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ABSTRACT

Students' attitudes, expectations, and opinions about a desirable preparatory preacademic program were investigated before and after 1 year of science studies in the Preacademic School (PAS) of the Hebrew University. A questionnaire was pre- and post-administered to 150 PAS students (70 percent of whom were classified as academically disadvantaged according to socioeconomic criteria) during the years 1978-1980. The questionnaire included items which asked students to give reasons for enrolling in the PAS, rank order six PAS goals and their goals for university studies, indicate their perceptions of factors influencing their success in future university studies, and express opinions about the importance of different learning activities; it also asked them to rate their performance and perceived abilities regarding various learning activities in science. Two findings noted are that prospective science students expect learning activities to play an important role beyond that of merely subject matter teaching, and that these learning skills (such as scientific reading and essay writing) have a greater influence on future success in university studies than such factors as hard work or talent. Based on these and other findings it was concluded that learning skills should play an important role in remedial programs for disadvantaged students. (JN)

ATTITUDES OF UNIVERSITY CANDIDATES TOWARDS LEARNING ACTIVITIES AIMED AT PREPARATION FOR SCIENCE STUDIES

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Attitudes of University Candidates towards Learning Activities Aimed at Preparation for Science Studies

The higher education character in many western countries has changed a great deal in the second half of the 20th century. The ideology of equality of opportunities to all, caused an increase in students population and itegrated new type of students to the universities - "The New Students" (Klingelhofer 1973; Tollefson 1975; Cross 1971) which are sometimes identified as academically disadvantaged, minorities or culturally deprived students.

At the same time, there is a growing tendency in the university instructional system towards replacing the traditional frontal lectures by workshops, guided studies and individual projects (Cornwall (1977)). This trend has been accompanied by the rapid change in information and knowledge, especially in the fields of science and technology (Beard (1973).

Many higher institutions have established special programs in order to prepare the "new students" for the new instructional demands and to maintain high educational and scientific standards. Tabberer and Allman (1981) who investigated study skills initiatives for students aged 16-19 highlight the importance of teaching study skills

The Preacademic School (PAS) of the Hebrew University in Jerusalem was the first in Israel to introduce a preacademic preparation program for students who intend to become science majors in the university, but did not meet the minimum university admission requirements. Traditionally the science section in the PAS has offered courses and laboratory instruction in mathematics, physics, chemistry and biology as well as in English and Hebrew. All science courses have been planned and designed by university science teachers. However, there were no courses or programs aimed at the development of learning skills such as efficient reading, data analysis, note taking or orientation in the scientific library.

Some of the Hebrew University teachers, PAS teachers and students who were informally interviewed expressed, however, their dissatisfaction with the low level

of study skills of the PAS students.

The main purpose of this study is to describe the students perceptions of their studies in the Preacademic School at the Hebrew University and to investigate the attitudes, expectations and opinions of these students with regard to a desirable preparatory preacademic program.

Method

Setting: In Israel a Matriculation (Bagrut) certificate is a prerequisite for admission to universities. ifferent university faculties have additional requirements to this minimum other requirements such as entry examinations or psychometric tests. Students who have not completed their matriculations in high school have a second chance to do it externally. The PAS (Preacademic School) was established in 1962 in order to prepare students from low socioeconomic background for university studies. Around 70% of the PAS students are classified on the basis of commonly accepted socioeconomic criteria as disadvantaged. The others are students from 'Kibutzim', war handicapped, some high school dropouts and Arab minorities. In addition to its preparation program the PAS provides an opportunity to complete or to improve the grade in the matriculation examinations. The PAS curriculum is comprised of two main sections: "science studies", and "liberal arts and social studies". The course takes 6 to 9 months. Upon graduation the students receive a certificate which allows them to be admitted to the university.

Sample: The study involved 150 students who attended the "science studies" program in the PAS. 52 of the students served as a pilot group in 1977-78. The rest participated in the main study in the years 1978-79 and 1979-80. The students were classified according to their socioeconomic and ethnic criteria by the PAS administration (see Table 1).

Insert Table 1 about here

Procedure: A survey questionnaire designed to procure students attitudes and expectations was pre and post administered. (The pilot students received the questionnaire only at the end of the school year).

The survey included 4 sections:

1) Goals and objectives of the PAS: Students were asked to indicate their main reasons for enrolling in the PAS, and to rank order six goals of the PAS according to their relative importance.
2) Goals and objectives for further university science studies: Students were asked to rank order their goals for university studies and to indicate their perceptions of the influence of different factors on their success in future university studies on a 5 points Likert scale.
3) Learning activities in science: Students were asked to express their opinions about 1) the importance and 2) the actual existance (only in post tests) of different learning activities (on a 5 points Likert scale).
4) Self concept: The students were asked to rate on a 5 points Likert scale their performance and perceived abilities regarding various learning activities in science.

The results were analysed by Statistical Package for the Social Sciences (SPSS) (Nie et al, 1970) and by Smallest Space Analysis (SSA) (Lingoes, 1973), which yielded individual scores, mean scores, standard deviations, frequency distributions, t tests and correlations.

Results and discussion

Table 2 presents students perceptions of the PAS's goals. The results show that students regard "a good preparation to university studies" to be the most important goal. The more practical goals pertaining to the admission to the university were rated lower. A surprisingly low score was given to the goal "achieving a better matriculation certificate". This indicates that although some of the PAS students didn't have matriculation certificate they expect the PAS to be a lot more than just a matriculation preparatory school.

Insert Table 2 about here

A slightly different picture emerged when students were asked to select one out of the five reasons to the question "what was your main reason for coming to the PAS" (Table 3). The largest percent of students indicated that their main reason for coming to the PAS was to increase their chances to be admitted to the university (reasons 1 and 2 in Table 3). The next popular reason was receiving a good preparation for university studies. Increasing of the scientific knowledge was the least popular reason.

Insert Table 3 about here

Students' opinions on the possible influence of different factors on future success in the university are summarized in Table 4. The items were classified into 3 subtests: I - learning skill activities. II - student cognitive abilities and learning habits. III - socioeconomical characteristics.

Insert Table 4 about here

The results show that especially after completion of the PAS students expect the mastery of learning skills such as scientific reading, data analysis or orientation in the library to influence their future success in the university more than factors like talent or hard work. Students definitely do not consider socio-economic factors such as ethnic or social origin to have any influence on their university studies and they do not believe that luck plays an important role in this respect.

In order to know our students main future goals for applying to the university, we asked them to rank order 6 given goals. It seems in the first place that our students aspire for a profession which will lead them to an interesting career. Acquisition of scientific knowledge comes next, while the achievement of high social status or making a lot of money were rated very low.

Insert Table 5 about here

Table 6 summarizes students' perceptions of the actual and ideal existence of certain learning activities in the PAS. Although the learning activities appeared randomly in the original questionnaire, we organized them in Table 6 into two subtests:

I - "learning skills" refers to study methods oriented activities such as scientific reading and writing, data analysis, note taking and independent studies.

II- "traditional" - include mainly subject matter oriented activities that were traditionally taught in the PAS.

From the results (Table 6, Figure 1) 2 main trends can be seen:

First, learning activities were rated higher than traditional subject matter oriented activities both initially and at the end of the school year.

Second, there was a significant discrepancy between the actual existence of learning skills oriented activities in the PAS and the ideal situation as students would have liked it to be. Such discrepancy was not found in relation to subject matter oriented activities. These two results indicate that those learning skill activities which were considered as highly important by students were insufficiently dealt within the PAS, while some subject matter oriented activities were perhaps overemphasised.

Insert Table 6, Figure 1 about here

Students self concept with regard to their performance and abilities in learning skills oriented activities is presented in Table 7. It seems that initially students perceived their competence with regard to many of the activities fairly low. Moreover, after a whole year of studying in the PAS their self concept didn't seem to improve. In some cases they rated their abilities at the end of the year lower than at the beginning. It seems that after a year of studying in the PAS the students became

either more critical of their studying abilities or more aware of their deficiencies and difficulties, or both.

Insert Table 7 about here

The correlations reported in Table 8 indicate only few significant relationships between achievement in the PAS and students self concept. However, with regard to scientific presentation and scientific reading in English in 1978-79, low achievers really considered themselves to do poorly. Although the results may be interpreted in many different ways, one very clear conclusion is that students discomfort with some learning skills did not improve during the school year.

Insert Table 8 about here

Conclusions

Obviously, students in the preacademic school feel that their previous educational experience is not enough and that they need additional preparation in order to succeed in university science studies. The students main concern was about their deficient abilities regarding learning skills activities. Their self concept in this respect was rather low. They felt that their competencies and skills, such as reading and comprehending scientific materials in Hebrew and in English, using a scientific library, taking notes, as well as with regard to other study skills, were rather low. They believed that improving their learning skills would influence their success at the university a great deal and expected the preacademic school to provide them with a proper preparation in this area. However, the students did not feel that they got anough preparation in this respect in the PAS traditional

program. The immediate conclusion is that in order to create a good preacademic preparation program it is most important to recognize the need for teaching learning skills in addition to subject matter teaching. In a previous study (Scherz, Michman & Tamir, 1984) a model for learning skills acquisition and its implementation as a workshop was suggested.

We believe that teaching learning skills, either in upper classes of the secondary school, or in preacademic programs, or in the first year in college, can play an important role in remedial programs for disadvantaged students.

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Table 1: Distribution of PAS population (in percents)

Year	N	Disadvantaged	Arab Minorities	Others
1977-78	51	60	14	26
1978-79	49	56	12	32
1979-80	55	38	25	37

Table 2 : Mean scores of the importance of the PAS goals as rank ordered* by students

The Goal	1977-78 (N=57) $\bar{X}$ Post	1978-79 (N=49) $\bar{X}$ Pre	$\bar{X}$ Post	1979-80 (N=55) $\bar{X}$ Pre	$\bar{X}$ Post
A good preparation to university studies	2.1	1.9	2.0	1.8	2.2
Increasing chances of admission to highly selective faculties	3.0	3.0	2.8	2.9	2.9
Admission to the university	3.1	2.8	2.7	3.1	2.7
Acquiring of knowledge in science	3.8	4.0	3.9	3.5	3.9
Obtaining a better matriculation certificate	3.3	3.8	4.2	4.2	4.0

* rank order in which 1 = highest 5 = lowest

Table 3: Distribution of Students' reasons for enrolling in the PAS (in percents)

Students main reason when coming to the PAS	% of students who chose the reason 1978-79	1979-80
Increasing the chances to be admitted to the university	24	38
Receiving a good preparation for the university	22	21
Increasing the chances to be admitted to highly selective faculties	24	17
Obtaining a matriculation certificate	14	10
Increasing the knowledge in science	11	14

Table 4 : Mean [illegible] students ratings* of the influence of selected factors on future success in the university

	1977-78	1978-79		1979-80	
	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$
	Post	Pre	Post	Pre	Post
Subtest 1: Learning skills					
- note taking	2.0	1.7	1.8	1.8	1.8
- coping with written scientific texts	2.1	1.5	1.7	1.7	1.9
- good knowledge in reading English	1.9	1.5	1.7	1.7	2.0
- efficient use of scientific library	2.1	2.1	2.1	2.3	2.0
- good oral expression in scientific subjects	2.0	2.0	1.8	2.1	2.1
- Ability to understand principles	1.7	1.4	1.2	1.6	1.4
Mean score in Subtest 1:	1.9	1.7	1.7	1.9	1.8
Subtest 2: Cognitive and personal abilities					
- talent	1.9	1.7	1.6	2.0	2.0
- full regular attendance in all classes	1.8	1.6	1.7	1.6	1.8
- hard work	1.8	1.5	1.6	1.4	1.8
- ability to do lab experiments		1.7	1.8	1.7	2.3
- ability to memorize	2.6	2.4	2.3	2.4	1.8
Mean score in Subtest 2:	2.0	1.8	1.9	1.8	2.0
Subtest 3: Socioeconomic and luck					
- luck	3.6	3.9	3.6	3.8	3.4
- ethnic origin	4.0	4.2	4.2	4.3	3.2
- social background	3.2	3.2	3.4	2.9	2.6
- social origin	3.6	4.0	3.8	3.8	3.4
Mean score in Subtest 3:	3.5	3.1	3.7	3.7	3.1

$\bar{X}$ on a 5 points scale in which

1=high influence and 5=does not influence

Table 5: Mean scores of the importance of goals that students want to achieve in the university

Students' goal in the university	1977-78 $\overline{X}$	1978-79 $\overline{X}$	1979-80 $\overline{X}$
1. Acquiring an interesting profession	2.2	1.9	1.4
2. Acquiring scientific knowledge	2.7	2.4	1.8
3. Acquiring a profession in order to "make money"	4.0	3.4	2.3
4. Achieving an academic degree	4.5	4.9	3.3
5. Achieving a high social status	4.7	4.8	3.4
6. Having 3 years of interesting student social life	5.1	5.1	3.8

rank order in which 1 = highest 6 = lowest

Table 6: Mean scores of students attitudes towards learning activities in the PAS - actual and ideal

Learning Activity	1977-78 $\bar{X}^{+}$ ideal	1977-78 $\bar{X}^{++}$ actual	1977-78 $\Delta\bar{X}$	1977-78 t	1978-79 $\bar{X}$ ideal	1978-79 $\bar{X}$ actual	1978-79 $\Delta\bar{X}$	1978-79 t	1979-80 $\bar{X}$ ideal	1979-80 $\bar{X}$ actual	1979-80 $\Delta\bar{X}$	1979-80 t
Subtest I: Learning skills												
1. Orientation in the scientic library	3.9	2.3	1.6	-7.4**	3.8	2.3	1.5	-6.4**	3.9	2.3	1.6	-4.2**
2. Using the library to write papers					3.4	2.7	0.7	-3.2**	3.3	2.8	0.5	-2.0*
3. Reporting	2.9	2.2	0.7	-3.0**	2.7	1.8	0.8	-3.9**	2.7	2.2	0.5	-1.5
4. Oral presentation of scientific subjects					4.1	2.5	1.6	-6.1**	3.8	3.0	0.7	-2.8*
5. Data analysis and presentation (tables,graphs)					3.0	1.7	1.3	-6.5**	3.1	2.0	1.2	-4.5**
6. Scientific reading in English	3 4	1.9	1.5	-7.0**	2.5	1 3	0.7	-3.0*	2.3	1.7	0.6	-2.7
7. Systematic reading of scientific articles in Hebrew	3.0	2.1	1.3	-4.3**	3.4	2.2	1.1	-4.9**	3.3	2.2	1.1	-3.6*
8. Independent study of scientific subjects	3.1	2.5	0.6	-2.9**	3 2	2.3	0.9	-4.9**	3.3	2.6	1.1	-3.4*
9. Efficient scientific reading					3.0	1.6	1.4	-7.9**	3.2	2.0	1.2	-3.8**

Table 6: (Contd.)

	1977-78				1978-79				1979-80			
	$\bar{X}$ ideal	$\bar{X}$ actual	$\Delta\bar{X}$	t	$\bar{X}$ ideal	$\bar{X}$ actual	$\Delta\bar{X}$	t	$\bar{X}$ ideal	$\bar{X}$ actual	$\Delta\bar{X}$	t
Subtest II: Traditional activities												
10. Studying of new scientific subjects	1.9	2.7	-0.8	3.5**	2.8	2.3	0.9	-3.2**	3.4	2.6	0.7	-3.4*
11. Lab experiments	2.3	2.1	0.2	-0.9	2.4	1.8	0.6	-3.4*	2.5	2.4	0.1	-0.8
12. Drill and practice of scientific material		2.2			1.6	1.4	0.1	-1.8	2.2	2.0	0.2	-0.8
13. Studying high school level science subject matter	2.3	2.4	-0.1	0.4	2.3	2.8	-0.5	1.6	2.2	2.7	-0.6	2.2*
14. Improvement or completion of matriculation scores	2.8	2.8	0.0	0.0	2.9	3.1	-0.2	0.8	2.3	2.5	-0.2	0.0

For actual * Mean according to Likert scale where 1 - exists to a large extent; 5 - does not exist

For ideal ** Mean according to Likert scale where 1 - desired; 5 - undesired

* $p < 0.01$

** $p < 0.001$

Table 7 : Mean scores of students self concept in mastering learning activities in science

	1977-78	1978-79			1979-80		
	$\overline{X}$ Post	$\overline{X}$ Pre	$\overline{X}$ Post	t	$\overline{X}$ Pre	$\overline{X}$ Post	t
1. Data analysis and presentations (tables, graphs)	2.6	1.7	1.7	0.0	2.6	3.0	1.4
2. Independent study	3.2	2.0	2.4	3.0	2.3	2.6	1.4
3. Scientific presentation (oral and written)	2.0	2.4	2.6	2.0*	2.5	2.8	1.7
4. Scientific reading (in Hebrew)	2.5	2.6	2.6	0.0	2.7	2.8	1.0
5. Scientific learning (in English)	2.6	3.2	3.1	-0.2	3.5	3.3	-1.0

Mean according to Likert scale where 1 - masters to a large extent
5 - does not master

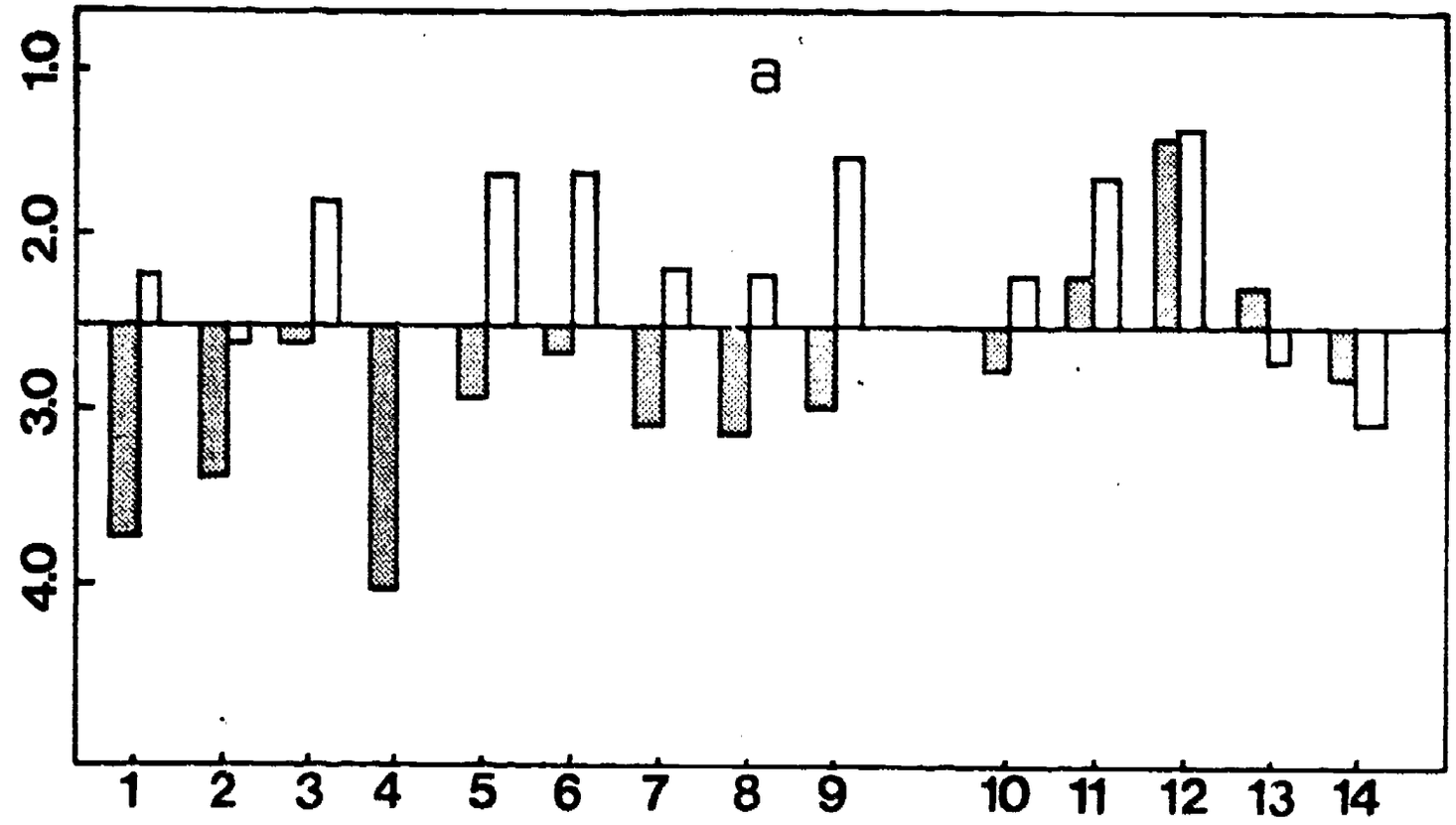
* $p < 0.05$

Table 8: Pearson correlation coefficients between achievement and students self concept of their learning skills

	Scientific Reading (in Hebrew)		Scientific Reading (in English)		Data analysis and presentation		Scientific presentation		Independent study	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
PAS final grade 1978-79	0.1	.22	.40	.10*	.01	.12	.34**	.43**	.15	.08
PAS final grade 1979-80	.25	.18	.19	.21	.00	.18	.03	.26	.04	.23

* $p < 0.05$

** $p < 0.001$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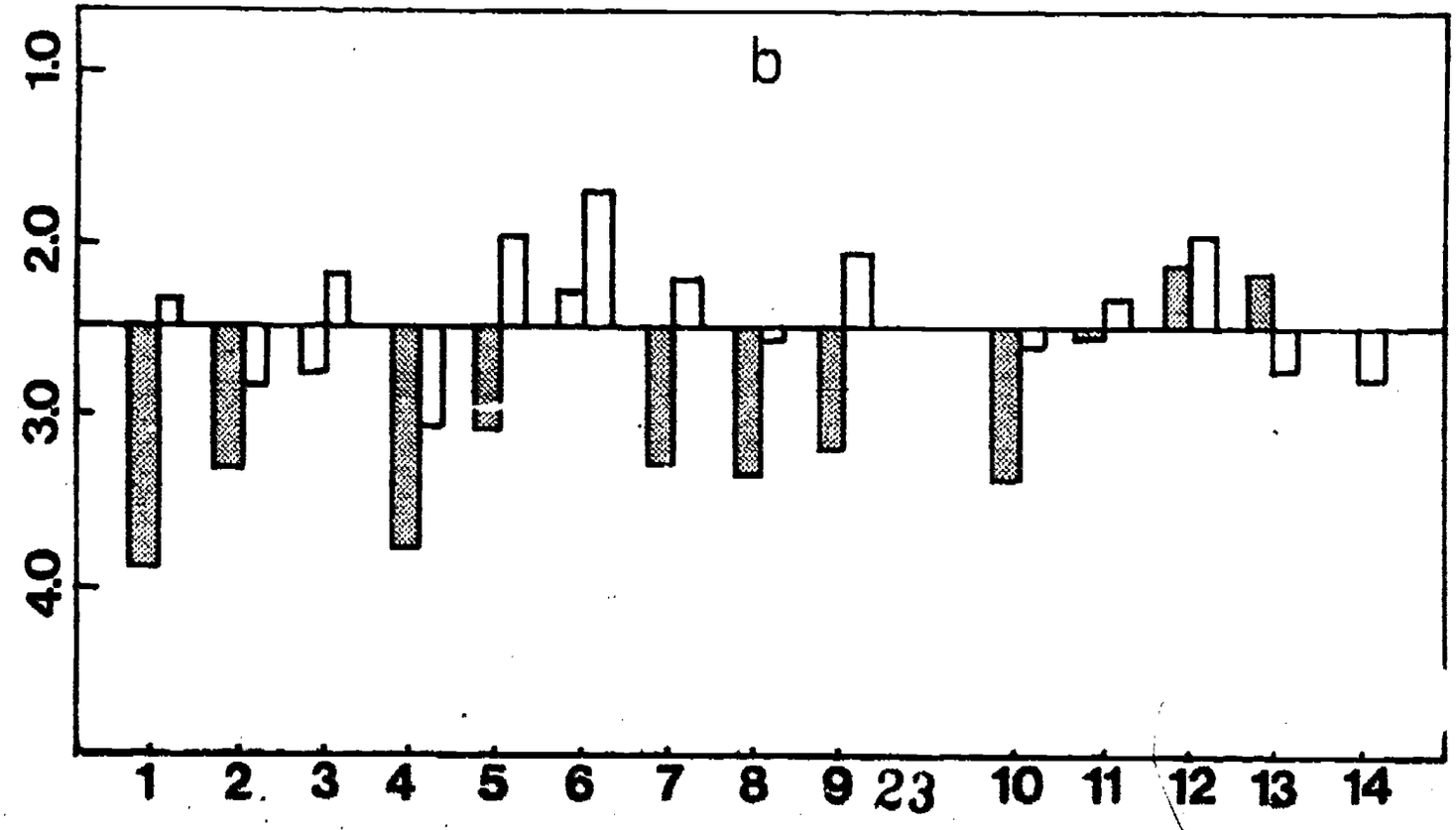
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Figure 1 : Mean scores of students' attitudes towards learning activities in the PAS.

a - 1978-79 b = 1979-80

The attitude items 1-14 are numbered according to the list in Table 6.