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Motivation, Classroom Climate, And Student-Teacher Relationships Among Secondary Vocational Students in Hungary

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Abstract

Student motivation is an important factor in school success. Therefore, it is important to determine the factors that influence their motivation. We aimed to investigate the impact of social factors on student motivation and academic achievement. Participants included 452 students from a secondary school in Budapest enrolled in one of three vocational fields to become a chemist, environmentalist, or information technology specialist. Dimensions were considered for the compilation of the paper-based questionnaire. Determining student motivation, developed in Hungarian were included the 3D Goal Orientation Questionnaire by Gabriella Pajor. To investigate school climate, factors of the What Is Happening in This Class? questionnaire developed by Fraser et al. were translated from English. The questionnaire for the assessment of teacher-student relationships by Éva Tímár available in Hungarian. The results show that vocational field, sex, and year were significantly correlated with academic achievement, which chemists, female, and those in year 0 achieving the highest GPA. The results revealed that GPA is significantly affected by two factors: the vocational field chosen and school climate (the involvement in school and out-of school life). All students in all motivation types were positively affected by involvement, showing that cooperative teaching methods led to higher levels of motivation.

Keywords: motivation; What Is Happening in This Class? questionnaire; teacher-student relationships; academic achievement; Hungary; classroom climate.

Introduction

The learning process is a complex phenomenon that depends on several factors [1]. Among these factors, student motivation, classroom climate, and student-teacher relationships are the focal points of our current study. In our view, these are factors that significantly affect student performance. We look for an answer to whether and to what extent these factors can be influenced for better performance.

Student motivation

Student motivation is a precondition for the efficiency of the learning-teaching process [2]. There are several theories on learning motivation. In the self-determination theory by Ryan and Deci (2001) [3], two subtypes of motivation determine why actions are taken. In intrinsic motivation, an action is taken due to pleasure and excitement involved in the action, not for the anticipated or expected external success or reward. Extrinsic motivation is directed towards an action carried out for the achievement of a separate goal and is not influenced by internal factors. The work of Ryan and Deci (2001) [3] highlights that learning at school aims to primarily build up intrinsic motivation, as this leads to higher performance and creativity.

Orientation theory is focused on the personal goals of student and distinguishes two subgroups of goals: mastery and performance goals. With mastery goals, students aspire to establish internal norms with the aim to acquire new capabilities and understand the curriculum material. With performance goals, students are influenced by their surroundings, compare themselves to others, and may attempt to outperform others [4]. According to the 2×2 Standpoints Model of Achievement Goals established by Elliot and Church (1997) [5], within the subcategories of mastery and performance goals the orientations of students are divided into development approach and development avoidance types. The aim of the approach type is to attain a positive outcome: success; for the avoidance type the aim is the evade the negative outcome: failure. The aim of mastery-approach students is to understand the task, achieve beyond the level they set for themselves, and avoid failure. Students of performance-approach orientation are intent on outperforming others.

Many researchers have addressed students' motivation toward performance goals in various contexts, including advancing age and sex differences. Controversial results have been obtained on the relationship between the achievement of students and their orientation with mastery and performance goals. For example, while Elliot and Dweck (1988) [6] failed to prove the correlation of student achievement and orientations goals, Cury et al. (2006) [7] ascertained a positive statistically significant coefficient among them. Students of performance-avoidance orientation are intent on not scoring lower results than others and evading underachievement. Several studies with primary school and university students have found a positive correlation between performance-approach orientation and grades and a negative correlation between performance-avoidance orientation and grades [8-10].

In her work based on the questionnaire assembled according to the 2×2 Model of Achievement Goal, Pajor (2013) [2] conducted a study with Hungarian university students (presurvey) and year 10–11 students (major survey) to map the relationship among academic achievement and orientation goals. Based on the results of university students, all four orientation types prognosticate grade point average (GPA). The mastery-approach type was the most predicative with a positive correlation with academic achievement, while performance orientation (approach and avoidance could not be separated) showed a negative correlation with academic achievement. The mastery-approach orientation goals were significantly positively correlated with attitude toward learning. After the presurvey, the questionnaire of 20 items was modified, and a third dimension for outcome was incorporated (3D Goal Orientation Theory). The result of the study showed that approach-outcome oriented students aim to obtain high grades, while avoidance-outcome oriented students aim to avoid low grades. Pajor's (2013) [2] major survey among teenagers supported existing results: being a mastery-approach, mastery-avoidance, and performance orientation type was significantly correlated with academic achievement. Significant sex differences were identified between mastery-approach and mastery-avoidance type and academic achievement: female students scored the items of this factor higher than the males. In addition, mastery-approach orientation was positively correlated with attitude toward learning.

Classroom climate

Based on 50 years of comprehensive research into classroom climate [11,12], MacAulay (1990) [13] investigated the interactions and outcome factors (cognitive, affective, and social) of four factors forming classroom climate: structure and organization (e.g., seating pattern, the design and rules of the classroom), cognitive process (e.g., classroom climate), student characteristics (e.g., student behavior), and teacher characteristics (e.g., teacher behavior). In the current study, student cohesiveness, involvement, and cooperation of those factors and their impact on student motivation and academic achievement were investigated.

Existing studies on classroom climate have shown that better classroom climate has a positive impact on students' academic achievement. The quality of the learning environment in school (primarily the classroom climate) fundamentally affects students' willingness to learn, and learning motivation is largely affected by the quality of classroom environment (Dorman, 2003; Fraser, 1994, 2002, 2007, 2012) [14-18].

Several studies have shown that constructivist teaching methods result in a positive correlation between classroom climate and scientific attitude of students [19-21]. These findings are supported by the work of Emilov and Tafrova-Grigorova (2014) [22], who found that scientific attitude was more positive in schools with a constructivist learning environment. Further, den Brok et al. (2010) [23] found that student of high-effective learning classrooms or task-oriented individualized classrooms had the highest task orientation and the most positive scientific attitudes.

Several questionnaires are available to assess classroom climate (Fraser, 1998) [24], including the What Is Happening in This Class? (WIHIC) questionnaire developed by a Fraser et al. (1996) [25]. Using this questionnaire, Kim et al. (2000) [20] examined students' attitudes toward the school climate. The questionnaires are scored by students on a 5-point Likert scale. The study by Kim at al. (2000) [20] found that students gave highest scores for student cohesiveness, task orientation, and cooperation, while lowest scores for involvement, investigation, and teacher support. The results are primarily explained by the nearly identical climate of all science lessons in Korea, in which teachers structure their lessons using the same textbooks based on a national curriculum. The study further found that boys gave higher scores for the learning environment than girls (Kim et al., 2000) [20]. A similar result was obtained in a survey conducted Fraser et al. (2010) [12] in Australia and Indonesia, in which the factors of teacher support and equity of the WIHIC questionnaire were assessed as higher by the boys, but student cohesiveness equity was assessed as higher by Australian girls. This study also found a close connection between scientific attitude of students and their opinion on learning climate (the more positive the attitude toward science, the greater the importance of learning climate) and a positive correlation between positive classroom climate and positive learning outcome. The cross-national nature of the study enabled the comparison of the learning climate in the two countries: the Australian students assessed task orientation and equity as the highest, and the Indonesian students assessed involvement and investigation as the highest.

Teacher-student relationships

Existing research shows that the teacher-student relationship is an important factor in learning. The relationship, which can be positive or negative, is based on continuous interactions [26]. A hostile teacher-student relationship can result in inhospitable interactions and is difficult to reverse [27]. Yunus et al. (2011) [28] found that students are more motivated in the presence of a positive teacher-student relationship, and Little and Kobak (2003) [29] found that those who receive emotionally positive teacher support work harder in school, are more persistent, and are more proficient in accepting criticism and coping with stress. Further, Hamre and Pianta (2001) [30] showed that positive teacher-student relationships enabled students to feel safe in the learning environment, and teachers who cared for their students were more productive in reaching social and professional success. The study conducted by Wentzel (1998) [31] concluded that teacher support made a positive impact on students' interest in school and specific subjects.

In Hungary, Tímár (1994) [32] revealed that learning climate is highly affected by the individual relationships of the persons in the school, including the teacher-student relationships. Moreover, the results revealed that girls evaluate teacher care as more important than boys.

Our hypotheses were as follows: Significantly positive correlations can be measured among motivation, students' academic achievement (semester grades), learning climate, and teacher-student relationships. Those correlations are independent from professional branch, sex, and age.

Materials and methods

Research design and procedures

Our study focused on the academic achievement of students in a vocational secondary school with high reputation in Budapest, Hungary. The school is attended by year 0 students (one-year foreign language studies) and vocational secondary students (year 9–12) enrolled in one of the three vocational fields:

"chemist specialty" (with chemistry and lab practice as major subjects), "environmental specialty" (with biology and environmental practice as major subjects), and "information technology" (with programming theory and practice as major subjects). The Hungarian vocational secondary school educational system offers year 0 or year 9. The year 0 is a language preparatory year for language preparation or bilingual classes. Students in language preparation classes learn English language at advanced level later on, in year 9-12. In bilingual classes they are taught vocational subjects (e.g. chemistry, software operation) in English in year 9–12. Students starting in traditional classes (year 9) study vocational subjects as well in Hungarian.

We conducted a survey in the academic year 2017–2018 using a questionnaire. The questionnaire included 24 items from the WIHIC by Fraser et al. (1996) [25] translated into Hungarian (i.e., student cohesiveness, cooperation, and involvement), 15 items from the 3D Goal Orientation Questionnaire developed by Pajor (2013) [2], and 6 items from a questionnaire about teacher care by Tímár (1994) [32]. Both the questionnaires by Pajor and Tímár were in Hungarian. The latter was chosen for its availability in Hungarian and covered the teacher care factor of WIHIC questionnaire. Thus, wherever possible, we used originally written in Hungarian questionnaire instead of translation from English.

Students responded to all items on a 5-point Likert scale; answers for inverse items were inverted to match the rest of data according to Gardner's (1995) [33] definition. Parametric tests were used for all the Likert scale measured variables even with unequal variances, and with non-normal distributions included in the research according to Norman (2010) [34].

Preparing the scale means was done by calculating their mean and standardized them to a 1 to 5 scale. The reliability of the questionnaire was tested on a sample of 452 pupils. The numbers of items and the reliability values are displayed by Table 1. The Cronbach's alpha values were sufficiently high, indicating good reliability of all measures.

Table 1. Factors, number of items, and reliability coefficients for the questionnaire used in our study

Questionnaire	Factors	Number of items	Cronbach's alpha	
			Literature data*	Survey results
WIHIC**	student cohesiveness	8	0.81	0.85
	cooperation	8	0.89	0.83
	involvement	8	0.84	0.73
Orientation goal questionnaire	mastery-approach	4	-	0.79
	mastery-avoidance	4	-	0.79
	performance-approach	4	-	0.90
	performance-avoidance	4	-	0.91
	approach-outcome	4	-	0.83
	avoidance-outcome	4	-	0.72
Teacher-student relationship	teacher care	6	-	0.85

*Fraser, 1998

** What Is Happening In This Class?

As per the central limit theorem, we assumed normality of the data when the sample size > 100 in each professional group. The Kolmogorov-Smirnov test was used to examine the normality of the means for certain groups prior to comparison when the magnitude of the sub-sample was below 100. Nonparametric tests (Mann-Whitney, Kruskal-Wallis) were carried out in cases lacking normality. In cases with normality, a corresponding parametric test was performed (analysis of variance [ANOVA], Welch's d-test, t-test, modified t-test) depending on the result of the Levene's test for homogeneity of standard deviation and the count of group means to be compared. Pair comparison of the values for several variables was performed via repeated measures ANOVA, and interactions were tested via repeated measures analysis of covariance (ANCOVA) method. We used SPSS to perform each of the mentioned statistical analysis as specified by Field (2009) [35].

Characteristics of the sample

A total of 452 students completed the questionnaire, 189 of whom were in the chemistry program, 110 in the environmental specialty program, and 153 in the information technology program. The ratio of females was 32.1% of the total: 40.5% of the chemists, 50% of the environmentalists, and 9.2% of the information technology students.

Ethical considerations

The research was approved (the number of permission is 2018/19b) by the Research Ethics Committee of the Faculty of Education and Psychology, Eötvös Loránd University Budapest on the basis of an Ethical permission application form request containing the description of the research (name of the implementers, purpose of the study, method of implementation, target group, etc.). Attached to the application were the questionnaire used in the research, a sample parental and student consent statement (a passive statement was attached due to anonymous data completion), and a statement of approval from the head of the institution involved in the research (in this case the school principal).

Results

Academic achievement

The semester GPAs in 2017–2018 by vocational fields and sex were as follows: chemists, male: 4.26, female: 4.27, overall: 4.26; environmentalists, male: 3.93, female: 4.23, overall: 4.06; information technology specialists, male: 4.08, female: 4.33, overall: 4.13. Chemists had significantly higher GPAs than environmentalists (pc-es = .01). No other field pair comparison revealed significant differences (pc-its = .15; pes-its > .99). The independent sample t-test showed that female had significantly higher GPAs than male (female: 4.26, male, 4.14, p = .03), and students in year 0 had significantly different GPAs than students in years 10, 11, and 12 (p0-10 < .01; p0-11 < .01; p0-12 = .02). Year 9 students had the second highest GPAs. There was a moderate difference between year 0 and year 9 (p0-9 = .06). No other pair comparison revealed significant differences.

Significant differences for year by vocational field were detected and assured by ANCOVA test. We have included three parameters in the model: vocational field, year, and their interaction. The global test of the model was significant, $F(13,316) = 3.70$; $p < .01$, and the predictor variables had a significant impact on the outcome variable, $F(4,316) = 6.08$; $p < .01$ and $F(2,316) = .52$; $p < .01$. No significant interactions were found, $F(7,316) = 1.72$; $p = .10$, so the patter of academic achievement followed the same pattern within the different vocational fields.

Motivation

No significant differences are detected among the mean scores for performance-approach, approach-outcome, or avoidance-outcome factors, $F(2,208) = 0.19$, $F(2,199) = 3.29$, and $F(2,206) = 0.49$, respectively. Compared to these three types of motivation, performance-avoidance, $F(2,204) = 10.47$, $p < 0.01$, mastery-approach, $F(2,208) = 16.12$, $p < 0.01$, and mastery-avoidance, $F(2,208) = 7.25$, $p = 0.01$, were significantly different from performance-approach, approach-outcome and avoidance-outcome.

The results reveal that all motivation scales except performance-approach and avoidance-outcome show significant differences based on vocational fields the results reveal that all motivation scales except performance-approach and avoidance-outcome show significant differences based on vocational fields (Table 2).

Table 2. Vocational field-based comparison of motivation factors.

		Mean			Levene's test		ANOVA/ Welch*	
Motivation	**n**	**Chemist**	**Environ-mentalist**	**IT specialist**	**F**	**Sig.**	**F**	**Sig.**
mastery-approach	211	4.03	3.72	3.59	6.53	0.01	16.12	<0.01
mastery-avoidance	211	4.09	3.74	3.79	0.54	0.59	7.25	0.01
performance-approach	211	3.16	3.24	3.17	0.48	0.62	0.19	n.s.
performance-avoidance	207	3.15	3.00	3.51	1.37	0.26	10.47	<0.01
approach-outcome	202	3.69	3.70	3.43	1.13	0.33	3.29	n.s.
avoidance-outcome	209	3.27	3.22	318	1.42	0.24	0.49	n.s.
*the given test results were certified by homoscedasticity test results								

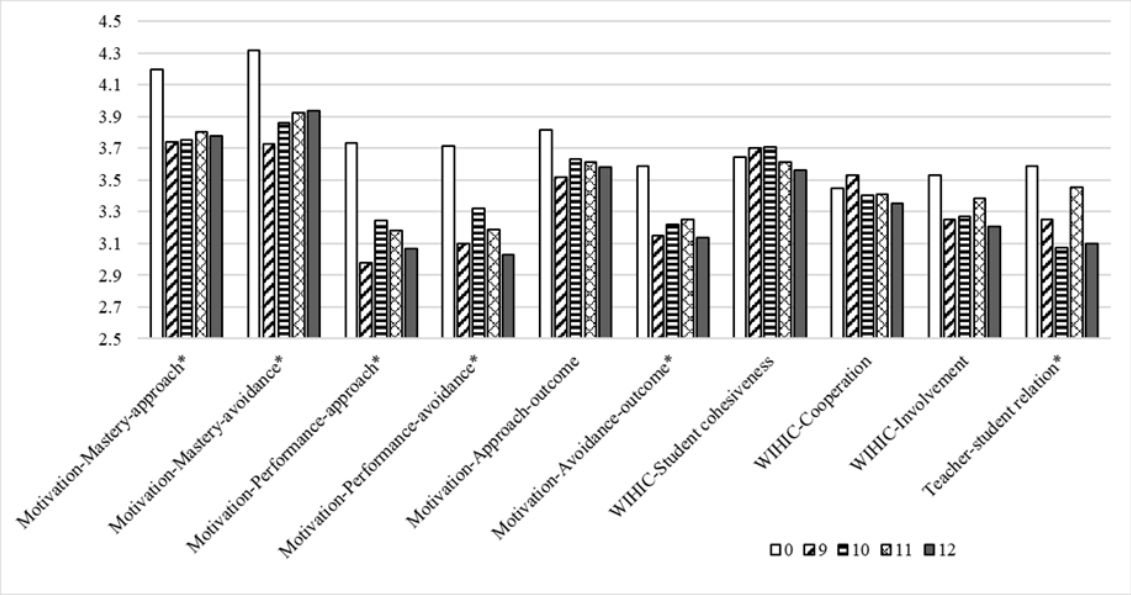
The results reveal that excluding performance-avoidance and avoidance-outcome scales, all motivation scales showed a significant difference between males and females, with higher points scored by females in all cases (Table 3.).

Table 3. The t-test results for sex-based comparison of motivation factors

		Mean		Levene's test		t-test*		
Motivation	**n**	**Male**	**Female**	**F**	**Sig.**	**t**	**df.**	**sig.**
mastery-approach	307	3.76	3.94	3.32	0.07	-2.29	450	0.02
mastery-avoidance	302	3.84	4.14	6.95	0.01	-3.50	319.44	0.01
performance-approach	291	3.11	3.37	2.86	0.09	-2.17	433	0.03
performance-avoidance	282	3.25	3.26	0.46	0.50	-0.12	422	n.s.
approach-outcome	277	3.49	3.90	4.58	0.03	-4.25	321.83	<0.01
avoidance-outcome	284	3.24	3.22	0.03	0.96	0.27	426	n.s.
*the test results were certified by homoscedasticity test results								

Excluding approach-outcome scales, all motivation scales showed a significant difference by year (Figure 1). The post hoc test of pairs revealed that differences are inherited from the significant difference of year 0 from higher (9-12) years.

Figure 1: The deviation of mean scores for types of motivation, WIHIC scales (student cohesiveness, cooperation, involvement), and teacher-student relation (*significantly different factors).



School climate and teacher care

The mean scores and standard deviations of the three factors of the WIHIC and teacher-student relationships are as follows: student cohesiveness: M = 3.65, SD = .78; cooperation: M = 3.43, SD = .82; involvement M = 3.30, SD = .72; teacher care: M = 3.25, SD = .89. When sex was taken into consideration, none of the factors (student cohesiveness, cooperation, involvement and teacher care) showed a significant difference. The results that significant differences could be observed for teacher-student relationship through the years, so we carried out a pair difference comparison for variable of teacher-student and years variable by post hoc test. Significant differences were detected between year 0 and year 10 ($p = .01$) and between year 0 and year 12 ($p < .05$), and between year 11 and year 10 ($p < .05$). The mean scores of years 0 students were significantly higher than year 10 or 12 students, and the mean scores of year 11 students were higher than year 10 students.

A regression model was fit for each motivation factor that was a potential predictor variable for WIHIC factors or teacher-student relationships (Table 4). All of the applied models provided significant explanatory power. The ratios of explained variance were within the range 0.10–0.18 for all motivation factors except for avoidance-outcome. For avoidance-outcome, the value was definitely high (explanatory value of 0.65), which may be explained by the strong positive linear correlation between two factors (avoidance-outcome and involvement: $r = .80$, $p < .01$). Each motivation type was significantly impacted by involvement factor.

Table 4. Regression models fit for motivation factors.

Motivation	Cons.	WIHIC			Teacher-student relation	R^2	F	Sig.
		student relation	coopera-tion	involve-ment				
mastery-approach	2.05	NA	0.18	0.19	0.16	0.18	32.63	<0.01
	<0.01		<0.01	0.01	<0.01			
mastery-avoidance	2.51	NA	0.26	0.17	NA	0.10	26.70	<0.01
	<0.01		<0.01	0.01				
performance-approach	0.90	NA	NA	0.46	0.23	0.14	37.99	<0.01
	0.01			<0.01	<0.01			
performance-avoidance	1.62	NA	NA	0.26	0.23	0.11	27.11	<0.01
	<0.01			<0.01	<0.01			
approach-outcome	1.69	NA	0.21	0.22	0.15	0.13	22.56	<0.01
	<0.01		0.01	0.03	0.01			
avoidance-outcome	-0.14	NA	NA	0.93	0.09	0.65	425.45	<0.01
	0.27			<0.01	0.02		32.63	<0.01

To explain the academic achievement of the students, a regression model was fit by including the following variables: three WIHIC factors, six motivation factors, vocational field, sex, and year. As the latter three variables were nominal/categorical variables, each of their category was applied as dummy variables in our model. Taken the large number of variables into consideration, several elimination methods were tested, of which backward elimination method proved to be the most efficient, $R2 = .24$; $F(10,271) = 8.74$; $p < .01$. WIHIC involvement, mastery-approach motivation, mastery-avoidance motivation, and teacher-student relationship had positive effects on academic achievement. Chemists and female students had higher levels of academic achievement. In addition, all the students in years 9–12 had lower academic achievement than the 0 year students (Table 5).

Table 5. The parameters of the regression model for academic achievement

	B	St. error	beta	t	Sig.
(Constant)	3.09	0.21		14.42	<0.01
WIHIC involvement	0.09	0.04	0.13	2.21	0.03
Motivation mastery-approach	0.11	0.04	0.16	2.53	0.01
Motivation mastery-avoidance	0.05	0.03	0.12	1.98	0.05
Teacher-student relationship	0.09	0.04	0.15	2.48	0.01
Field chemist	0.17	0.06	0.16	2.86	0.01
Female	0.15	0.06	0.14	2.45	0.02
Year 9	-0.27	0.11	-0.22	-2.54	0.01
Year 10	-0.38	0.11	-0.29	-3.50	<0.01
Year 11	-0.40	0.10	-0.34	-3.93	<0.01
Year 12	-0.23	0.11	-0.18	-2.14	0.03

Discussion

Six types of goal orientation were examined (mastery-avoidance, mastery-approach, approach-outcome, performance-approach, performance-avoidance, and avoidance-outcome). Performance-approach, performance-avoidance, and avoidance-outcome types did not differ significantly from each other and were assessed with the lowest mean score compared to all other motivation factors. The type with the highest assessment was approach-outcome, followed by mastery-approach and mastery-avoidance. Our findings contrast with Pajor (2013) [2], who found orientation goals of students in Hungary are not differentiated into approach and avoidance types.

Regarding vocational fields, the mean scores for approach-outcome, mastery-approach, and mastery avoidance were significantly higher for chemists than for students in other fields. The results further indicate that environmental specialists and chemists evaluate the importance of mastery-approach motivation equally high. Information technology specialists assessed performance-avoidance with significantly higher mean scores compared to the other two vocational fields. Chemists with higher academic achievement typically rated the mastery and approach goal orientations highly, indicating that they consider the overachievement of self-determined goals or the evasion of underachievement and succeeding as important. The environmental specialists having the lowest GPAs. They can be

motivated by comparing their results to their previous results and being intent to solve tasks by comparing to themselves according to their goal orientation. The results further indicate that information technology students compare themselves to others and hope to avoid poor grades. Overall, the results indicate that the goal orientation of students in distinct vocational fields are relatively well-defined, and that there is a clear correlation with semester GPAs.

Regarding sex, female students assessed mastery-approach, mastery-avoidance, performance-approach, and approach-outcome factors with significantly higher mean scores than their male counterparts; for the other two factors no significant differences were observed.

Regarding grades, significant differences were observed for five motivation factors, excluding approach-outcome. Year 0 students rated the items higher than students in higher years. The motivation of year 0 students was higher than of other students, which is similar to the findings of several national and foreign studies (Osborne et al., 2003, Hassan, 2008, Józsa et al., 2017) [36-38].

Regarding the WIHIC factors of involvement, student cohesiveness, and cooperation, no significant differences were observed by vocational field, year, or sex. Hence, the school climate was similarly assessed by all students.

Year 0 students rated teacher-student relationship more highly than students in years 10 and 12. Hence, the importance of teacher-student relationships was most important to year 0 students.

The goal orientation of students was promoted by teacher care, indicating that a school climate where teachers are open and supportive is conducive to helping students reach their goals. Student cohesiveness (group work, cooperation) had a positive impact on the motivation of both chemists and environmentalists but did not affect information technology students. This may be explained by the education system, as chemists and environmentalists participate in lab practice sessions where students work in groups Student cohesiveness did not affect student motivation.

The WIHIC factors had significant explanatory power for semester GPAs, and two of the motivation factors (mastery-approach and performance-approach) had a significant positive impact on teacher-student relationships.

Among the tested factors of students' motivation affecting school climate, involvement determined the motivation of all students. Academic achievement was correlated with vocational field.

In conclusion, the motivation and GPAs of chemists and environmentalists can be maintained and increased by pedagogical methods involving goals that students can understand, master, and surpass. For the motivation of information technology specialists, competitive situations are most beneficial.

Vocational fields had no significant impact on school climate or teacher-student relationship. Further investigation on why year 10-12 students' motivation may lower than year 0 or 9 students' motivation, is necessary.

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