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KALINA BARTNICKA*

HOW TO STUDY MATHEMATICS – THE MANUAL FOR WARSAW UNIVERSITY 1ST YEAR STUDENTS IN THE INTERWAR PERIOD

JAK STUDIOWAĆ MATEMATYKĘ – PORADNIK DLA STUDENTÓW PIERWSZEGO ROKU Z OKRESU MIĘDZYWOJENNEGO

A b s t r a c t

In 1926 and in 1930, members of Mathematics and Physics Students' Club of the Warsaw University published the guidance for the first year students. These texts would help the freshers in constraction of the plans and course of theirs studies in the situation of so called "free study".

Keywords: *Warsaw University*, *Interwar period*, *"Free study"*, *Study of Mathematics*, *Freshers*, *Students' clubs*, *Guidance for students*

S t r e s z c z e n i e

W 1926 r. i w 1930 r. Koło Naukowe Matematyków i Fizyków Studentów Uniwersytetu Warszawskiego opublikowało poradnik dla studentów pierwszego roku matematyki. Są to teksty, które pomagały pierwszoroczniakom w racjonalnym skonstruowaniu planu i toku ich studiów w warunkach tzw. „wolnego stadium".

Słowa kluczowe: *Uniwersytet Warszawski*, *okres międzywojenny*, *„wolne stadium"*, *studiowanie matematyki*, *pierwszoroczniacy*, *studenckie koła naukowe*, *poradnik dla studentów*

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* L. & A. Birkenmajetr Institute of History of Science, Polish Academy of Sciences, Warsaw, Poland; kalinabartnicka@tlen.pl

This paper is focused primarily on the departure from the "free study" in university learning in Poland after it regained its independence in 1918. The idea of the "free study" had been strongly cherished by professors and staff of the Philosophy Department of Warsaw University even though the majority of students (including the students of mathematics and physics) were not interested in pursuing an academic career. The concept of free study left to the students the decision about the choice of subjects they wished to study and about the plan of their work. The young people entering a university had difficulties deciding what subjects and in what order they should select, as they usually set their minds on preparing themselves to teach in secondary schools. To help them make the right choices, the elder students and young researchers active in students' scientific clubs and circles at Warsaw University published guidances about what university study is, how to organize the work, and what subjects and in what order to select. The first of these guidances was published in 1926.

The concept of "free study" gradually collapsed, under the pressure of the urgent needs of that period in the history of Poland, which specifically required the training of professionals at schools of higher learning. These needs, along with the necessity to consider the cost of running the university, the economical planning of study, and devising of the ways of entrance into the university, required creation, sometimes through the back door, of more rigid curricula, and a more regulated course of study. The latter was reflected in the way the Ministry introduced its regulations on teacher examinations, the Master's and Doctor's examinations, and the academic staff's acceptance of this process was reluctant and slow.

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After the First World War, developing the Polish system of higher learning required swift measures and decisions from the newly emerging state authorities and academic clubs, the consequences of which could hardly be foreseen. Many learning and educational issues had been discussed during the War, but no unanimous position was established. Various concepts and visions clashed, some quite beautiful, but simply unreal. Few seemed to fully realise the actual economic, organisational and scientific capacities of the state and its society. The ambitious plans to create a homogenous law and a modern learning system were to be thwarted by the material hardships of both the state and the society. The newly emerging state administration had no clear vision of the system of higher learning, still less experience in running one.

As far as universities were concerned, in each of the former partitions the traditions, experiences and expectations were different. During the 19th century Polish people undertook multiple ineffective attempts at creating a Polish or Polish-German university in Poznań. The Polish youth went to study at German universities, of which the nearest ones were in Berlin and Wrocław (Breslau) [4, p. 247]. This was the decisive factor for why the Humboldt model of a university was the most familiar to the Polish people in the German partition: one which formally observed academic freedoms, such as the freedom to teach; professors were required to combine research and didactic work; and students were given the freedom to choose what subjects and in what order they were to study; whereas (in theory) the ultimate goal of study was to prepare students for independent academic research.

In the second half of the 19th century, during the autonomy of Galicia, the best conditions for the development of Polish schools of higher learning prevailed in the Austrian partition. At universities, Polish was made the official language. In Lwów (Lviv) and Kraków, buoyant learning and scientific institutions thrived. Both the Lwów and Jagiellonian universities were state institutions, under direct authority of the ministry in Vienna. First, the regulations of Leon Thun's state university reform of 1849 applied there, but then, along with other Austrian schools, they began to gradually emulate the Humboldt university model. The philosophy department was made equal in rank with other university departments and had lost its preparatory function. The universities were granted an extensive degree of autonomy. The principle of freedom to study and teach (the so-called "free study" [8, pp. 115-143]) was introduced. The students had the right to choose[1]. However, professorial teams of particular departments were gradually putting in order the sequence of studying subjects in specific years of study, and were recommending them to the students[2].

The principle of freedom to teach was adhered to, most fully, at philosophy departments, whose key goal was to train secondary school teachers. No specific learning curriculum was set, however. It was up to the student to choose freely the sequence of completing classes and taking exams. The course of studies of prospective teachers was "regulated" by the gradually expanding requirements of the state-level teacher examination involving specialised subjects (major and minor), the related exercise and discussion classes, and the obligatory subjects for all teachers: philosophy, Polish literature and the German language; as well as pedagogy (philosophy and pedagogy test or confirmed attendance at the Pedagogy or Philosophy seminar). The way to employment and scholarly career was made available when the student obtained the degree of doctor of philosophy, and then habilitation, also regulated by specified requirements[3].

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[1] "Students may choose their teachers and lecturers irrespective of what will be required of them as they sign up for state examinations or specialised doctoral examinations", *O naukach. Przepisy ogólne o przyjęciu na uniwersytet ogłoszone w rozporządzeniu Ministra Wyznań i Oświaty z 1 października 1850*…, [in:] *Zbiór najważniejszych przepisów uniwersyteckich*, Ed. by K. Kumaniecki, Kraków 1913, p. 16, Article 44; [7, pp. 151-152].

[2] An item of information states on p. 83 that "a group of professors" put together a study curriculum which is not binding, but a failure to comply with it may result in the student's inability to complete his or her studies within 10 semesters; See: *Wskazówki dla studentów Wydziału Lekarskiego przy zapisywaniu się na wykłady, wydane przez grono profesorów tego Wydziału na Uniwersytecie Lwowskim in: Zbiór ustaw uniwersyteckich, które uczniowie c.k. Uniwersytetów otrzymują przy immatrykulacji*, Lwów 1903, pp. 82-83.

[3] "The instruction advised choosing those lectures in the first year of study which were fundamental for the given scientific disciplines. (…) in the first year (…) students were advised to attend the classes on the introduction to advanced mathematical analysis, analytical geometry, and experimental physics, and take part in seminars of mathematics, analysis and geometry; in the second year (…) calculus, the function theory, differential geometry; and in the third and fourth years differential equations and calculus of variations". The students were advised to start the study of physics with the course on theoretical mechanics and thermodynamics. Later on, the students might choose subjects in any order: begin the study of astronomy and geophysics with the course on differential and integral calculus; in the first year they might attend lectures on spherical astronomy, in the first or second years also lectures on chemistry. In natural sciences the first two

The professors of the Jagiellonian University's Philosophy Department observed that students of the mathematics and natural science departments, especially those in their 1st year of study, "were making gross mistakes in selecting their subjects". "The benefit a student gets from his studies depends to a large extent on whether he is properly prepared to understand the lectures he attends; therefore, it is of paramount importance that the student first of all should acquire the skills required to comprehend them". "Enrolling in the lectures in an improper order immensely decreases the benefits one acquires from studying". Therefore, in order to make it easier for students to select rationally the sequence of subjects they were to study, the philosophy department's professorial staff decided to "set out certain guidelines they could follow when enrolling in lectures and classes"[4].

In the early 20th century a set of guidelines was prepared for students: *Tips for Philosophy Department Students Who Enrol in Mathematical and Natural Science Lectures* [7, pp. 179--184][5]. The reason why this set of rules was drawn up was the necessity to make more efficient the process of learning of mathematical and natural science subjects as a result of their quick development and the progressing specialisation. In Austrian schools and those in Galicia, the academic freedoms introduced by law in 1850 had been gradually limited. This process varied and proceeded at different speeds in different departments. In principle, the reason for this was that students should use more efficiently the studying time they needed to embrace the material of their scholarly discipline. The development and diversification of science in the second half of the 19th century made it more difficult for the student to sensibly select and rationally set out the lectures and classes offered by the university departments over the semesters and years of his study.

The free study was intended to scientifically train prospective independent scholars, which was certified by their doctoral degree. However, young people were coming to study at universities in order to obtain the knowledge they needed to teach in secondary schools, fill positions in administration, obtain medical certificates etc., and their employment was dependent on whether they passed the state examination that certified they had obtained the knowledge necessary at the particular position. An inept selection of the subjects, especially in the first year of study, led to decreased efficiency and waste of time. There were certain differences between the universities in Lwów and Kraków in the numbers of students and terms of organisation, study courses, and studying objectives. Whereas Kraków was more oriented toward research and scholarly work, Lwów focused on training teachers.

During the First World War, universities in Galicia did not discontinue their work for long, all the while retaining their Polish character. Many future professors of schools of higher learning of post-war Poland were educated there. Therefore, their models of working and the opinions of the professorial staffs had a profound impact on the emerging Polish

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years were common for all specialisations, and the curricula would separate from the third year on; [7, pp. 176-177].

[4] *Wskazówki dla studentów Wydziału filozoficznego, zapisujących się na wykłady matematyczne i przyrodnicze*, [in:] *Zbiór najważniejszych przepisów uniwersyteckich*, edited by K.W. Kumaniecki, Kraków 1913, pp. 419-424.

[5] See also: *Wskazówki*, [in:] *Zbiór najważniejszych przepisów*, op. cit.

system of schools of higher learning and the *Act on Schools of Higher Learning* of 1920 (reprinted in [8, pp. 248-267, Annex 4])[6].

In the Russian partition, the issue of tradition, organisation and patterns of learning was quite complex. The Annexed Territories cherished the fine tradition of the Wilno University shut down in 1832. The Kingdom of Poland revered the traditions of Polish schools of higher learning: the Royal University of Warsaw closed down in 1831 as a result of repressions following the collapse of the November Uprising; the Warsaw Main School existed between 1862 and 1869. The Royal University of Warsaw was a state school. It comprised five departments: Theology, Philosophy, Law and Administration, Medical, and Fine Science and Arts. For that time, it was a modern school, with extensive freedoms in the area of learning, awarding of scientific degrees, research, uncensored work of its academic staff, and focus on practical learning and didactics. The Philosophy Department, of an equal status with other departments, comprised the Divisions of: Proper Philosophy, Mathematics, and Natural Sciences. The length of study and the outline of the curriculum were governed by official regulations, but the course of study was set out by the management of the particular department. After 1823 the supervision of and interference with the curricula by the educational authorities were becoming stronger and stronger.

Students were required to take exams in all subjects (major and minor) for the particular year of study. The final exam, at least two hours long, encompassed the whole material of the major subjects and was held in public in the summer session after the thesis had been handed in and reviewed. By passing this exam, the student obtained the Master's degree, and was "fit for national service having acquired skills and knowledge at University"[7]. There was no sequence of subjects arranged by the university authorities for the successive years of study because some of the subjects were taught by professors alternately every second year. The least detailed curriculum was set out at the Philosophy Department's Mathematics Division. The only recommendation was that the students ought to study geometry, algebra, and elementary physics [2, pp. 87-88, 109-110, 165].

The Warsaw Main School was a state school with four departments: Law and Administration, Medicine, Philology and History, and Mathematics and Physics. It was under the control and authority of the education ministry in Petersburg. The students were required after the first and second years of study to take the so-called professorial examinations. This was merely a formality, which really amounted to collecting professors' signatures in the student book every semester, which certified the attendance at the lectures. As a matter of fact, the students took only two oral exams: the middle exam after two years on the subjects attended, and the final exam. In 1866, a third exam in Russian was introduced. Next, the student submitted his thesis on the subject of his choice [2, pp. 356--357]. The Royal University and the Main School were oriented toward training teachers, administrative staff, and other specialists, according to specified curricula and study plans.

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[6] *Ustawa o szkołach akademickich*, 3 July 1920, "Official Journal of the Republic of Poland" 1920, vol. 72, item 494.

[7] *Tymczasowe urządzenie wewnętrzne Uniwersytetu Królewsko-Warszawskiego, 1818*, Tytuł VIII, Egzaminy; reprinted by R. Gerber, [in:] *Księga protokołów Rady Ogólnej Uniwersytetu Warszawskiego*, Warszawa 1958, pp. 190-191.

The Russian Imperial University, which in 1869 replaced the Polish Main School was organised according to patterns and regulations for Russian universities (mainly of 1882). The curriculum, plan and course of study were rigid. "Students were not required to complement their classes with additional reading: some professors tended to look at this with contempt, and at the exam they only required an ability to demonstrate the knowledge of the class programme, oftentimes with the actual phrases used there. The exams were highly formalised". The studies were to be completed with a degree exam but after each year the students had to take promotion exams. The questions were drawn from a question box, and the lists of questions could be obtained by the students at the Dean's office. The studies were usually completed with a certificate of a real ("rzeczywisty") student, which certified the graduate's ability to take up professional work. The best students (with examination average of 4.5 or higher) could write and defend a candidate thesis. By obtaining the status of candidate, the student was given the opportunity to obtain the Master's degree and embark on a scientific career [3, pp. 484-490].

Other patterns of learning were introduced in Warsaw by the secret school operating in the last two decades of the 19th century, the so-called Flying University, and its offshoot from 1907, a private school run by the overtly operating Society of Science Courses (Towarzystwo Kursów Naukowych – TKN) [6]. This was a kind of free university, which exercised the freedom of learning and teaching. Lectures and other forms of classes depended to a large extent on the school's ability to take on lecturers. The students were not subjected to state examination rigours. They obtained certificates confirming the subjects they passed, which were not officially recognised in the Kingdom of Poland and the Russian academic system.

TKN professors and students' expertise must have had an impact on the didactic staff of the reinstated Warsaw University because a lot of TKN lecturers became later, in the restored Poland, professors of the Warsaw University and Warsaw University of Technology. Moreover, it was within the TKN circles that conceptual work on the reestablishment of Warsaw University (UW) was initiated. This work was underway already before the outbreak of and during WWI, and after the Russians withdrew from Warsaw in the summer 1915, the organisational work started in connection with the relaunching of both Warsaw University and Warsaw Technical University [3], pp. 14-15]. The operations of Warsaw University, which opened as early as 15 November 1915, and of its didactic staff, were to be of temporary nature all the way until 1920.

Although the *Act on Schools of Higher Learning* passed on 13 July 1920 laid down the conditions for putting the universities in order, it was rather general and required more detailed work on the schools' statutes; it soon turned out that the visions and dreams of university professors did not go in line with the directions set out for the schools of higher learning by the Ministry for Religions and Public Education (MWRiOP).

Apart from drawing from the Polish university traditions, rejected under the Russian sway, it was probably through self-learning, by using the *Manual for Self-Learners*, that the views of the academic world in Warsaw and school managers in the restored Poland were being shaped on how the schools of higher learning and the organisation of studying should be arranged. It may be interesting to look at Zygmunt Janiszewski's specific opinion expressed in the *Manual's* Volume 1, which focused on mathematics: "We call a self-learner

everyone who in his studies is dependent on his own initiative. The antonym of the self-learner is a 'pupil' of one school or a teacher, subject to foreign influence, curriculum and control. A student of mathematics need not be a pupil; at the best and most popular universities the students are to a large extent self-learners: they must set out their own plans of studies, select the lectures, coursebooks etc." [6, pp. 115-116]. In a footnote, the author explains that the evidence for such an understanding of studying is the "distribution by some German universities of printed guidelines, or '*ratschläge*' to all new students. Whereas the students of polytechnics and most universities in Italy, England, and particularly in Russia, are to a larger or smaller extent 'pupils', subjected to a strict curriculum, examinations etc." [6, p. 116].

However, it was also understood that self-learning required following a certain order which made the acquiring of new knowledge simpler. The sequence of contents in the subsequent volumes of the *Manual* can, it seems, be interpreted as an order suggested by the authors, or a course of study of the particular divisions of the given science[8]. It must be stressed that both studying at a TKN school and self-learning using the *Manual* required the students to possess substantial maturity, consistence, and independence. It seems that the fragment quoted above quite well represents the views of most professors of the re-emerging Warsaw University on what university studies should be like and what type of European university they sought to take as a model for Polish universities: the Humboldtian university and the "free study".

The work to restore or create Polish schools of higher learning on the territories of the former Russian (Warsaw, Wilno, and soon Lublin) and German partitions (Poznań) conveyed the features of a spontaneous uprising, particularly in Warsaw, where it started already during the war. Among the matters to be resolved quickly, the most urgent ones involved drawing up the curricula and courses of study, and recruiting the didactic staff. Both issues were closely connected with the concept of university, and were further linked to the principal goals set for the universities by the educational authorities, that is, the Ministry for Religious Denominations and Public Education.

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Only in Galicia did the universities – the Jan Kazimierz University in Lwów and the Jagiellonian University in Kraków – have a relatively stable (inasmuch as it was possible after the war ended) professorial staff and curriculum of study, and were therefore able to continue their pre-war activity which they had developed during the autonomy of Galicia (admittedly, inasmuch as the universities' financial capacity and the change of the seat of the educational authority from Vienna to Warsaw allowed it) [1, pp. 61, 69].

The professorial staff of Galicia universities and Warsaw's scholarly community heavily influenced the 1920 *Act on Schools of Higher Learning*. The Introduction to the *Act* stipulated

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[8] The mathematical sciences unit in Volume 1 of the *Manual* was prepared by Z. Janiszewski, W. Sierpiński, S. Zaremba, and S. Mazurkiewicz. The chapters were as follows: General Introduction (description of mathematics and its breakdown), learning degrees (I – elementary, II – secondary school, methodology of mathematics teaching), III – higher mathematics and its sections.

that the goals of the schools of higher learning, particularly universities, would be to serve science and the homeland; cultivate and spread the knowledge; seek and find the truth "in all branches of human knowledge, as well as lead the way for the academic youth to explore the truth"; on the other hand their goal would be to "prepare the youth for practical professions, the execution of which requires a scientific capacity of various branches of knowledge and an independent judgement of its theoretical and practical aspects". Schools of higher learning obtained an extensive degree of autonomy in such areas as drawing up their own statutes (Art. 1) and granting academic, scientific and professional degrees (Art. 3), as well as "the right to freely learn and teach". Professors and *docents* had a guaranteed "right to present and discuss any issues, authoritatively and in line with their own conviction, and by scientific means" in the realm of science they represented, as well as a "complete freedom in whatever methods and exercise they chose to employ" (Art. 6). The ultimate self--governing power was held by the academic senate (Art. 18), which was responsible among other things for approving of the programme of lectures. The responsibility for "keeping watch of the development of learning" and the right organisation of teaching, lectures, speeches, and publishing were handed over to the department boards (Art. 32), but their statutes and programmes had to be submitted for approval to the Ministry.

Schools of higher learning were supposed to grant professional degrees (Art. 95). Two scientific degrees were introduced: a lower one, usually the Master's degree, and a higher one – the Doctoral degree. The mode of obtaining *veniam legendi* (habilitation) was laid down in clear terms. In the transitional period, until 1926, students who had begun their studies before 1920 could take exams and apply for doctoral degrees according to the existing regulations (Art. 112). The academic year was split into three trimesters. The *Act* did not include any guidelines regarding the course of study or examination requirements with regard to the students. These matters were to be settled by departmental statutes and regulations, and the continually modified ministerial decisions.

After 1920, subsequent regulations were put in place to regulate the curricula of study including those in medicine, pharmacy, and law, in the transitional period till 1926, upholding to some extent Galicia regulations. The studies at the Philosophy Department, which since 1916 included studies in mathematics and natural science, were also organised according to the regulations existing at pre-war universities of Galicia: the student selected the subjects of his own choosing (lectures and classes; preliminary seminars and regular seminars). "This selection was confined by the requirements of the final exams, but still it was quite extensive. The lectures informed the students of the up-to-date knowledge in a given discipline of science. Practical skills were practised at classes, and preliminary and regular seminars. The student's independent work was highly acknowledged, especially when conducted in some of the University's multiple students scientific clubs [3, pp. 76-77, 200-209].

The Warsaw University's Philosophy Department had no strict learning curricula. "It was recommended that the student choose subjects according to such groups as: philosophical, historical, mathematical, and natural science". The student was free to choose his or her major and minor subjects. The learning course was supposed to take four years, and the student was obliged to attend at least eight hours of class a week. Those students who had begun their studies before 1920, were bound to take only two examinations

before they obtained a doctoral degree: one in the major and minor subjects, and the other in philosophy.

According to the new curricula, those who studied 11 trimesters had to take an obligatory Master's exam in one of a wide array of subjects including such as mathematics, physics, chemistry, and pedagogy. In order to make a Doctor's degree, the candidate had to submit his or her doctoral thesis and pass the exam. Those intending to become secondary school teachers had to undergo quite a complex procedure of the teacher examination, which they could take after three years of study. The teacher exam was on the one hand, "scientific", and on the other hand, "pedagogical". The first kind comprised two parts: a) written (two compositions: „domowe", prepared at home and „klauzulowe" – prepared under surveillance); b) oral, in the subject of one's teacher specialisation and an optional subject. The "pedagogical exam was oral and included Polish and optionally a foreign language if the subject was to be taught in this language; philosophy, pedagogy, and didactics of the major subject. It was also obligatory to conduct a trial lesson, the topic of which was set by the examination board. The pedagogical exam was meant to verify the candidate's qualifications to teach the subject of their choosing, educate secondary school students, and to prove that they knew the didactics of their subject and possessed the theoretical foundations of pedagogy" [3, pp. 204-205][9].

The scope of freedom in terms of subjects the students chose and workload varied across different departments. A student of the Philosophy Department (after 1927 divided into two departments: Mathematics and Natural Science, and Humanities) had in the years 1921–1933 an increase in the number of classes which they had to verify with signatures in their student books: at least 15 hours for the first three years and at least 8 hours in the fourth year, but the free selection of subjects was left to the student. As the post-war university operations were becoming more and more stabilised, the unfavourable consequences of free study for students were becoming even more evident.

Although the MWRiOP stressed the scientific goals of universities, it was primarily interested in training teachers and specialists. It was also evident that the ministry was seeking to extend its control over universities and, consequently, the professorial staff. University students, who were rather impoverished and in most cases poorly prepared for university studies by the post-war secondary schools, entered universities in order to obtain qualifications they needed for professional work, in a relatively short time. Whereas the country had a huge demand of well-educated secondary school teachers, lawyers, doctors, and other specialists, university professors sought to uphold the principle that universities train unselfish learned scholars. The curriculum and mode of learning did not take into account these needs, capacities, as well as ambitions of the studying youth. Scholarly training in the form of free study, which was so much in line with the ambitions of the academic community, was out of touch with the needs of the majority of students.

As the primary goal of universities, the 1920 *Act* mentioned research, rather than the necessity to train professionals, but failed to specify how these two goals ought to

[9] See: *Decree of the Minister of Religions and Public Education* [WRiOP], 1 September 1920, "The Official", Journal of the WRiOP Ministry, 1921, No. 2, [in:] *Studium Historyczne na Uniwersytecie Warszawskim. Poradnik dla studentów pierwszego roku*, Warszawa 1924, p. 63.

be reconciled, as an effective implementation of these two goals required a different organisation of the course of study. As the principle of free study was formally upheld, the university faced a grave problem. The latter was addressed by the Head of State Józef Piłsudski in May 1921 on the occasion of gifts donated by craft guilds to Warsaw University. He spoke openly of the goal to "provide the nation and the state with sufficient numbers of professional", and at the same time seek "to be anti-utilitarian (!), to be the shrine of pure science, strive for the absolute truth, whilst ignoring utilitarian aspects", which is fairly self-contradictory[10].

The Ministry attempted to bring some order into the learning system by means of regulations and examination requirements, but specifying this proceeded very slowly, and was determined on *ad hoc* basis by subsequent ministerial decrees. The government paid immense attention to the training of teachers of comprehensive secondary schools and teacher training colleges. It was the procedures of taking teacher examinations at universities in front of state examination boards that were developed in detail relatively quickly, although they were complemented several times. The UW statutes were passed as late as 1925, and brought into effect with the Minister's approval in the academic year 1925/26. The following year saw the split of the UW Philosophy Department into two separate departments: Mathematical and Natural Sciences; and Humanities. This led to the development by the new department boards of regulations setting out the learning organisation and course of study. In the following year, the Ministry issued new regulations on examinations.

Formally, students could freely plan their course of study: select the subjects, enter them into their student books, and do so for the following years of study. However, rash decisions, often due to the lack of information what to study, when and in what order, made the acquiring of knowledge harder, led to a waste of time, and, because the classes were paid, raised the cost of studying. This was a serious problem also because of the sharp rise in the students' population at UW. In the period between 1920/21 and 1923/24, the number of students rose from 6116 to 9419, and then remained steady at roughly nine thousand, which was 25% of all Polish students and about 21% of students at philosophical departments. The UW Philosophy Department, which until the academic year 1926/27 comprised mathematical and natural science subjects, as well as humanities, was the second most populous department after the Law Department, with some 1/3 of all UW students studying there, 2/3 of whom were in the humanities section (see [3, pp. 129-131]. This should give the picture of some 900 disoriented young people starting their studies every autumn and made their choices of subjects without realising the consequences of their decisions.

At the UW Philosophy Department it was the elder students working in students' scientific research clubs who offered the freshers help and advice. They drew up and published a guide for how to manage one's studies, giving such advice as: how to select the subjects (lectures, classes, seminars), in what order to study them and in which years, how to deepen one's knowledge with independent work and reading, without useless waste of one's energy or

[10] See: T. Manteuffel, *Uniwersytet Warszawski w latach 1915/16–1934/35. Kronika*, Warszawa 1936, p. 40.

time[11]. In comparison to the "guidelines" at schools of Galicia or the rough information in the lists of lectures mentioned above, the publications of Warsaw University Students' Scientific Club (students of humanities, mathematical-physical or natural sciences departments alike) in the first decade of the interwar period were much more extensive and precise. These were little compositions clarifying what free study is, describing its pros and cons, what difficulties there may be, how to avoid them, and lastly, how to hold both: a high scientific level of study and the professional one. The authors understood the difficulties of the young people studying for material reasons, who made up a significant majority at the university, but they evidently cared about the high scientific level of the studies which were to open the way to research work.

In 1925 the Senate passed the *Warsaw University Statutes*[12]. Art. 38 of the *Statutes* stipulates that the Department Board "keeps watch of the development of science and promulgation of knowledge through proper organisation of the teaching process, lectures, public speeches, and publications"; Art. 97 discusses the organisation of the academic year, splitting it into 3 trimesters consisting of 10 weeks each (autumn trimester 1.X–15.XII; winter trimester 8.I–20.III; spring semester 20.IV–30.VI). Art. 99 § 2 included certain limitations on the registration of students and auditors in some classes. By registering in some department, the student could also select lectures and classes in another department. However, in case the student was suspected of attending a lecture that was not related to his or her course of study, the dean might reject the registration. The Statutes came into effect in the academic year 1925/26. The departments, in line with the 1920 *Act on Schools of Higher Learning*, were supposed to prepare their own internal regulations. The division of the Philosophy Department in the following year led to further changes.

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After the split of the UW Philosophy Department, Tadeusz Manteuffel explained in his article *How to Study History* that in most schools of higher learning, even at some university departments, the primary goal of studying was merely practical. They trained professionals who would be able to use their theoretical knowledge in their practical lives; teaching involved passing on to the student the scientific truths that had already been discovered on the one hand, and the encyclopaedic knowledge in a given discipline on the other. Whereas in the case of the humanities and Mathematics and Physics departments, "as a matter of fact,

[11] In 1924, the UW History Students Club, which was supervised by Marceli Handelsman, prepared the 80-page-long *UW History Study. The Manual for First Year Students*. After the Philosophy Department was divided into the Humanities Department and the Mathematics and Natural Science Department, this same club undertook to arrange for a series of lectures to be first delivered and next published, Part 1 in 1927 and Part 2 in 1928, under the common title *How to Study at the Humanities Department*. The authors of the lectures included some of the future luminaries of Polish science: Maria Ossowska, Tadeusz Manteuffel, Jerzy Manteuffel, Zofia Szmydtowa, Czesław Leśniewski, Zofia Podkowińska, and Michał Walicki.

[12] *Warsaw University Statutes*, [in:] *Ustawy i niektóre rozporządzenia dotyczące szkól akademickich*, Warszawa 1925, pp. 265-311.

they do not set themselves any practical goals and deal with unapplied sciences, i.e. with theoretical knowledge, science for science; they seek to train scientific researchers that are supposed to work on, deepen and enlarge a given branch of science". Students were to familiarise themselves with research methods and learn to think in "scientific categories". However, both at the humanities and the mathematical and physics departments the "staggering majority" of students were candidates for teachers with no scientific aspirations at all. With their needs in mind, the University was set to be reorganised: "the free study was bound to be discarded and a system of examinations was to be introduced. This system was eventually introduced last year" (i.e. 1926/27 – K.B.)[13].

In order to help the young people starting their mathematical studies understand the working and organisation of the Department, as well as select the classes and rationally plan their work, the students of the Warsaw University Club of Mathematics and Physics Students prepared in 1926 r. *Studium Matematyczno-Fizyczne na Uniwersytecie Warszawskim. Informator dla nowowstępujacych*[14], guide for 1st year students. They followed the example of the Warsaw University Club of History Students' publication of 1924.

Mathematical-Physical Study Guide of 1926 turned out to be extremely useful. 300 copies of the publication were distributed within two years. Meanwhile, further changes occurred in the structure of UW departments, in that a separate Mathematics and Philosophy department had been created, and in the Ministry's examination regulations. The Publishing Committee UW of the Club of Mathematics and Physics Students decided to publish a new, extended issue of the guide, which would consider not only the changes and new regulations, but embrace the perspective of the entire, 4-year course of mathematics and natural science studies. The 260-page-long publication *Mathematics, Physics and Astronomy Institute of Warsaw University. The Manual for Students* was published in 1930[15].

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[13] T. Manteuffel, *How to study history*, [in:] *Jak studiować na Wydziale Humanistycznym*, Warszawa 1927–1928, Part I, pp. 19-21.

[14] The facsimile of this publication comprises some 80 pages. Editorial Committee: Vice-President of the Warsaw University Club of Mathematics and Physics Students Hilary Kon, Chairman of the Publishing Committee Arkadiusz Piekara, and member of the Science Committee Jan Edward Szpilrajn; partners of the Editorial Committee: Physics Institute Assistant Witold Bernhardt, Vice-President of the Union of the Polish Academic Youth Science Clubs Eugeniusz Geblewicz, Vive-President of the Philosophy of Mathematics Section Adolf Lindenbaum, Chairman of the Warsaw University Club of Mathematics and Physics Students Jan Morgentaler, Astronomy Observatory Assistant Jan Rybka, Physics Institute Assistant Andrzej Sołtan, Head of the Marine Section of the Gdańsk Astronomy Observatory dr Edward Stenż, Physics Institute Assistant dr Szczepan Szczeniowski, Warsaw University of Technology Assistant dr Kazimierz Zarankiewicz, and Warsaw University Assistant Professor dr Antoni Zygmund. The Committee took advantage of the advice provided by Assistant Professor dr Kazimierz Kuratowski, Assistant Professor Bronisław Piekarski, Ksawery Świerkowski, Antoni Rajchman, Assistant Bolesław Iwaszkiewicz. They used the lists of lectures sent in by the Department Offices of other Polish universities.

[15] *Mathematics, Physics and Astronomy Institute of Warsaw University. The Manual for Students.* The 2nd run was altered completely by the Publishing Committee of the UW Club of Mathematics and Physics Students, Warszawa 1930, p. 263, in lithographic print. The names of the co-authors and the people who had contributed to the creation of the manual were thoroughly accompanied

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In the Preface in the *Mathematics and Physics Study* (1926), the author signed as EJS [most likely Edward Jan Szpilrajn] remarks that every year a crowd of 1st year students are looking for guidelines for "what they ought to do with themselves, which lectures to attend, from what and how to study", and advises that the candidates can obtain information if they turn for help to the Union of Clubs of Mathematics and Physics Students, whose Information Office, based in Kraków at 20 Gołębia str., responds to such enquiries by post. And in Warsaw, the information about the studies organisation and system can obtained from the Board of the Warsaw University Club of Mathematics and Physics Students, based at 72 Nowy Świat str. [the Staszic Palace – K.B]. Therefore, the members of Warsaw University Club of Mathematics and Physics Students decided to issue an extensive publication on the organisation of mathematics studies, especially that the *Warsaw University Statutes*, and examination regulations were at last passed.

These publications on mathematical studies (of 1926 and 1930) vary in terms of content and volume but the starting point in both is the distinction between the mathematics as a subject and the university mathematics. One should not take up university studies without a deeper interest in it or the necessary skills, as even As and Bs at the high school final exams were no sufficient proof of such skills. It is not a good reason to enrol in these studies because it is easy to get there or because one hopes to get a job easily after graduating. There is no use hoping, either, in the event of failing to get into a polytechnic, medicine or a natural science department, that after one year of studies at the Mathematics Department the candidate can better prepare him- or herself for the entrance exams there because studying at this department does not deal with high school subjects[16].

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by notices about their scientific degrees and functions. Two new people joined the co-authors of the 1926 publication.

The Editorial Board: Vice-Presidents and activists of the Mathematics and Physics Club: K. Billich and M. Jakimowiczówna, as well as J.A. Szpilrajn, at the time the Chairman of the Union of the Polish AcademicYouth's Mathematics, Physics and Astronomy Clubs. The publication used the texts of A. Zygmund and K. Zarankiewicz, the co-authors of the first publication of 1926, and the Collection of Regulations on University Studies (*Zbiór ustaw i rozporządzeń o studiach uniwersyteckich*), edited by T. Czeżowski (Wilno 1926). The other contributors to the Manual included S. Fogelson. MA, senior assistant of the Mathematics Seminar B. Iwaszkiewicz, dr M. Kerner, dr S. Lubelski, senior assistant of the Experimental Physics Institute dr S. Szczeniowski, Assistant of the Theoretical Mechanics Institute A. Wundheiler MA, Z. Marynowski, and J. Wasiutyński. The following professors and assistant professors endorsed the publication: S. Dickstein, J. Łukasiewicz, M. Kamieński, O. Nikodym, and A. Tarski; doctors: I. Bobrówna, W. Kapuściński, E. Rybka, A. Lindenbaum, S. Nikodymowa, S. Szczeniowski, M. Żebrowska; Masters of Science: B. Iwaszkiewicz, W. Ścisłowski, A. Wundheiler; "fellows": I. Kępińska, B. Piekarski, and A. Trojecka.

[16] S. Zaremba discussed this problem in response to a questionnaire sent by the Mianowski Fund in 1917 on the most urgent needs of the Polish learning system. "The significance of mathematics among other subjects of the Polish learning system (…) is all too often underestimated..." – he wrote. "It is very common to identify one's knowledge of mathematics with the proficiency in figures or graphic structures". However, "a deeper understanding is out of the question without the proper study of mathematics (…) The ability to properly understand mathematics (…) belongs to the basic features

Between studying at a secondary school and university there is also a huge leap in terms of exploring and understanding of such concepts as "section ('sekcja'), limit, convergence, continuity, and uniform convergence" at the lecture on the "Introduction to analysis" – this must not be ignored but one cannot be put off by first obstacles. Both publications recommend that beginners study *The Manual for Self-Learners* as an indispensible complementation of the tips and guidelines they provide, as it will help them learn the skill to study things. Both dedicated a lot of space to explaining to the first year students entering the university what university is and what is the subject they chose to study, mathematics.

University was not an institution where they taught you something, but an establishment where you could learn many things. Aside from a certain set facts, the student is provided with something far more precious, "ways of understanding and exploring, and later methods of scientific research". By learning them, the student will comprehend the goal of research, "which does not so much lie with seeking the truth, as with seeking the beauty", and the latter may induce one to work creatively. The student will face both research obstacles and ways leading to discovering new truths. Therefore, it is not the lectures, but classes and seminars, as well as work in research clubs, that are the most crucial during university studies. A seminar is a forge of knowledge, a place where the student makes personal contact with the professor and discusses scientific problems. Working in research clubs is slightly less formal; it is easier to make contacts and acquaintances with older colleagues and feel the research atmosphere[17].

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The *Mathematics and Physics Study* of 1926 contains tips regarding the intellectual work. It advises taking notes during lectures but says students should use them and learn from them carefully as one can make mistakes while note-taking. It is important to read coursebooks, but not too many at the same time. It is sensible to start with one book, which is neither too extensive nor too difficult, study it carefully, even twice, and only skim other books. It is imperative that students take on an active attitude: work through sets of exercises and attempt to prove the theorems. In case of problems with understanding something, it is useful to ask someone more competent. It is wrong, however, to read more than one can take in, and in case of fatigue, it is good to take a rest. "It is wrong to force oneself to read or research as it is ineffective". It is imperative that students study foreign languages. They should start with German, for the time being read using a dictionary, and after 2–3 months they will need no dictionary at all[18].

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of a mind that is truly educated (…) It is one of those features which are in one's living practice the most useful (…) in any profession". Therefore, the teaching of mathematics must not be conducted in a merely utilitarian way, but rather in the specifically scientific way". He added, "universities (…) can only then properly educate professors of mathematics of secondary schools and seminaries when they are equipped with the right number of professional teachers themselves" (S. Zaremba, *O najpilniejszych potrzebach nauki w Polsce ze szczególnym uwzględnieniem matematyki*, „Nauka polska. Jej potrzeby, organizacja i rozwój", Vol. I, Warszawa 1918, pp. 4-7).

[17] *Studium Matematyczno-Fizyczne*, 1926, pp. 8-9.

[18] *Studium*…, op. cit., pp. 10-11.

The publication contains a four-year program of mathematical study, outlined by, as it may be guessed by looking at the initials K.Z., Kazimierz Zarankiewicz. The program divides the disciplines studied in the 1st and 2nd years into two groups: group A contains the more important subjects; group B contains the subjects that may be moved on to other years. It was also recommended that students should compare the program they were setting out on their own with the suggestions of the *Manual for Self-Learners*[19]. K.Z. recommended choosing:

In year 1: A) Analysis I (Infinitesimal calculus); Analytic geometry; Set theory. B) Abstract algebra with group theory; Number theory.

In year 2: A) Theory of functions of a real variable; Theory of analytic functions; Ordinary differential equations. B) Synthetic geometry.

In year 3: A) Partial differential equations; Differential geometry; Infinite sequences and series; Calculus of variations; Groups. B) Not specified.

In year 4: the studies were supposed to involve only lectures and work in the selected specialisation[20].

What is characteristic are the following comments made by the program's author: The proposed plan and sequence of studies may be set out differently "as far as studying the specific science does not require any knowledge of another [science]".

1) The Year 1 subjects should be studied together, by reading one coursebook from each section;
2) The program mentions sections that contain knowledge every mathematician must possess;
3) Every student with scientific ambitions should explore in detail and in depth the section he or she selected to study, and which will later be the field of his or her own creative work;
4) The choice of specialisation is made according to one's liking;
5) The topics of lectures and seminars at every university are dependent on the individuality of the professors working creatively there.

* * *

A separate part of the manual of 1926 deals with the sequence in which students should study the particular sections. The author signed as Dr A. Z., i.e. Antoni Zygmund, answers three questions: What to study? How to study? Which coursebooks to use? The formal assessment of this text including the coursebooks it recommends and their assessment can be judged by someone specialising in the history of mathematics. But what is important for the historian of education and higher learning are the more general questions, such as students' workload.

Dr A. Zygmund argues that studying mathematics is hard and involves hard work. Analysis I and Analytic geometry, lectures and classes take a Year 1 student 11 hours a week.

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[19] See: Z. Janiszewski, *Wstęp do Stopnia III, Poradnik*, op. cit., Vol. I, pp. 122-123.

[20] The Editorial Committee added a disclosure that the proposed study curriculum is theoretically justified but not very practical under the current regulations (probably due to the order of taking teacher examinations); See *Studium*…, op. cit., p. 12.

They cannot be delayed because without embracing these sections it is impossible to study the Year 2 subjects. One should add to this 5 hours of the lecture in practical physics and, optionally, the completion of Practical Lab I in the spring semester. In total, it is 16 hours a week. It is the maximum of what can be done effectively but even this leads to overwork, especially when students also need to earn their living. Aside from this, there is individual work: doing the exercises assigned in classes and others. This is necessary for embracing and memorising the material. Attending lectures alone is not enough; their contents need to be worked on at home, too. Students must therefore also read. The author then reviews and evaluates the coursebooks for each subject[21].

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Szczepan Szczeniowski presented problems connected with studying physics along with recommendations for an arrangement of subjects and reviews of coursebooks. In year 1, students need to complete the mathematical subjects they will need in studying physics: Abstract algebra and the Determinant theory; Analytic geometry; Analysis. At the same time, as their major subjects they must study Experimental physics, complete classes in Lab I, and in the chemical lab along with lectures. In year 2, their major subjects should be Theoretical physics and Lab II exercises (attending Lab II is conditional on attending Lab I for one year and completing these classes in year 1). This arrangement of subjects cannot be altered or moved to a later period.

The author argues that as few as 10% of students take notes at lectures, whereas physics is pure science and employs the mathematical apparatus. It involves precise note taking, particularly because there are no instructors' notes published in Polish or good coursebooks. The best way is to analyse the notes using a coursebook immediately after the lecture; any unclear problems need to be consulted with coursebooks. It is, however, arduous; it is necessary to attend seminars, and, from Year 2 analyse and present the assigned topics, not using coursebooks but by working on one's own. It is possible because the topics of the subjects are specified earlier on. The topics of classes in Lab II are also specified well in advance; they take three hours, and preparing them involves the assistants' help. In the subsequent years of study, the students know enough about arranging their workload to do this by themselves. Bearing in mind that the sciences are mutually connected and dependent, no delays are allowed in studying any of the subjects[22].

Edward Stenż wrote two short texts on studying and coursebooks used in meteorology and geophysics; Jan Morgentaler wrote on astronomy. They were quite superficial, probably because they required some foundations of mathematics and physics studied with all the Mathematics students during their first year in the university. However, a much more extensive part of the manual discussed issues of more general nature regarding scientific degrees (Master and Doctor) and the conditions of receiving qualifications to teach at secondary schools and teacher training colleges. It provided information on the ongoing

[21] *Ibidem*, pp. 15-21.
[22] *Ibidem*, pp. 22-32.

work on Master studies in Astronomy and on Pedagogy studies. As a matter of fact, regulations were being continually amended[23].

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The Decree by the Minister for Religious Danominations and Public Education of 26 November 1925 on Master's degree examinations at the universities' philosophical departments, that is humanities and mathematical and physical, were analysed very thoroughly. Obtaining the lower scientific degree, that is Master's degree, was defined as a proof of completing higher studies and became the indispensable condition of obtaining a doctoral degree (Act 1 of the Decree). No doubt, this raised the value of the Master's degree and opened up to its holders two ways of using it: either seeking to obtain the desired teacher's certificate, or treating is as a threshold to the potential scientific career. Irrespective of how one looks at it, it was clearly an attempt to reconcile university's scientific goals with those involving training professionals. It also enabled universities to include modules in the curricula which aimed to train researchers, in a way pushing them into the system of teacher training. The candidate could obtain a Master's degree in a specific field within a philosophy department's learning framework. This field also designated a prospective teacher's major subject. However, by the time a candidate received his or her teacher certificate, they had to prove their methodological qualifications in theory and practice by taking the teacher examination before a separate Examination Board. The examination procedure was complex and comprised many stages.

In order to be eligible for the final phase of the Master's qualification process, the candidate had to prove passing all the subjects that the Ministry deemed relevant for Master's competency within the specific specialisation (e.g. in physics, mathematics, history, etc.) There were 8 or 9 examinations, and the regulations specified the subjects and sequence of completing them quite strictly. There was little choice left to the student. The examination-bound subjects were divided into three groups of subjects and sciences that complemented one another. The sequence of taking the exams was to a large extent dictated by the sequence of studying them.

Group A comprised six basic subjects (differential and integral calculus, and the introduction to analysis; analytical geometry; higher algebra with elements of number theory; theoretical mechanics; experimental physics; main principles of philosophy with special focus on logic. Group B comprised two exams on "separate" (oderwanej) or "applied" mathematics, and several sets of subjects recommended by the Departmental Council. Group C comprised complimentary subjects: the student had a choice of some sections of theoretical physics, astronomy, crystallography, logic or graphic methods and numerical calculation.

Formally, the candidate had some freedom in terms of the dates and sequence of taking the exams, but in fact the regulations aimed to force the student to work systematically and to gain control over the stages of his or her learning process. This was a serious, even decisive,

[23] *Ibidem*, pp. 32-38.

step towards eradicating the free study[24]. If a candidate's Master's thesis was considered sufficiently good, the examination board designated the date to discuss this thesis. It could be conducted along with the last exam for the Master's degree. During the discussion the student was supposed "to demonstrate his or her general knowledge in a given field of his or her specialisation".

The regulations regarding re-taking the exam or re-writing the thesis in case of failing to pass the exam are quite puzzling. The candidate could re-take the exam no earlier than in the following examination session. One was allowed to re-take the exam three times, and the fourth attempt had to be approved by a special decision of the department's council. These regulations were to be binding from the academic year 1926/27. However, earlier, in March 1926, the Ministry's decree came into effect regulating the curriculum and examinations in the field of mathematics for the degree of Master of Philosophy.

The total number of lectures and classes of Group A subjects, in which the student declared his or her attendance, could not be lower than 10 hours a week so that the trimester could be approved as completed for the student to be eligible for the Master's exam. The theme of the Master's thesis could be obtained after the student passed all Group A exams. The discussion was also supposed to involve testing the level of the candidate's mathematical knowledge and could be combined with the exam that finalised the Master completion course, i.e. Exam 8 from Group B.

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The *Mathematics and Physics Study* publication of 1926 contained information about lectures on mathematics, physics, and astronomy at the Polish universities for the academic year 1926/27, with most detailed information on Warsaw University. It contained even a tip where to look for the bulletin board informing Warsaw University students of the time of a lecture, its place, and the number of hours it took every week. It clarified who and when (that is, in what order), could/should listen to specific lectures. There was no information about the seminars because these were intended in principle for 3rd or 4th year students. The proposed plan and distribution of hours was agreed as a result of the negotiations between Jerzy Kazimierz Bilich, representing the Maths-Physics Club, and the rector and professors. Although it "did not contain major collisions", some inconveniences could not be avoided due to the shortage of classrooms and lack of space in them faced by the growing numbers of lecturers and students.

The *Study* presented in quite great detail the institutes of mathematics, physics, and astronomy at Warsaw University: it gave their addresses, informed about how long they existed, whether they possessed libraries or other collections, who was the head of the institute, the names of professors on duty hours, what classes were held there. It provided

[24] According to *Act 5* of the Minister for Religious Denominations and Public Education's *decree of 26 November 1925*, the student was obliged to complete each subject that was part of the given Master's program, in the appropriate sequence. The subject of the Master's thesis was to be explored in the course of two trimesters.

the addresses of the major libraries and listed the key scientific associations in Warsaw and all of Poland.

Lastly, the *Study* presented the information on the students scientific Club working at the Philosophy Department, the Warsaw University Mathematics and Physics Club, who initiated the *Mathematics and Physics Study* publication. The Club was housed in the Staszic Palace in Warsaw. In 1926, the Club celebrated its 10th anniversary, which was a good occasion to recapitulate its activities and demonstrate its successes. The University Rector, the Philosophy Department's Dean, as well as professors attended the celebrations. It was usually the senior years students, graduates, and candidates seeking to obtain scientific degrees, and even junior scholars that were active participants in the Club. Prof. S. Dickstein exercised the academic care over the club, and its first president was Kazimierz Kuratowski. The Club' patrons and associates oftentimes included distinguished professors. It was a member of the Union of Mathematical, Physical and Astronomers' Clubs of the Polish Academic Youth. The Club operated in many fields, such as research, publishing, and students' mutual help; it cooperated with other scientific associations and students' research caucuses all over Poland; its library contained more than 2000 books including expensive and rare coursebooks; it published its own coursebooks, and it sold coursebooks. The club undertook to awaken, support, and develop students' scientific interests; held regular scientific meetings, where papers were presented and debated.

Any student could join the Mathematics and Physics Club by paying 1 złoty of entrance fee and a monthly fee of 30 groszys. In 1926, the Club had 325 members and 10 senior members. The *Study's* authors recommended joining and working for the Club stressing that it was an important element in a students scientific development; it allowed making new contacts, dealing with older and more experienced mathematicians, participating in less formal discussions than those in class or at seminars. This helped create a truly scientific atmosphere, which is extremely important for the development of both students and researchers, for the former it was even more important "than lectures, a book, or seminars".

The formal problems related to the discipline, curricula, presentation of the subjects, coursebooks and other publications recommended for further reading, the reputation of the professors and other academic staff, as well as other people that had contributed to the publication of the guidances of 1926 and 1930, can all be analysed and evaluated by experts, historians of mathematics. However, it is worth noting that the free study as a principle in university study organisation was clearly decreasing in importance, and this process was reflected in the content of guidances for Philosophy Department students, both in mathematics and natural science, and in humanities. The publishers and authors of both the *Mathematics and Physics Study* of 1926 and the *Mathematics, Physics and Astronomy Institute* of 1930 decided to deal with the tips and guidelines regarding mathematical studies in a way more broad than just include lists of lectures. Both these publications contained a lot of information about university studies in general, about mistakes, problems and threats caused by wrong planning and selection of subjects, about Master's, Doctor's and teacher examinations. These explanations are interesting for a researcher of today as they cast light on the changes that were underway.

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