations were met," together with a response of "good" to the questions on the "evaluation regarding reception by the centre" and "evaluation regarding organization of program." These respondents show a moderate level of satisfaction with the E.E.C. of Soufli.

Finally, a response of "good" to the question on the "overall impression of students," a response of "acceptable" to the question on the "degree of student enthusiasm" and a response of "important" to the question on the "importance of visit for involvement in other E.E. programs" were not significantly associated with any response to the other questions.

4. Conclusions – discussion

Two thirds of the educators who accompanied the students to the E.E.C. of Soufli belong to the secondary education system and are of various specializations, such as philologists, physicists, mathematicians, English teachers, physical education teachers. One third is involved in primary education, most of them

being teachers. They belong to various age categories and women had a slightly higher participation rate than men, possibly revealing in this way a greater sensitivity to environmental issues or simply that there are more female teachers. The educators' participation in E.E.C. programs reveals that they are people who are positively predisposed towards environmental protection issues. A large percentage of educators had realized E.E. programs in their school (60.7%), attended meetings (63.8%) and seminars (46.3%) relevant to the subject of E.E., whereas 13.1% had also participated as instructors in such activities.

With the aid of loglinear analysis, we are able to see that interactions between pairs of variables exist. Three such pairs of variables are "realization of E.E. program – attendance at E.E. meetings," "realization of E.E. program – attendance at E.E. seminars," "attendance at E.E. meetings – attendance at E.E. seminars." Therefore, there is evidence that there is a direct link between the educators' involvement in environmental issues and their attendance at meetings and seminars relevant to the subject of environmental education.

According to the views of the educators, the E.E.C. of Soufli meets their expectations and their assessment of the program's organization, content and accompanying activities is very positive. Furthermore, they realize that the center's program is accepted by the students, gaining their enthusiasm and participation.

Also, a large majority of the educators stated that they would like to revisit the E.E.C., but for another environmental program. This fact highlights the need for the E.E.C. staff to renew their programs.

The educators' participation in a program run by the E.E.C. is a stimulus for their involvement in other environmental programs.

With the aid of analysis of homogeneity, we may distinguish two main groups of educators. Both of them are positive towards the E.E.C. of Soufli, but to differing degrees. The first group of educators are very positively predisposed towards the E.E.C. of Soufli and stated that they will involve themselves in the future with E.E. programs in their schools. The second group have a positive attitude and stated with less conviction that they will realize E.E. programs in the future.

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