

Were Today's Professors Good Students? Case Study of the Zagreb University School of Medicine

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Aim. To determine whether the medical school grades of today's professors at the Zagreb University School of Medicine could serve as the predictors of their subsequent academic success.

Methods. We performed a retrospective descriptive study of medical school grades of professors and/or assistant professors at the Zagreb University School of Medicine from 1990 to 2003. The professors were divided into four groups according to the course they taught: Basic Science, Clinical Non-Surgery, Clinical Surgery, and Public Health. In total, data for 297 professors were analyzed.

Results. Today's professors were above-average students. The analysis of grades of professors teaching different disciplines revealed that Basic Science professors were the best students, followed by Non-Surgery and Surgery professors, whereas Public Health professors were the worst. Grades that professors earned in Public Health courses were the highest, followed by grades in Non-Surgical and Surgical courses. The grades in Basic Science courses were the lowest.

Conclusion. Professors at the Zagreb University School of Medicine were above-average students and their grades seem to be important predictors of future success in academic career. Among today's professors, Basic Science professors were the best students.

Key words: Croatia; educational measurement; professors, medical; students, medical; schools, medical; universities

After graduation from medical school, further career success can be measured in terms of academic, scientific, and professional achievements. Criteria for achieving academic degrees change over time. Still, the title of professor remains the overall prize for successful scientific and professional accomplishment as the highest academic degree that can be earned in medical hierarchy.

Being successful is very important for happiness and high career satisfaction (1). Thus, predictors of success always remain an interesting and yet unclear topic for investigators. Traditional predictors include non-cognitive factors (personality, learning styles, and working habits), which are difficult to evaluate, demographic factors (sex and ethnicity), and cognitive factors (previous academic ability) (2), which can be evaluated with intelligence quotient (IQ) and grades (3). Relatively few studies provide comparative analyses of the power of possible predictive factors, used alone or in combination, of medical students' later academic performance (2).

According to previous investigations in academic communities of developed countries, grades are accepted as a valuable predictor of future ac-

ademic success (4,5). Good academic outcome measures in medical school are predictors for good performance after graduation (6). In the United Kingdom, "A" level grades (the best grades), can predict time taken to gain academic degree (3).

In Croatia, exam grades as selection criteria are applied from the beginning of medical education. Selection of future medical students among applicants at the Zagreb University School of Medicine depends on high school grades and admission test (7). Grades are also important for almost all undergraduate and postgraduate activities, such as assistant student posts, scholarships, postgraduate studies, research fellowship, and residence posts (8).

We conducted a retrospective study to determine whether medical school exam grades of current professors at the Zagreb University School of Medicine were predictive of their subsequent academic success. Considering the wide range of clinical specialties, preclinical and public health fields, we presumed that it would be valuable to investigate the possible difference in grades among professors teaching different disciplines as early indicators of their specific affinities. Our hypothesis was that professors

had had higher grades than average students of their class, without significant difference among professors teaching different subjects.

Material and Methods

We analyzed medical school exam grades of professors and/or assistant professors teaching at the Zagreb University School of Medicine from 1990 to 2003. Our study did not include grades of professors who graduated from other universities, but only grades of those who enrolled into and graduated from the Zagreb University School of Medicine.

Methods

We grouped professors in four groups according to the year of their enrollment to the Zagreb University School of Medicine (1942-1954, 1955-1964, 1965-1974, 1975-1985) and compared their exam grades. We also compared exam grades of groups of professors from each time period with exam grades of all students in their generation, ie, 1950, 1960, 1970, and 1980, who served as control groups. We took into account the grades of every tenth generation of all students as representative of the general trend in exam grades.

We analyzed exam grades of professors in each group formed according to the type of course they taught: Basic Science (Anatomy, Biochemistry, Biology, Histology, Microbiology, Pathology, Pathophysiology, Pharmacology, and Physiology), Clinical Non-Surgery (Anesthesiology, Dermatology, Family Medicine, Forensic Medicine, Infectious Diseases, Internal Medicine, Neurology, Nuclear Medicine, Oncology, Pediatrics, Psychiatric Medicine, Psychiatry, and Radiology), Clinical Surgery (General Surgery, Gynecology, Maxillofacial Surgery, Ophthalmology, Orthopedics, and Otorhinolaryngology), and Public Health (Ecology, Epidemiology, Social Medicine, Sociology, and Statistics).

Further we analyzed exam grades of professors in different groups of courses (Basic Science, Non-surgical, Surgical, and Public Health courses).

Finally, we analyzed exam grades that each group of professors (Basic Science, Non-surgery, Surgery, and Public Health professors) earned in each specific group of courses (Basic Science, Non-surgical, Surgical, and Public Health courses).

Data Collection

The year of enrollment and grades from all courses of professors and their control groups were obtained from the archive files and computer database of the Zagreb University School of Medicine. We collected data for a total of 297 professors who enrolled to the Zagreb University School of Medicine between 1942 and 1985. The lowest grade at the Zagreb University is 2 (sufficient), and the highest is 5 (excellent). Grade 1 means that a student failed the exam and has to take it again; records of these grades are not kept in the databases.

Statistical Analysis

The frequencies of examination grades were presented as contingency tables. The results of examinations are shown as percentages of students who received grades 2-5. The differences were tested by chi-square test, and $p < 0.001$ was considered statistically significant. Results were presented by grade point average (GPA). We used Microsoft Excell 2002 package (Microsoft Office XP, Microsoft Corporation, Redmond, WA, USA) for all statistical analyses.

Results

According to their medical school grades, today's professors were above-average students in their generation. In each time period, grades of professors-to-be were higher than grades of their student colleagues ($p < 0.001$) (Table 1, Fig. 1). The grades of professors who enrolled to Zagreb School of Medicine between 1955 and 1964 were lower than grades of those who enrolled between 1942 and 1954. However, the grades of those enrolled between 1955 and 1985 showed a significantly increasing trend ($p < 0.001$; Table 1, Fig. 1).

When analyzed according to the type of course they taught, Basic Science professors had the best medical school grades, followed by Non-surgery and Surgery professors, whereas Public Health professors had the lowest grades ($p < 0.001$; Table 2, Fig. 2). The highest grades that our professors earned during their student days were grades in Public Health courses, followed by grades in Surgical and Non-surgical courses, and the lowest in Basic Science courses ($p < 0.001$; Table 3, Fig. 3).

We analyzed grades of each group of professors in each group of courses and found that in the group of Basic Science and Non-surgical courses, Basic Science professors had the highest grades, followed by Non-surgery and Surgery professors, whereas Public

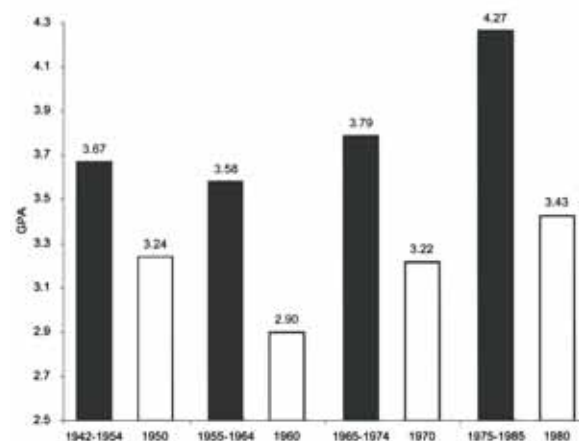


Figure 1. Grade point average (GPA) of professors as students (enrolled in 1942-1954, 1955-1964, 1965-1974, and 1975-1985 periods) and GPA of all students (control groups) generations of 1950, 1960, 1970, and 1980). Closed bars – professors as students, open bars – all students (controls).

Table 1. Comparison of medical school grades earned by today's professors enrolled into Zagreb University School of Medicine in the indicated period with grades earned by all students in respective generation (control generations of 1950, 1960, 1970, and 1980)

Year of enrollment	Professors' grades (%)				Year of enrollment	Students' grades (%)				p*
	2	3	4	5		2	3	4	5	
1942-1954 (n=66)	18.8	23.7	29.3	28.2	1950 (n=299)	29.2	31.0	26.0	13.8	<0.001
1955-1964 (n=94)	19.5	26.9	30.2	23.4	1960 (n=210)	42.1	32.1	19.1	6.7	<0.001
1965-1974 (n=93)	14.4	24.1	29.9	31.6	1970 (n=210)	29.8	31.6	24.9	13.7	<0.001
1975-1985 (n=44)	4.6	14.2	30.8	50.4	1980 (n=287)	22.5	30.0	29.3	18.2	<0.001
p†	<0.001				<0.001					

*Chi-square test: professors vs other students in their generation.

†Chi-square test: between generations.

Health professors had the lowest grades (Table 4, Fig. 4). In the group of Surgical courses, grades did not significantly differ, but in the group of Public Health courses, Public Health professors had the highest grades, followed by Basic Science, Non-surgery, and Surgery professors (Fig. 4).

Table 2. Medical school grades earned by professors, grouped according to the type of course they taught

Professors of:	Grades (%)*			
	2	3	4	5
Basic Science (n = 67)	10.8	20.3	30.2	38.7
Non-surgery (n = 143)	14.3	23.0	29.1	33.6
Surgery (n = 74)	18.3	24.0	31.6	26.1
Public Health (n = 13)	19.6	25.9	31.6	22.9
All professors (n = 297)	14.7	22.8	30.0	32.5

*Chi-square test, $p < 0.001$ among groups of professors.

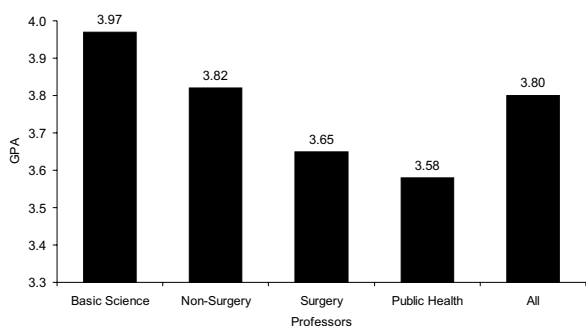


Figure 2. Grade point average (GPA) of professors as students grouped according to the type of course they taught (Basic Science, Non-surgery, Surgery, Public Health, and all professors).

Table 3. Professors' medical school grades earned in course groups

Courses	Grades (%)*			
	2	3	4	5
Basic Science	19.4	26.3	27.2	27.1
Non-surgical	11.6	18.9	32.1	37.4
Surgical	13.6	23.3	31.0	32.1
Public Health	9.2	20.2	32.9	37.7
All courses	14.7	22.8	30.0	32.5

*Chi-square test, $p < 0.001$ among the courses.

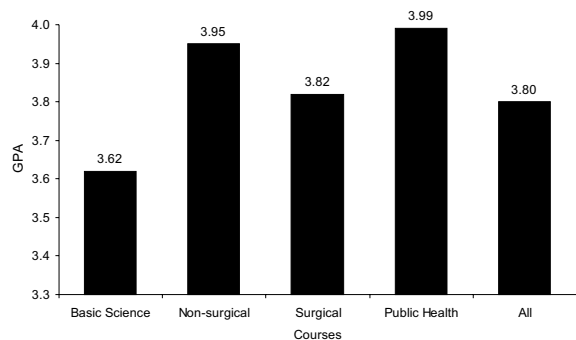


Figure 3. Grade point average (GPA) of professors as students grouped by courses (Basic Science, Non-Surgical, Surgical, Public Health, and all courses).

Table 4. Medical school grades (%) in four groups of courses earned by professors grouped according to the type of course they taught (Basic Science, Non-Surgery, Surgery, and Public Health professors)

Professors	Grades (%) in groups of courses*			
	2	3	4	5
Basic Science				
Basic Science (n = 67)	14.2	23.4	27.3	35.1
Non-surgery (n = 143)	18.7	26.6	26.5	28.2
Surgery (n = 74)	23.9	27.9	28.4	19.8
Public Health (n = 13)	29.3	26.3	29.3	15.1
Non-surgical				
Basic Science (n = 67)	9.6	15.2	33.0	42.2
Non-surgery (n = 143)	11.8	19.1	29.8	39.3
Surgery (n = 74)	12.8	20.9	34.7	31.6
Public Health (n = 13)	14.8	28.4	34.7	22.1
Surgical				
Basic Science (n = 67)	10.8	23.8	30.1	35.3
Non-surgery (n = 143)	12.8	22.1	32.2	32.9
Surgery (n = 74)	17.5	22.9	30.6	29.0
Public Health (n = 13)	16.6	35.2	24.1	24.1
Public Health				
Basic Science (n = 67)	5.1	18.9	31.9	44.1
Non-surgery (n = 143)	8.8	21.4	31.3	38.5
Surgery (n = 74)	14.6	20.9	35.6	28.9
Public Health (n = 13)	6.0	10.0	40.0	44.0

*Chi-square test; $p < 0.001$ among professors' grades in all groups of courses, except surgical ($p = 0.121$).

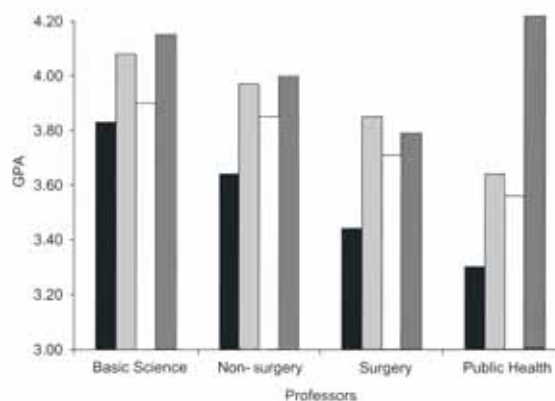


Figure 4. Grade point average (GPA) of professors as students in four groups of courses: Basic Science – closed bars, Non-surgical – gray bars, Surgical – open bars, and Public Health – striped bars. Professors were grouped according to the type of course they taught (Basic Science, Non-surgery, Surgery, and Public Health professors).

Discussion

As shown by their medical school exam grades, professors at the Zagreb University School of Medicine were above-average students in their generation. This finding supports the notion that grades may serve as valuable predictors of the future academic achievement, as well as a valuable selection criteria for getting a job and advancement in professional life. The predictive value of grades, however, is a result of working habits, motivation, and personality, rather than intelligence (3).

According to their grades, today's Basic Science professors were the best students and Public Health professors the worst. When analyzing grades in each

group of courses separately, we found that Basic Science professors had the highest grades in all groups of courses, except in Public Health courses, where the highest grades were earned by Public Health professors. Probable explanations for Basic Science professors receiving the highest grades were their preference for scientific subjects, more thorough approach to studies, and critical thinking abilities (9,10). We also assumed that better students participated in extra-curricular activities (such as assistant student posts) from the first few years of medical studies, unlike other students. This both reflects spontaneous selection of better (more ambitious) students and implies that these activities may have enhanced their ambition and abilities. It is also possible that supervisors or instructors with whom they had worked, influenced their choice regarding the future preclinical or residency choices (11).

The worst grades of Public Health professors could have resulted from the lack of motivation and lower interest in medical courses and higher interest in the public health field, as evident from the best grades they earned in Public Health courses (12). Another fact that has to be taken into account is the influence of competition. Motivation for the enrollment into the School of Medicine could be either "person-oriented" or "natural science-oriented" (13). Considering the fact that "natural science-oriented" students are mostly the best students and that better "person-oriented" medical students express the preference for clinical medicine (11), the competition for Public Health posts is much lower.

Non-surgery professors earned worse grades than Basic Science professors but better than Surgery professors. Grades of Surgery professors were lower, probably due to higher interest in practical surgical curriculum, and lower interest in other courses. Because medical specialties are clearly divided into surgical and non-surgical, we assumed that traits such as personality and interest exerted the strongest influence on specialty preferences (3,11,14).

Despite the differences in grades among professors and generally increasing trend of the grades at the Zagreb University School of Medicine (15), which is also present in western academic communities (16, 17), the unequivocal finding of our study is that professors have always had better grades than average students.

Professors had the highest grades in Public Health courses and the lowest in Basic Science courses. Basic Science courses were probably the most demanding, which is why students scored lower grades, whereas the Public Health courses were easier than others and resulted in the highest grades. Lower grades in Basic Science courses were probably also related to the adaptation period to student life. Another possible reason for lower grades in these courses could be a different type of examination: exams in Basic Science courses always have a written test, whereas exams in other courses are almost all only oral. Oral exams could be generally considered easier to pass and less objectively evaluated (18-20). Higher

grades in Public Health courses could be an outcome of a less demanding curriculum.

High grades in Non-surgical courses could be explained by higher student interest in clinical courses and also by a larger number of courses included in this group, which are not equally demanding.

It seems that professors earning good grades as students later teach more demanding courses, ie, courses in which students score lower grades. It is possible that professors who had good grades as students have higher evaluation criteria as examiners, whereas professors who had lower grades as students have lower evaluation criteria as examiners. This relation between success of professors as students and their evaluation criteria during exams should be studied in more detail.

Our study had a few limitations. Small number of Public Health professors was a result of the smaller number of Public Health courses during the studied period and a considerable number of today's Public Health professors who did not graduate from Zagreb University School of Medicine. Also, considering generally increasing trend in exam grades (15), it is possible that predominately younger groups of professors had higher grades than the groups of professors who are predominately older.

In conclusion, we believe that it is important to emphasize that professors were above-average students. Grades earned at the Zagreb University School of Medicine are important predictors of future success in academic career and should be further studied prospectively.

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