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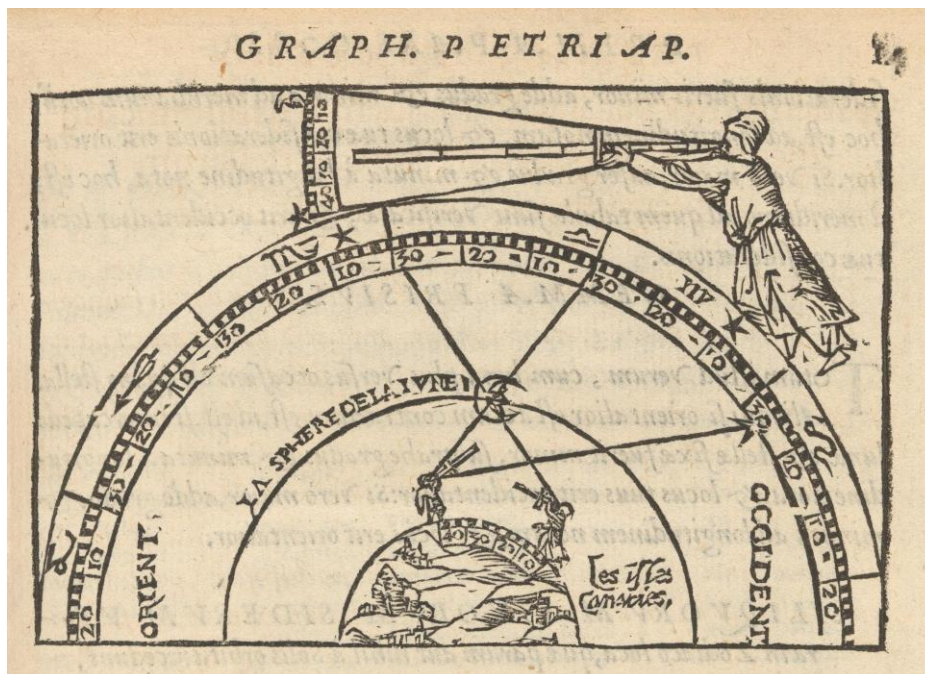
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A LONGITUDINAL STUDY OF GENERAL EDUCATION LEARNING ACHIEVEMENTS AND THEIR RELATIONSHIP TO THE CHOICE OF FURTHER EDUCATIONAL PATHWAYS



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SUMMARY

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The aims of the study: to determine the main regularities that are characteristic to the early stage of professional career formation, comprising the studying in a general education school and its completion; to analyze the paths by which students come to different vocational or higher education schools and different learning directions; to determine what indications have enabled to predict the educational trajectory of a general education student.

Objectives of the study

1. After performing the analysis of the 'educational trajectory' concept relying on the research results and the scientific literature sources dealing with the possible factors of the formation of the educational trajectories, to prepare the research methodology, which must reason the concept of the educational trajectory used in this research.
2. To analyze the diversity of educational trajectories of at least two cohorts of students, identifying the factors that determine their formation, determining the main types of educational trajectories and their percentage distribution in the population.
3. To assess the acceptability of types of educational trajectories, ensuring equal opportunities, educational effectiveness and productivity, overcoming educational (achievement, opportunity) gaps; distinguish groups of educational trajectories that are more or less consistent with the principle of equal opportunities, groups representing greater or lesser effectiveness or productivity; identify the structural, educational content, educational organization, social and economic disturbances of the education system, that influence the choice of an acceptable educational trajectory.
4. To investigate what symptoms help to predict a student's educational trajectory, what factors increase the risk of an unacceptable educational trajectory of a student (i.e. a trajectory that limits the student's ability to realize his/her personal potential), and to create indicators for educational monitoring that would allow early warning of the formation of unacceptable educational trajectories.
5. Based on the results of the study, develop recommendations for structural reforms of the country's education system, the renewal of educational organization, educational institutions at the national level, school founders and schools to ensure that all students have equal opportunities to develop their personal potential and choose a career direction based on it.

Theoretical background. A comprehensive definition of the term 'educational trajectory' is presented, and the heuristic potential of this concept is revealed. 'Educational trajectories' refer to the continuous process in which minors and adolescents move through the educational system from one school class/institution to another, from one educational level to another, including the transition to the vocational training and higher education sector, and finally to the first job in the profession. There are socio-educationally "very favorable", "very unfavorable, critical" and "medium, indifferent" educational trajectories. The relative prevalence (%) of one or another statistical trajectory type in the student population can be considered as an indicator of the quality of education and the "added value of the school".

The main empirical indicator of educational trajectories is the level of learning achievement and its stability. More generally, educational trajectories can and should also be associated with non-cognitive personality characteristics such as values, motivation, willpower, health, etc. Modeling of educational trajectories should also include non-formal education, its potential for the student's personality and future social adaptation and career trajectory. The concept of 'educational trajectories' is closely related to the theory of cultural

capital and class reproduction of society through the educational system by the sociological classicist P. Bourdieu.

Empirical basis, methodology and logical consistency of the research.

Data from 2015-2021 were used to identify the "Educational Trajectories". The data provided by the NEC/NŠA reflect the educational performance of grades 4 to 12. These are the data from the centrally administered standardized tests of NMPP, PUPP, VBE, and MĮ-school grade point averages. It can be said that global data (Total Census) were used. About 15,000 to 25,000 students were studied in the same age cohort. Subjects, sample size of the combined study is about $N \approx 200,000$. According to its genre, the study corresponds to the terms Large scale study and Big Data study.

Research stages and methods:

1. Transformation of primary data into unified, one-dimensional and statistically normalized scales. Here are - the scale of percentiles and the z-scale of the standard normal distribution. Then the compilation of additive indices of the primary and higher level takes place. Classical psychometric statistic and factorial validation is used.
2. Identification of educational trajectories and their percentage distribution in the student population. Here the method of K-Means cluster analysis is very suitable. The method of Q-intersection and further joining of individual intersections into a continuous trend was used. The panel design was also used. Two- to three-year panels of school performance data from 4th to 12th grades were combined. The discovered "Educational Trajectories" were interpreted and named.
3. Study of the statistical relations between "Educational Trajectories" and the social environment variables.
4. Summary of the research results, formulation of conclusions and recommendations.

The main conclusions

1. **On the reliability of intercepted secondary data.** Before starting the analysis of secondary data from NEC/NŠA, the researchers had to check their metrological quality. It turned out that the pedagogical diagnostic system applied in Lithuania as a whole has a high methodological quality. This is also true for all standardized tests - NMPP, PUPP, VBE and even school grades. Various public insinuations in the society about poor results of the VBA grades should actually not be associated with allegedly inferior tests, allegedly inadequate examination tasks, but with the objective trend of deterioration of educational performance (especially mathematics) in the country. The unexpectedly high diagnostic quality of common school grades is related to the fact that there is a centralized, regular review of educational achievement based on nationwide standardized tests. This fact significantly reduces opportunities and motivation for manipulation of school grades by teachers and school administrators. It is possible to conclude that a reliable system of achievement evaluation grades is being formed in the country. If the centralised policy of monitoring learning achievements is reduced, it will likely result in a system of school grades that eventually will lose its orientations and unravel.
2. **Regarding the possibility of creating valid and reliable aggregated indices for measuring school performance.**

The high metrological quality of the data, which the researchers adopted from the NEC/NŠA, opened important methodological possibilities for the study. Using classical psychometric analysis and factorial validation, aggregated first- and second-order indices of educational achievement were created. Indices/scales were developed for separate educational subjects as

well as indices for all educational subjects at a given educational level. The possibility of identifying educational trajectories on the basis of statistically deeply aggregated data of metrological quality has emerged.

3. About the identified "Educational Trajectories". About the high diversity of "Educational Trajectories" of Lithuanian students.

3.1 Cluster analysis was used to discover the pattern of 6 educational trajectories and the prevalence (%) of each trajectory in the student population. The classification/typologisation of the trajectories was carried out according to: 1) levels of educational achievement and 2) the subject profile of achievement - "mathematics-science" and "humanities". The model reveals very distinctive and peculiar trajectories. The model of six trajectories is characterised by their universality and relative stability - they tend to be replicated in all grades and levels of education without major reformulations. The several cross-sections for the diagnosis of "Educational Trajectories" were combined into a longer trend covering 4th through 12th grades. It turns out that identifying trajectories is quite important for curriculum developers and educators. It provides a "key" to developing a more diverse, differentiated curriculum and designing more effective instruction.

3.2. Further, based on the K-mean cluster analysis, a next model of "Educational Trajectories" was developed, which consists of 9 components (trajectories). The distribution (%) of all 9 trajectories in the student population was determined. The model is based on data from linked measurements (panel design). The trajectories were classified/typed by: 1) level of educational achievement and 2) student "ability" to "improve," maintain the same level of achievement, or significantly deteriorate over 2-3 years. The nine trajectories model is also characterized by universality and relative stability - it has a tendency to repeat itself without major changes in all grades and educational levels. The panels of "Educational Trajectories" linked from 2-3 years were also combined to form a longer trend covering 4th through 12th classes. It is presented that the relative sizes and the graphical-statistical configuration of the captured trajectories can be used as a tool to measure the "added value of schooling".

4. Regarding the strong social bending of "Educational Trajectories" .

It turned out that different variables of the social context strongly and systematically influence the educational performance of Lithuanian students. This effect, its magnitude is often so great that it can be said to be partially dissonant with the values of equal opportunity and social justice in education in the modern welfare state. In particular, the following highly reliable statistical regularities were discovered.

4.1 Female students in Lithuania generally follow more favorable "Educational Trajectories" than boys. The general education system is generally more favorable and friendly to girls than to boys. Some gender effects of subject profiling of educational achievement are quite evident. In the statistical groups of middle achievements (and moderately favorable "Educational Trajectories") there is a strong and very reliable statistical regularity: boys show relatively better achievements in the mathematical-scientific profile, girls – better achievements in the humanitarian profile.

4.2 There are strong urban-rural differences. The type of commune and place of residence also play a major role. Rural students follow much less favorable "Educational Trajectories" than urban students. Students in metropolitan communities follow much more favorable "Educational Trajectories" than students in regional communities. Municipalities that had the status of a county center, as well as ring and recreational municipalities, occupy an intermediate position with respect to the indicator under study.

4.3 There are unjustly large contrasts between non-state (one could say private) schools and schools founded by the municipality. The latter schools have disproportionately less favorable educational trajectories. Favorable "Educational Trajectories" exhibit a disproportionately greater tendency to concentrate in private schools. It makes sense to speak of parallel systems of schooling, of contrasting educational realities and worlds.

4.4 Students who are transported to school by private family transportation (and such a possibility or its deficit is conditioned by the socioeconomic status of the family) go through much more favorable Educational Trajectories than students who get to school by other means of transportation. Students who use yellow and/or school buses to reach school are disproportionately characterized by unfavorable Educational Trajectories.

4.5 Students receiving social support, free meals, educational assistance are disproportionately more likely to have the least favorable Educational Trajectories. This shows the pronounced social conditionality of Educational Trajectories, but at the same time the efforts of the state and its rather targeted social and educational support policies.

4.6 In terms of language of learning, the school status of ethnic minorities generally has no significant impact on educational trajectories. A conditional exception is schools with the Polish language of instruction where at least up to the 10th grade, inclusive, slightly less favorable Educational Trajectories occur. The regularity is not strong, and the corresponding tendency no longer occurs in 11th-12th grade.

4.7 Different types of orphan status are associated with disproportionately less favorable Educational Trajectories.

4.8 Mean learning achievement depends on the size of the school. Schools with more teachers and students of optimal size can guarantee relatively higher educational achievement than small, vanishing schools.

4.9 The level of learning achievement depends on the personal-professional profile of the school principal. Average learning achievement in the school is relatively higher if:

- The principal is older/at early retirement age.
- The principal had a higher leadership category (prior to elimination),
- The principal came to his position from a higher teacher qualification category (teaching expert, teacher methodologist).

4.10. Educational Trajectories refer to the transition from general education to vocational training and higher education and the labor market. Those on very favorable educational trajectories regularly transfer to universities; those on relatively favorable educational trajectories attend colleges. The vocational education sector as a whole becomes a "collector" of unfavorable educational trajectories. On the one hand, this is logical; on the other, it contradicts Lithuania's vision of the future as a high value-added economy and knowledge society. The vocational education sector is relatively underutilized after both 10th and 12th grade. Despite investments and modernization, vocational education still seems to be perceived as a marginal, stigmatized sector in the mass consciousness. The irrational fetishism of higher education and the undeserved underestimation of vocational education institutions and their possibilities manifest themselves in society. Even elite universities like Vilnius University somehow get the representatives of the most unfavorable, profoundly crisis Educational Trajectories, and this is a complete anomaly because these young people are not ready for higher education without prolonged resocialization and retraining.

Concrete recommendations were formulated in the final report

1. Improving the procedures for collecting and archiving the data needed to develop and analyse educational trajectories.

Examples are used to show how to improve the organisation and archiving of statistical matrices reflecting global data on learning achievement. The main recommendation relates to the design of statistical matrices based on linked samples. It is desirable to have a long, extended "panel" of time-linked measurements on the same pupils.

2. On a methodological algorithm for calculating/identifying educational trajectories.
3. On the dependence of didactic testing results and educational trajectories on the difficulty of the tasks and on the contingent of pupils.
4. The need to carry out curriculum content monitoring studies and to collect a bank of test items.
5. The interpretation of educational trajectories. Indicators for the early identification and prevention of the emergence of socio-pedagogically unfavourable 'crisis' educational trajectories
6. Indicators that allow to grasp the real "added value" of the education system and the school.
7. Reducing and coping the contrasts in learning achievements that are socially determined.

The research report covers 195 pages, and the results are presented in 34 tables and 89 figures.

Abbreviations used in the summary

NŠA-National Agency for Education

NEC - National Examination Center

NMPP - National examination of students' achievements

PUPP - Evaluation of the Achievements of Lower Secondary Education

VBE - State maturity examinations

MĪ – Year-end grades