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Abstract

The present study seeks answers to two questions: what lies behind the attitude towards technological studies (TS) and determines the professional choice of young people, and have attitudes towards TS in Bulgaria changed during the period of transition? In order to answer these questions research was conducted with two experimental groups: students in TS and engineers working in technological areas. We assumed that attitudes are based on underlying values and that any change in these determines the changes in the content of students' attitudes towards TS. We also assumed that these changes are determined by the significant transformations in the economic and social situation of Bulgaria over the past decade. These social and economic changes are reflected in personal values, and these in their turn determine the professional choice and attitudes of young people. The research findings confirmed our expectations.

It is possible that the attitude of students to study will change during the course of their education. They may feel a lack of adaptation and a negative attitude because of dissatisfaction of their interests, difficulty of study or a lack of friends. The questions we tried to answer were: What lies behind attitudes towards technological studies and determines the professional choice of young people? Have these attitudes changed during recent years and if so, what was the reason behind this change? Do male and female students have the same attitudes towards their studies and if not, why not?

We assumed that attitudes could be important factors in students' educational choices and successes, and we found considerable research focusing on sex segregation in educational and dropout decisions (Eccles 1987; Harding 1992; Michel 1988; OECD 1986; Tinto 1982). Given the results of those studies, we expected that a male-dominated academic

environment would prohibit sufficient social integration (Tinto 1975), and women would be less motivated by the task values of technological courses (Eccles 1987). To answer the research questions and to test our hypothesis, we explored psychological influences on attitudes towards study by using Eccles's value expectancy explanation of academic choices (Eccles 1987). In that model the professional choice is influenced by two main factors: 'personal life values' in terms of subjective task value and 'perceived ability' in terms of self-evaluation of personal abilities. Both influences are linked to sex differences in career and educational choices. It is hypothesised that individuals are not likely to pursue a career in a domain in which they feel they possess inferior abilities. In addition, people tend to follow educational tracks that are associated with a high subjective task value—that is, when the rewards of engaging in a particular task outweigh the costs.

Eccles defines task value in terms of four components: (a) a utility value of the task in facilitating one's long-range goals; (b) an incentive value, in terms of immediate rewards of engaging in the task; (c) an attainment value of the task in terms of its relation to one's self-image and personal values; and (d) a cost of engaging in the activity. We assumed that subsequent to university enrolment, these values continue to influence educational career decisions. Therefore, if they are not fulfilled, task values could be reasons for a negative attitude towards study.

We also think that task-related values (the psychological outcomes) should be considered only in interaction with the educational institution as a learning and social environment. If universities are differently structured (e. g., state or private universities) and courses are taught in different ways, the same student characteristics (such as academic success and occupational orientation) do not necessarily result in the same kind of attitude.

Considering the results of earlier research on the attitude towards studies, we expected the attitude to develop from distinct aspects: (a) environmental, such as university setting and field of study; (b) academic, such as successes, satisfaction, and perceived ability; and (c) psychological, such as task-related values. According to this model, we expected that attitude is influenced directly by academic variables and also by psycho-

logical reasons. Considering the differences between students now and in previous times, we argue that because of the differences in study programmes and the limited prospects on the labour market, technology students now more frequently have a negative attitude towards study than students did previously. We also assumed that male and female students' attitudes are also based on different reasons. We expected that women studying technology are more often disappointed in their studies, with the result that they more frequently have a negative attitude towards study than men do. Furthermore, we expected that women's reasons for their attitude develop more frequently from a perceived ability and satisfaction/dissatisfaction with the attainment value of the chosen field of study, whereas men's reasons for their attitude arise more frequently from satisfaction/dissatisfaction with the utility value and the incentive value of the chosen field of study (Eccles 1987; Farkas et al. 1990; Jacobs & Eccles 1992; Van Heugten & Van Vonderen 1992).

To summarise, we formulated two main hypotheses:

- H1: We assumed that attitudes are underpinned by values. Values in life were what changed in the period of transition. These transformations have had a determining effect on the changes in the content of students' attitude towards TS. We also assumed that these changes are based on the significant transformations in the economic and social situation in Bulgaria during the past ten years. The social and economic changes are reflected in personal values, which in their turn determine the professional choice and attitudes of young people.
- H2: The gender differentiation in attitudes towards study, and the differentiation between students now and in the past differ significantly. The main reasons determining that attitude are motivational (based on task-related values and academic performance) and are not the same for different genders, or for students now and previously. The variance in attitude towards study is directly influenced by the students' background (sex, university setting, year of study, field of study), as well as by task values and academic criteria.

Method

Sample

The research project was carried out with two experimental groups: 63 students in TS (32 males and 31 females) and 60 engineers working in technological areas.

Questionnaire

The attitude towards study of matched groups of male and female technology students from two generations with different social and economic backgrounds was measured using a scale composed of three items on attitude in regard to the field of study, and continuation of study.

The reasons determining the attitude were measured by 12 items (5point scales, with 1 = very important reason and 5 = very unimportant), which, after factor analysis, revealed four underlying dimensions that corresponded with the four components of task values.

Satisfaction with study was measured by means of questions regarding the importance and applicability of 15 characteristics of the current study, such as theoretical, practical, human oriented, technical, and labour market-oriented.

To measure the occupational orientation we used a question pertaining to the preference for working in a specific sector. Preference for working in the field of 'scientific research' and 'technology' indicated the degree of technical orientation in occupational interests.

Perceived abilities were measured on the basis of 20 skills or abilities using a 5-point scale ranging from 'very poor' to 'very good'.

The concept of academic success was measured by asking students the average of the grades they had achieved in the last semester. From these averages, we developed a 7-point scale consisting of good, average, and below-average students.

Finally, several background variables were included: sex, university (state or private), year of study, and fields of study.

Data analyses

We used path analysis with decomposition of effects to describe the direct and indirect effects pertaining to attitude towards study.

Analyses were made in three phases. The attitude was first regressed on the background variables and their interactions. Endogenous predictors—satisfaction, occupational orientation, perceived abilities, and academic success—were then added. The scores on four factor scales of reasons for attitude were included in the last phase of the analysis. The standardised regression coefficient showed the direct effect between two variables. An independent variable can also have an indirect effect through an intervening variable. This indirect effect is computed as the algebraic product of the path coefficient between (a) the independent variable and the intervening variable and (b) the intervening variable and the dependent variable. The sum of direct and indirect effects is then the total effect of one variable on another.

Results

The students from both experimental groups cannot as a whole, be described as subjects with a negative attitude: The overall mean on the scale of attitude (with 5 = very positive) was 3.9 (SD = .95). As predicted, there were significant differences between groups: Female students reported a negative attitude more often than male students did (3.8 and 4.1, respectively, F = 10.74, p < .01), and present students expressed negativity more often than students did previously (3.7 and 4.1, respectively, F = 12.53, p < .001) (see Table 1).

We had assumed that reasons determining the attitude are based on personal values, in particular, on task-related values such as utility, immediate rewards, attainment, and costs (Eccles 1987). Factor analysis referring to these values revealed four factors with eigenvalues greater than 1, explaining 69% of the variance. A varimax rotation yielded four valid scales, which were labelled: (1) social reasons, for example: 'My fellow students have other interests than I have' (Cronbach's alpha = .72); (2) conflicting interests, for example: 'The content of the programme does

not correspond with my interests' (alpha = .85); (3) prospects of study, for example: 'I found out that prospects of getting a job with this education are not very good' (alpha = .83); and (4) difficulty of study, for example: 'The grades I received for my exams are rather poor' (alpha = .66). These four factors of reasons for attitude can be interpreted in sufficient correspondence with the four task values of Eccles (1987): lack of incentive and attainment value is found in conflicting interests, utility value is reflected in prospects with study, and costs are indicated by difficulty of study. Attainment value is also represented in social reasons, a factor referring further to social integration.

The data supported our predictions that reasons for attitude are not the same for male and female technology students, or for students now and in previous years and that those variances are explained by task-related values, university setting and academic criteria rather than by sex. The results of the regression comparisons showed that the original main effects of sex disappeared after inclusion of all intervening variables in the third phase (see Table 2). The small effects of sex were, as predicted, only indirect. These indirect effects explain why students with different backgrounds have different attitudes. It appears that students now report conflicting interests more often than did those in previous times. For both types of students, the difficulty of the studies was apparently more important for women than for men. The expectation that women have a negative attitude more frequently because of a perceived lack of ability and dissatisfaction with the attainment value of the chosen field of study, whereas men's negative attitude is mainly caused by dissatisfaction with the utility value and the incentive value of the chosen field of study, was not confirmed. No indirect effect of sex was observed in the variables perceived abilities, prospects (utility value), attainment and incentives.

Discussion

Both present and past technology students on average showed low frequencies of negative attitudes. As predicted, the students now express negativity more frequently than students did formerly and female students

more often than male students. If the negative attitude foreshadows the intention to leave, then present students and female students should be more vulnerable to dropping out. The statistics, however, do not support such an inference.

We predicted that differences in attitude between categories of students could be explained by academic and psychological variables. Our expectations were derived from Eccles's model of educational choice and Tinto's model of educational dropout (Eccles 1987; Tinto 1975).

Of the four reasons determining attitude, the utility value, expressed by prospects of study and conflicting interests, contributes significantly to the explanation of the attitude, which could mean that long-term utilities are directly related to the attitude towards study. The research findings also showed that all academic criteria augment their effects on attitude through reasons for attitude. Occupational orientation and satisfaction increase their effects considerably. Students with a less technical occupational orientation have more negative attitudes, because they suffer more frequently from conflicting interests, have more social reasons for attitude, and subjectively experience their studies as more difficult. Less satisfied students have more negative attitudes, because they too suffer more frequently from conflicting interests and have more social reasons for attitude. Of all the reasons for attitude, conflicting interests channel the greatest number of indirect effects and evidently constitute the most influential reason for a negative attitude.

The total effects of university setting and sex appeared to be limited, they were significant only through an intermediate variable (see Table 2). However, there is a tendency for the impact of university setting to increase its effect and this is related to another intermediate variable the quality of education. Students now less often consider their study programme in correspondence with their interests than students did previously. Furthermore, the difficulty of studies is considered as a more important drawback by women than by men. We may thus conclude that our general prediction that intermediate variables would explain differences between categories of students has been supported. The changes in attitude are influenced by changes in reasons for that attitude and by changes in academic criteria. According to the data, as far as

academic criteria are concerned, changes in grades, satisfaction with studies, and occupational orientation produce changes in attitude; and as far as task-related values are concerned, changes in conflicting interests, difficulty of studies, and social reasons influence changes in attitude. The data suggest that conflicting interests and occupational orientation are the two most influential variables. We found evidence to support the suggestion that students now more often have a negative attitude than their colleagues had previously because of incongruency between their interests and the programme of study, a factor that has an objective explanation. The transitions that have taken place in the economy related to a decline in heavy industry and uncertain developments in the public sector have provoked significant changes in the engineering educational process and professions, with a decline in their social status and prestige. Unemployment figures not only cause uncertainty among students themselves, they also negatively affect how curriculum development accords with students' interests and the demands of the labour market.

We expected that all components of the task value in regard to sex differences, except for costs, would intervene between gender and attitude. The data indicate exactly the opposite, which proves that the gender differences can be explained only by different experiences of costs.

The results did not confirm the prediction related to the explanation of the gender differences in self-assessment. Women's self-assessment was indeed lower than that of men, but this variable did not significantly contribute to variance in attitude.

Summarising the research findings, we concluded that the attitude towards technology studies as a whole, has not changed significantly. The changes that have taken place are rather of an internal nature, from one field of study to another one (e.g., from engineering to informatics) and they are determined by the transformations in the economic and social situation in Bulgaria, as well as by the objective process of globalisation in Europe. All of these social and economic changes are reflected in personal values and indirectly define people's attitudes, decisions and choices.

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Table 1. Regression analyses in three phases on scores of attitude scale

A	В	С	D	Е
Students (now = 1, previously = 2)	0.16[b]	0.08	0.20[b]	0.11
Sex (male = 1, female = 2)	-0.14[b]	-0.20[b]	-0.13	-0.09
Year of study	0.08	0.12	0.14	0.12
STS study (STS = 1)	0.01	0.07	0.09	0.05
Students, female		0.00	0.09	0.10
Students, 1st year		-0.10[a]	0.02	0.00
Students, STS study		-0.06	-0.03	0.01
Female, 1st year		0.16[b]	0.18	0.15
Female, STS study		-0.05	-0.09	-0.08
Satisfaction (1 = high, 5 = low)			-0.28[b]	-0.20[b]
Occupational orientation (1 = technical, 2 = non-technical)			-0.35[b]	-0.21[b]
Perceived abilities (1 = high, 5 = low)			-0.21[b]	-0.16[b]
Academic success (10 = high, 1 = low)			-0.21[b]	-0.16[b]
Social reasons for attitude				0.12[b]
Conflicting interests				0.35[b]
Prospects of study				0.00
Difficulty of study				0.14[b]

1 = often / 5 = never

Key: A–Variable / B–Background / C–Phase 1 (interactions included) / D–Phase 2 (academic criteria included) / E–Phase 3 (reason for attitude included)

A	В	С	D	Е	F	G
Social reasons	0.12					0.12
Conflicting interests	0.35					0.35
Prospects						
Difficulty	0.14					0.14
Satisfaction	-0.20	-0.013	-0.070		-0.083	-0.28
Occupational orientation	-0.21	-0.032	-0.087	-0.015	-0.139	-0.35
Perceived abilities	-0.03[a]		-0.042		-0.042	-0.07
Academic success	-0.16			-0.031	-0.031	-0.19
University	0.11[a]		0.074		0.074	0.18
Sex	-0.09[a]			-0.023	-0.023	-0.11
Year	0.12			0.031	0.031	0.15
STS study	0.05[a]	0.023			0.023	0.07

Table 2. Significant direct and indirect effects on attitudes

Key: A–Variable / B–Direct / C–Indirect – social reasons / D–Indirect – conflicting interests E–Indirect – prospects of study / F–Indirect – difficulty of study / G–Total Indirect

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