limit to this extension of study time. According to Crombag, van der Drift, and Vos (1985), there is an optimum time students are able and willing to spend on study activities, at least in higher education. If their teachers increase workload past this optimum, students will not work harder but will show study delay, fail their examinations, or drop out.

Hence, if one attempts to evaluate an innovative educational program, the workload placed on the students can be used as an important indicator of its quality.

In this chapter data is presented concerning the perceived study load of students of the Maastricht medical faculty. These data were gathered over a period of more than 10 years by means of a program-evaluation questionnaire. Because they have been collected from the start of the medical faculty in 1974, they provide valuable insights in the quality of the innovative, problem-based curriculum, both in its developmental and steady stages. This chapter provides tentative explanations for fluctuations in the data gathered from a curriculum development perspective. We explain changes in workload as perceived by students over the years in terms of changing features of the program.

First, however, are a few remarks about the format and contents of the curriculum concerned. The Maastricht medical curriculum is a 6-year program. The first 4 years are for the most part spent on preclinical educational activities in a curriculum organized mainly around important categories of illness; the last 2 years consist of clinical clerkships. In the preclinical phase each curriculum year is subdivided into units of 6 weeks, each dedicated to a specific theme, for instance: atherosclerosis, the child, or pain in the chest. Such an instructional unit is called a block.

The prevailing instructional method is problem-based learning. This means that students work on problems in small-group tutorials. Guided by their tutor, they analyze these problems, put forward hypotheses, try to find possible explanations for the phenomena described in the problem, and formulate learning objectives for self-directed learning activities. The problems used as stimuli for learning may vary in format and focus, depending on the objectives of the teaching staff involved. In addition to the tutorial sessions, a number of other educational activities are scheduled, including training of basic medical skills, lectures, laboratory work, site visits to health care facilities, or participation in health care. At the end of each block, knowledge acquired is assessed, and a program-evaluation questionnaire is administered.

METHOD

Subjects

Subjects were 10 consecutive year groups of medical students. The first-year group consisted of 50 students. The number of students increased to 150 for the last groups.

Procedure

Program-evaluation data for the first 4 curriculum years, that is, data on 20 educational blocks, have been collected since 1975. We could not include the first batch—the 1974 students—because both the block themes and the format of the program evaluation questionnaire were different compared with the following years. Students had to fill in the questionnaire every 6 weeks. This means that for the various batches up to the class of 1981 data are available, gathered at no less than 20 different measuring points. The questionnaire used to gather these data has evolved over the years, as questions have been discarded and new questions have been included. Since 1981 the questionnaire has had a fixed format and content. It inquires about such topics as the quality of the problems used as stimuli for learning, the contributions of the tutor and those of resource persons, the level of difficulty of the subject matter that was to be studied, motivational aspects, the functioning of the tutorial groups, and study load during the block. Three topics have been part of the questionnaire since 1975: workload, students' general evaluative impressions regarding the block as a whole, and the clarity of the program.

The variable of primary concern of this chapter is the workload.

From 1975 to 1981, the students were asked to respond to the following statement: "The workload of this block was heavy." They could indicate their agreement or disagreement by encircling a number ranging from 1 to 3, with 1 indicating total disagreement, and 3 indicating total agreement with this statement; 2 was considered the neutral point.

Since 1981, a somewhat different format has been used that involves a response on a 5-point scale. In order to make comparisons possible over the years, both 5-point scale and 3-point scale were transformed into a 10-point scale. The workload score of each block is determined per batch of students by computing the average score.

RESULTS AND DISCUSSION

The study-load data can be presented cross-sectionally and longitudinally. Figure 30.1 gives an example of longitudinal data of three classes, entering respectively in 1975, 1978, and 1981.

Each of these graphs can be read as follows. The first point on the left represents the average workload indication for the first block of the academic year in which this class entered medical school (data for the first block were not available in 1975 and 1981). This average score is, in 1978, equal to 3, which means that this class was of the opinion that this block did not require too much intellectual or physical effort.

The graph as a whole represents the data produced by this class through their 4 preclinical curriculum years; in other words, it is a longitudinal section. (The elective blocks of the second, third, and fourth years are not included.)

Figure 30.2 gives an example of cross-sectional data of 2 academic years, that is: data collected in the first 4 curriculum years are presented as within 1 academic year.

In Figure 30.3 data are presented which have as their unit of analysis single blocks. Of course, the nature of these data is also cross-sectional.

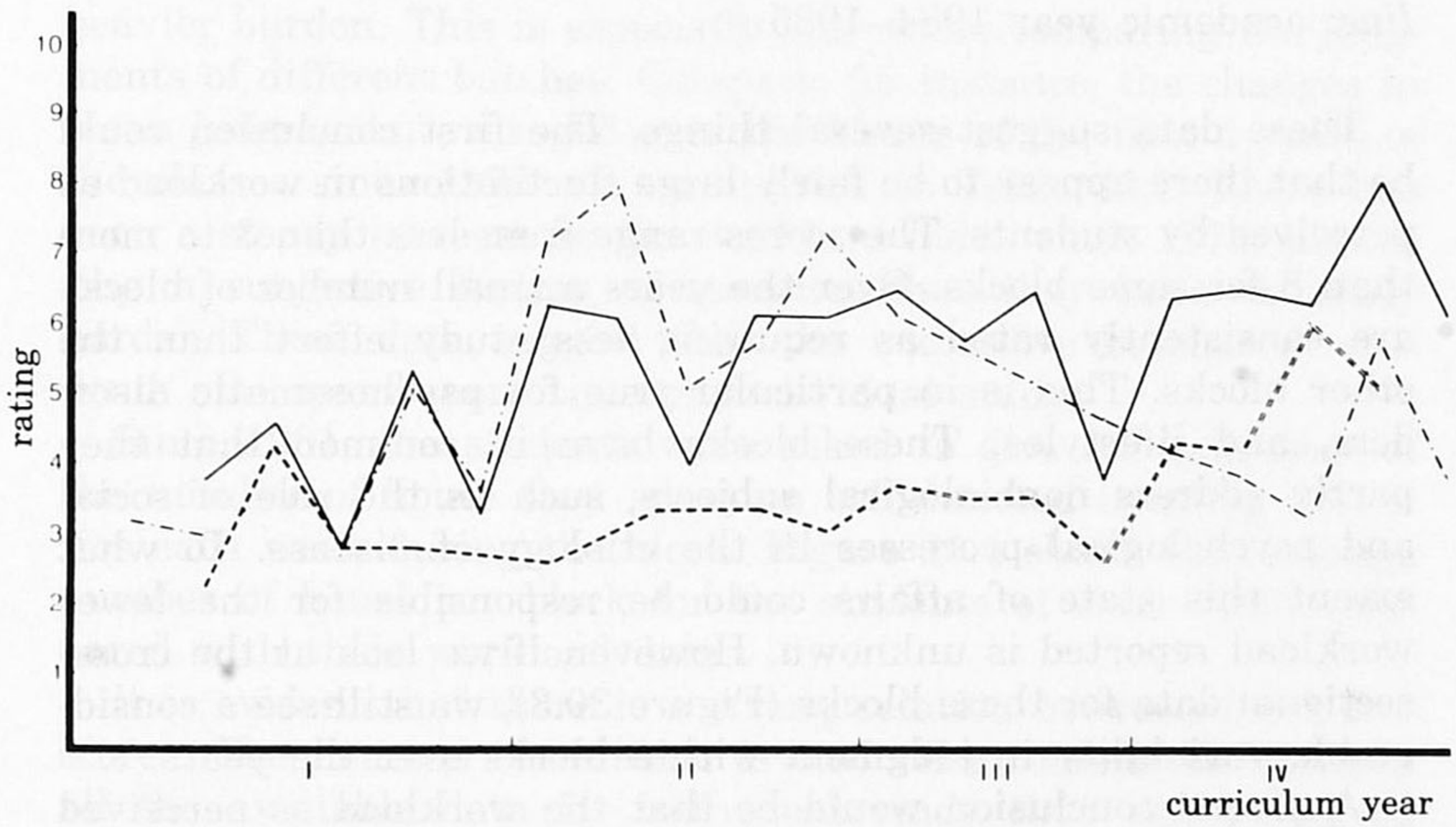

FIGURE 30.1 Perceived workload of three classes (longitudinal). *Dashed line*: class of 1975; *dashed/dotted line*: class of 1978; *solid line*: class of 1981.

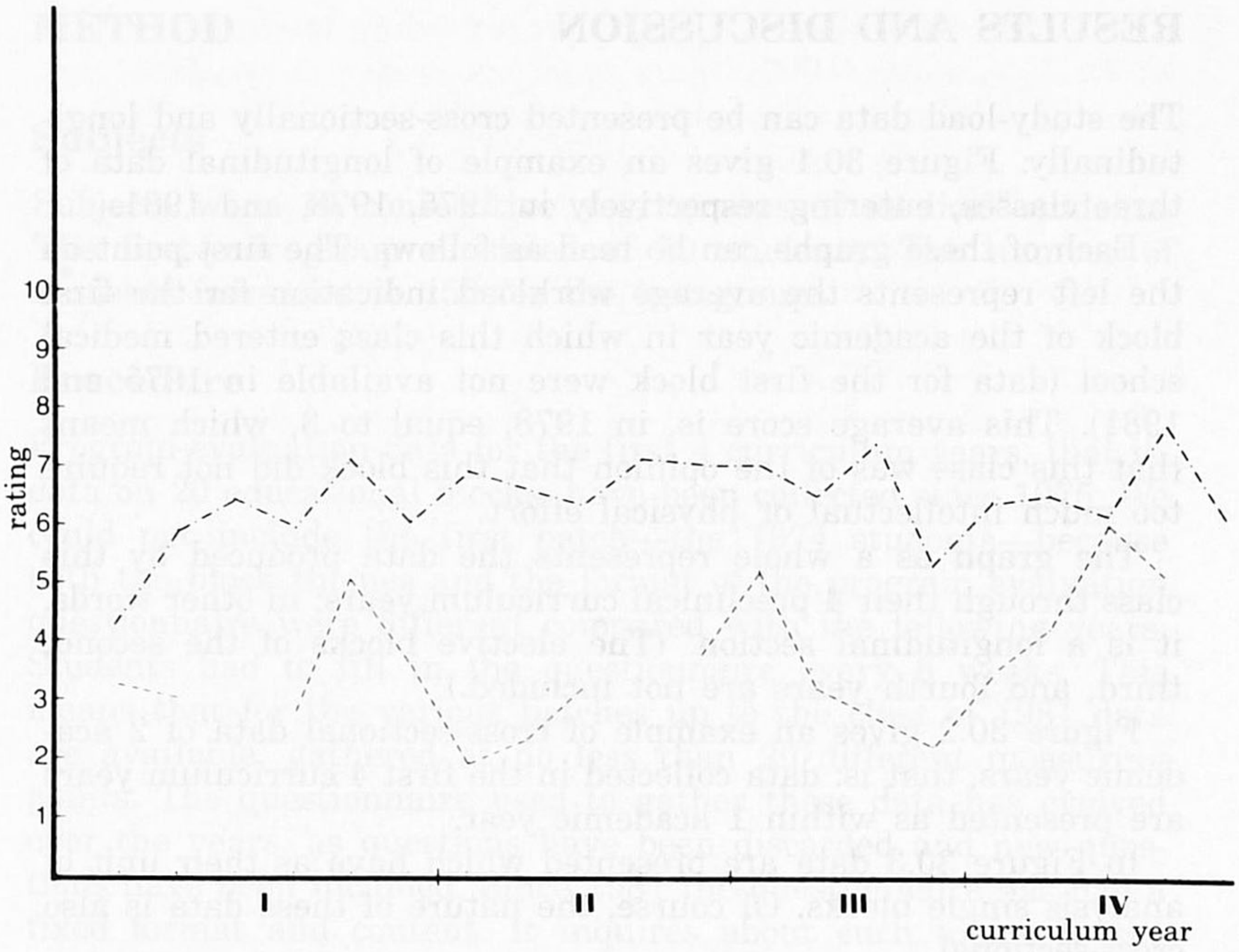

FIGURE 30.2 Workload data collected per academic year (cross-sectional). *Dashed line*: academic year 1978–1979; *dashed/dotted line*: academic year 1984–1985.

These data suggest several things. The first conclusion could be that there appear to be fairly large fluctuations in workload as perceived by students. The scores range from less than 3 to more than 8 for some blocks. Over the years a small number of blocks are consistently rated as requiring less study effort than the other blocks. This is in particular true for psychosomatic disorders, and lifestyles. These blocks have in common that they partly address nonbiological subjects, such as the role of social and psychological processes in the etiology of disease. To what extent this state of affairs could be responsible for the lower workload reported is unknown. However, if we look at the cross-sectional data for these blocks (Figure 30.3), we still see a considerable variability in judgment within blocks over the years.

A second conclusion would be that the workload as perceived by the students tends to become higher over the years. This is the case for the longitudinal data and, also cross-sectionally, for some blocks. This seems to imply that in the course of time the

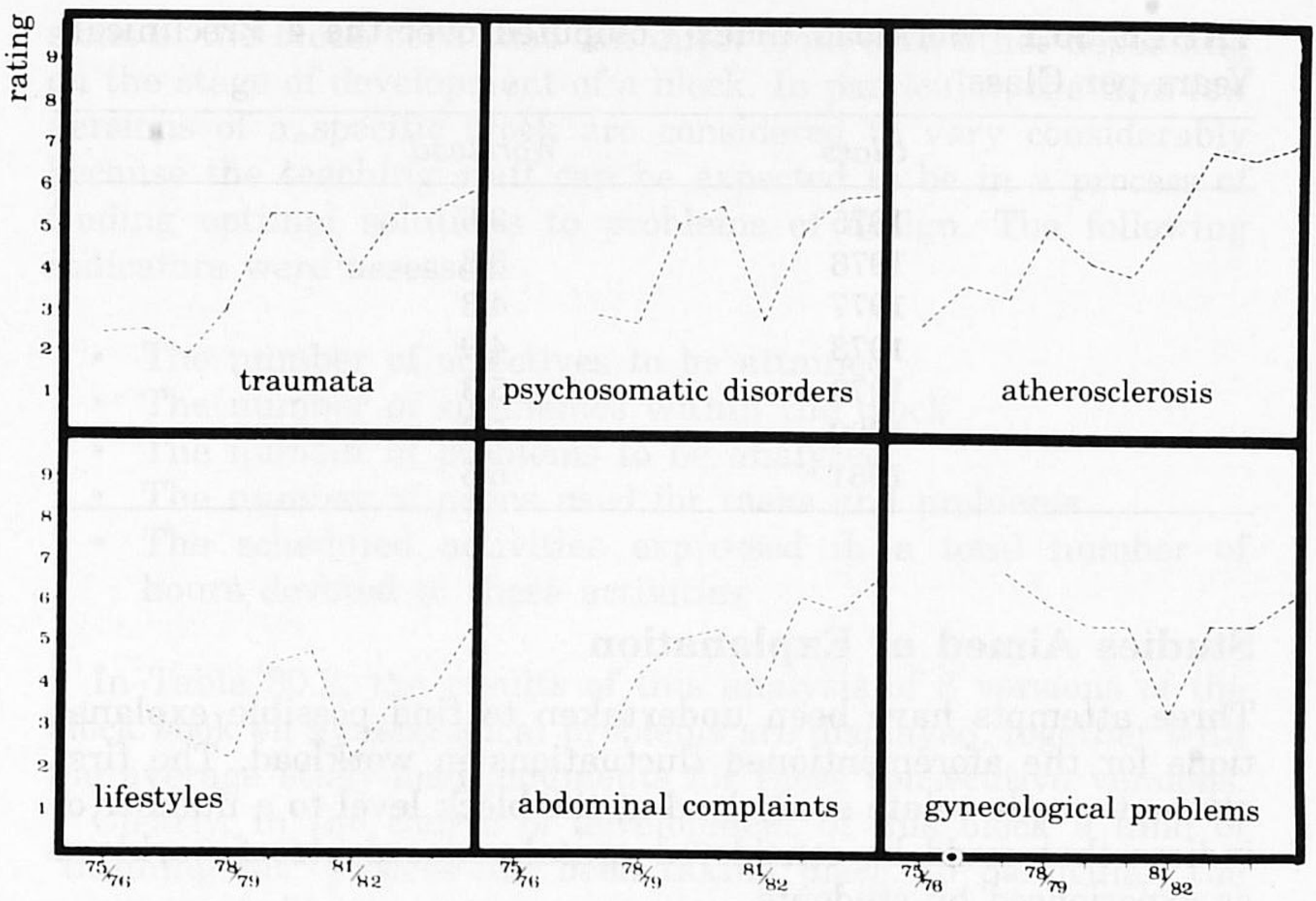

FIGURE 30.3 Examples of workload data per block.

students involved are experiencing medical education as a heavier burden. This is especially true when comparing the judgments of different batches. Compare, for instance, the changes in mean judgments, averaged over the blocks of the first 4 years of the classes since 1975, as exemplified in Table 30.1. There has been a steady increase in the workload index since 1975, indicating a subjective feeling of students that they have to study harder. These data suggest that the successive batches of students also spend more time on individual study.

Since 1981, the students were asked to give an indication of the number of hours they spent on self-directed learning activities each week during the block. Figure 30.4 shows this average number of hours per block for the students of class 1981, compared with their workload data.

It is evident that there is a strong relation between these two scores. The Pearson correlation is 0.83. The correlation between all the available data for individual study time and perceived workload for all the classes since 1981 is 0.50. The question is now why the program is seen as becoming more and more demanding? This question is dealt with in the next section.

TABLE 30.1 Workload Index Computed over the 4 Preclinical Years per Class

Class	*Workload*
1975	3.6
1976	3.8
1977	4.3
1978	4.9
1979	5.3
1980	5.2
1981	5.5

Studies Aimed at Explanation

Three attempts have been undertaken to find possible explanations for the aforementioned fluctuations in workload. The first attempt was to relate study load at the block level to a number of indices that could be considered causal antecedents of workload as experienced by students.

To that end, all block books of two representative blocks were analyzed. Of course, each block has a number of consecutive ver-

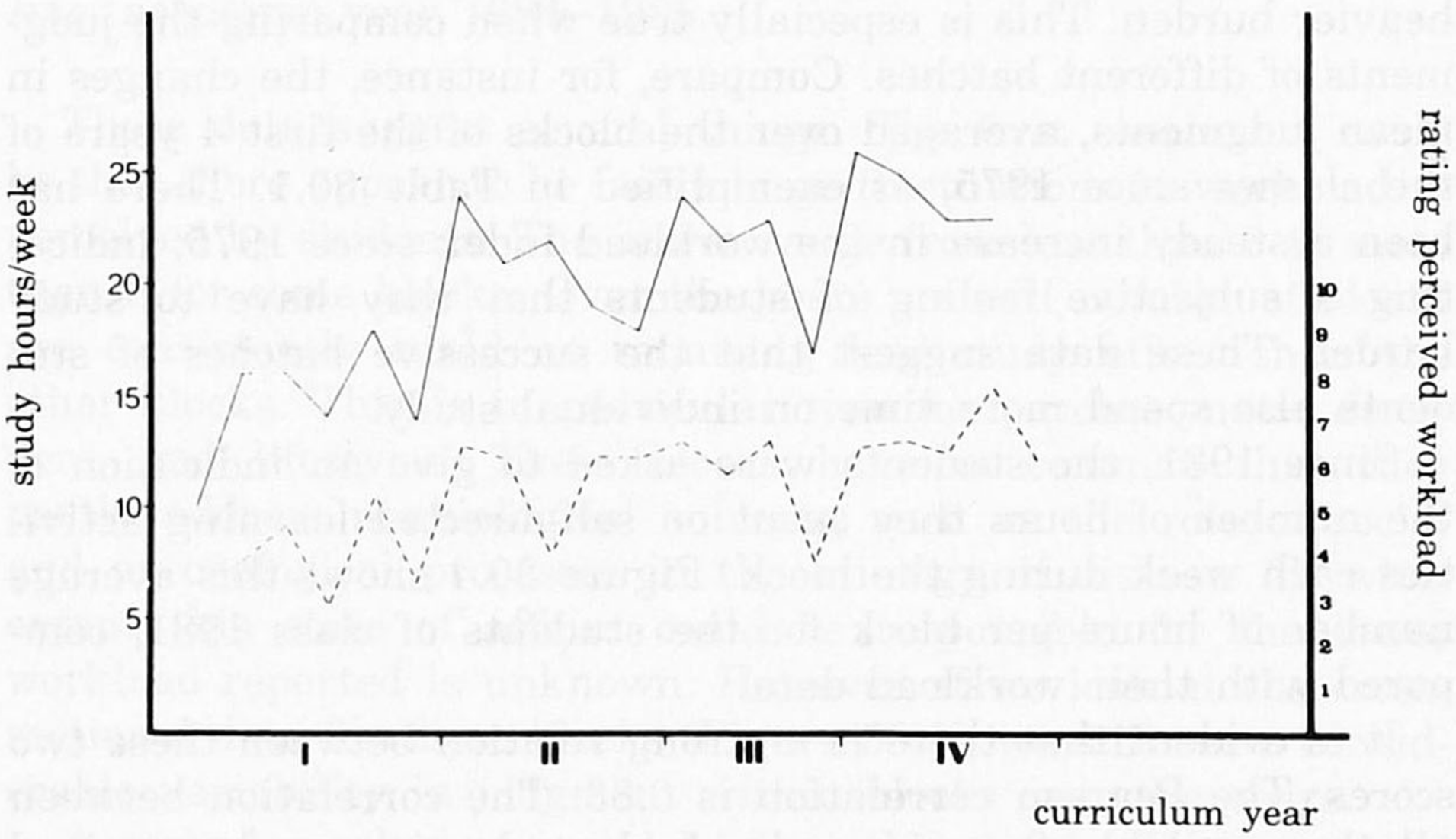

FIGURE 30.4 Number of hours actually spent on individual study per week, as reported by class 1981, compared with their perceived workload. *Solid line*: workload; *dashed line*: self-study.

sions of the block book that can differ from each other depending on the stage of development of a block. In particular, the first few versions of a specific block are considered to vary considerably because the teaching staff can be expected to be in a process of finding optimal solutions to problems of design. The following indicators were assessed:

- The number of objectives to be attained
- The number of subthemes within the block
- The number of problems to be analyzed
- The number of pages used for tasks and problems
- The scheduled activities expressed in a total number of hours devoted to these activities

In Table 30.2, the results of this analysis of 8 versions of the block book on gynecological problems are displayed, together with the average study-load judgments for these consecutive versions.

Clearly, in the course of development of this block a kind of "thinning-out" process has been taking place. In particular, the numbers of objective subthemes and problems have been cut back (of course, these indices are highly interdependent). Rank-order correlations have been computed between each of these indices and workload and are presented in Table 30.3.

These results suggest that workload as perceived by the students is indeed to an extent a function of the range of subjects that have to be addressed, subjects operationalized as the three indices mentioned before. That the number of scheduled activities is not related to study load cannot be a surprise, because in this block these activities are almost a constant.

Table 30.4, containing the data from 10 versions of the atherosclerosis block book, gives a somewhat different impression. The correlations between these data and the perceived workload are presented in Table 30.5.

These correlations suggest that in this block it is not so much the number of topics to be addressed by the students that influences their perception of how much is expected from them but rather the number of scheduled activities. Although some of these correlations are substantial, the pattern of correlations for both blocks is quite unpredictable. This suggests that other, perhaps partly noncurricular influences, play their roles. This impression is reinforced by a second analysis performed on all block books in the academic year 1981. For each of the 20 block books of that year, the number of problems presented to students and the num-

TABLE 30.2 Indications of Workload of the Block "Gynecological Problems"

	Years							
	77/78	*78/79*	*79/80*	*80/81*	*81/82*	*82/83*	*83/84*	*84/85*
Objectives	+ + + + +	+ + + +	+ + +	+ +	+ +	+ +	+ +	+ +
Subthemes	6	4	3	3	3	3	3	3
Number of tasks	20	16	13	13	11	11	11	12
Number of pages	200	118	114	120	57	52	52	38
Scheduled activities (hours/block)	16	16	17	18	16	15	15	13
Perceived workload	6.8	6.0	5.5	5.5	3.3	5.5	5.5	6.3
Literature study (hours/week)					23	22	23	20

TABLE 30.3 Rank-order Correlations between Perceived Workload and Indicators for Workload in 8 Consecutive Versions of the Block Books on "Gynecological Problems"

Indicator	*Rank-order Correlation*	*p value*
Objectives	0.68	.022
Subthemes	0.76	.013
Number of tasks	0.71	.014
Number of pages	0.37	.19
Scheduled activities	0.09	.736

ber of scheduled activities (as objective indicators of study load) were counted.

These two variables were subsequently combined into one index in order to enlarge potentional predictive power. The Pearson correlation between these data and the perceived study load is 0.33.

The level of this correlation again stresses the importance of noncurricular influences on study load as perceived by students, unless of course one believes that curricular factors that are not investigated here could be responsible.

The correlation computed between reported study time in number of hours per week and the objective index of workload is equal to 0.40. This correlation does not offer new perspectives on the problem. What, then, are the noncurricular influences or events that could in principle be responsible for the phenomena observed in our data? We briefly discuss three possibilities here.

The first possibility has to do with the different stages of development that the Maastricht medical school had to go through. In the first 4 years of its development, it was by and large unclear how well or poorly its students—trained according to new instructional principles—would perform in clinical practice. It is possible that after the first experiences with respect to performance of students in clinical practice had been gathered, the teaching staff—tutors, resource persons, block book planners—transmitted to students a general feeling of uneasiness that expressed itself in these students as a feeling that more devotion to their studies was expected from them. And indeed at the end of the 1970s an atmosphere like that existed within the faculty. A phenomenon like that would cause a rather sudden change in the perceptions of students and therefore cannot account for the gradual increase that is observed in the data.

TABLE 30.4 Indications for Workload of the Block "Atherosclerosis"

	Years									
	75/76	*76/77*	*77/78*	*78/79*	*79/80*	*80/81*	*81/82*	*82/83*	*83/84*	*84/85*
Objectives	+ + +	+ + +	+ +	+	+ + +	+ +	+ +	+ +	+ +	+ +
Subthemes	5	4	6	6	5	4	4	4	4	4
Number of tasks	5	4	18	13	10	9	9	11	11	18
Number of pages	47	17	56	81	74	46	39	39	39	30
Scheduled activities (hours/block)	6	9	12	18	15	21	25	24	24	26
Perceived workload	2.8	3.7	3.4	5.1	4.3	4.0	5.3	7.0	6.8	7.1
Literature study (hours/week)							18	19	20	19

TABLE 30.5 Rank-order Correlations between Perceived Workload and Indicators for Workload in 10 Consecutive Versions of the Block Books on "Atherosclerosis"

Indicator	*Rank-order Correlation*	*p value*
Objectives	−0.37	.18
Subthemes	−0.33	.22
Number of tasks	0.11	.65
Number of pages	−0.28	.28
Scheduled activities	0.76	.002

However, there may be some effect in the cross-sectional data. Table 30.6 shows the mean scores of perceived workload per class, per academic year. The data from the academic year 1979/1980 show a sudden increase in perceived workload in all four curriculum years. That is the academic year in which our course of study became completed and the first students graduated.

A third possible factor exerting its influence on students is the changing job perspectives of medical graduates in the Netherlands.

In 1974 the Maastricht medical school was established as the eighth medical school in the Netherlands in the belief that in the 1980s there would be a shortage of physicians. This prediction turned out to be wrong. At the moment, more than 1,500 trained physicians are without jobs in the Netherlands, and no one expects that this situation will change quickly.

That career opportunities in medicine are limited has become clearer and clearer over the course of the years, and one cannot exclude the possibility that this state of affairs is perceived by students as an increased pressure to work hard and excel. This societal factor plays a prominent rule in the statements voiced by students when they are interviewed about their instruction, and thus could be a plausible candidate for the explanation of the phenomena described.

CONCLUSION

In the first part of this chapter, the opinion was expressed that workload is an important indicator of the quality of instruction because it exemplifies the extent to which a teacher has succeeded in matching what he sees as instructional necessities with

TABLE 30.6 Mean Scores Perceived Workload per Class/Year

	Years									
	75/76	*76/77*	*77/78*	*78/79*	*79/80*	*80/81*	*81/82*	*82/83*	*83/84*	*84/85*
Year 1	31	28	32	35	53	52	40	54	53	68
Year 2	39	31	33	28	66	58	45	57	66	68
Year 3	—	40	35	35	58	52	39	53	57	66
Year 4	—	—	44	51	59	59	42	59	59	66

the capabilities of the students. It was suggested that a curriculum that puts a heavy burden on its students does not induce them to work beyond a fixed number of hours per week but rather forces them to fail their examinations, extend their study, or drop out (Crombag et al., 1985). This is, in particular, true for curricula that are not yet cristalized, that do not yet have a definite format and content. In this case, study-load data could steer the process of educational development.

In this chapter we presented study-load data from the Maastricht medical curriculum from both a longitudinal and cross-sectional perspective. We have shown that over the years there appears to be a general trend towards higher study-load judgments. As far as can be seen, these perceptions are to some extent supported in the number of hours students actually spend on self-directed learning activities. We have tried to put forward some explanations for this phenomenon. The results of these attempts are inconclusive. Sometimes moderate correlations between features of the educational program, such as the number of objectives pursued in a specific block, the number of subthemes, problems, or scheduled educational activities and experienced study load are found. Other possible influences are the role of the teaching staff in transmitting information about what is expected from the students, changing examination procedures, and the diminishing hope among students that they will ever be able to practice medicine. In particular, this last factor could be a plausible explanation for the increasing perceived study load, because students refer to it often while discussing their education. Further research should concentrate on how these perspectives on the future determine what students do.

REFERENCES

Bloom, B.S. (1976). *Human characteristics and school learning*. New York: McGraw-Hill.

Crombag, H.F.M., van der Drift, K.D.J.M., & Vos, P., (1985). De inrichting van curricula en het werkgedrag van studenten. *Universiteit en Hogeschool, 31*, 5.