COMPARATIVE HYGIENIC CHARACTERISTICS OF EDUCATIONAL WORKLOAD STRUCTURE AND DAILY MENTAL PERFORMANCE IN STUDENTS OF DIFFERENT-PROFILE TECHNICUMS

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ABSTRACT

The educational burden of students is determined not only by the total duration of study but also by the structure of daily activities and the proportion of theoretical, practical, independent, and extracurricular work. The present study provides a comparative analysis of these characteristics among students of technical, medical, and pedagogical technicums. The analysis was based on data from 240 first- and second-year students aged 16–18 years, with 80 students in each professional profile. Timing observations were used to characterize the daily educational regimen, while the Kraepelin arithmetic test and Anfimov proof-reading test were used to assess changes in mental performance during the academic day. The technical profile was characterized by the greatest total daily educational burden and the largest reduction in mental performance by the end of the day. Medical-profile students occupied an intermediate position, whereas pedagogical-profile students demonstrated the smallest reduction in performance. The findings indicate that assessment of educational workload should include both quantitative duration and functional consequences, and that the organization of educational activities should take into account the specific characteristics of each professional profile.

Keywords: educational workload; mental performance; technicum students; daily regimen; fatigue; professional profile; comparative assessment.

INTRODUCTION

The transition from general education to professional training changes the daily structure of adolescent students. In technicums, classroom instruction is supplemented by practical training, independent preparation, laboratory activities, and profile-specific assignments. Therefore, the same nominal number of lessons may be accompanied by different total educational burdens.

Assessment of student workload based solely on classroom duration may underestimate the actual time devoted to educational activity. Independent preparation and practical work may substantially extend the period during which students remain cognitively engaged. For this reason, a functional assessment of mental performance provides an additional dimension for evaluating the adequacy of an educational regimen.

Mental performance is a dynamic characteristic. During a school day, prolonged cognitive activity may be accompanied by changes in the speed and accuracy of operations. Comparing performance before and after classes makes it possible to characterize the direction and magnitude of these changes rather than relying only on subjective descriptions of fatigue.

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The purpose of this study was to compare the structure and duration of educational workload and the within-day dynamics of mental performance among students of technical, medical, and pedagogical technicums.

MATERIALS AND METHODS

The analysis included 240 first- and second-year students aged 16–18 years from three professional profiles: technical, medical, and pedagogical. Each profile was represented by 80 students. The source study described the groups as practically healthy and comparable in age and sex distribution.

The educational regimen was evaluated by timing observations. The observation framework included classroom lessons, independent homework preparation, extracurricular and practical activities, and rest periods. The resulting duration indicators were compared with the regulatory level cited in the source study.

Functional performance was evaluated at two points of the academic day. The Kraepelin arithmetic counting test was used to assess the speed and accuracy of mental operations. The Anfimov proof-reading test was used to assess attention and accuracy by recording errors in the viewed material. The coefficient of mental productivity was also considered as an integrated indicator of speed and accuracy.

The principal analytical approach was comparative. Differences between professional profiles were described using the reported workload values and changes in test performance. The source study considered differences statistically significant at $p<0.05$. No additional participants or measurements were introduced in the present article.

RESULTS

Table 1. Comparative profile of educational workload

Profile	n	Daily educational workload	Relative position
Technical	80	9.8 h/day	Highest
Medical	80	9.1 h/day	Intermediate
Pedagogical	80	8.3 h/day	Lowest

The duration of total daily educational activity differed between the professional profiles. The technical group had the highest reported value, 9.8 hours per day. This was approximately 18–20% above the regulatory level cited in the source study. The medical group averaged 9.1 hours per day, while the pedagogical group had the lowest value, 8.3 hours per day.

The difference between profiles is important from a functional perspective because workload duration represents the cumulative period during which students are exposed to educational demands. The observed gradient was consistent with the subsequent differences in mental performance.

Table 2. Within-day change in mental performance according to the Kraepelin test

Profile	Reduction by end of day	Interpretation
Technical	23–26%	Largest decline
Medical	17–19%	Intermediate decline
Pedagogical	11–13%	Smallest decline

Mental performance decreased in all three groups by the end of the academic day. The reduction was most pronounced among technical-profile students, reaching 23–26%. Medical-profile students demonstrated a 17–19% reduction, whereas the corresponding change among pedagogical-profile students was 11–13%.

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Thus, the ranking of profiles according to workload duration corresponded to the ranking according to the magnitude of the reported reduction in mental performance. This pattern does not by itself establish causality, but it demonstrates a consistent relationship within the source data.

Table 3. Functional changes identified by the proof-reading assessment

Indicator	Technical	Medical	Pedagogical
Errors by end of day	Greatest increase	Increase	Smallest increase
Mental productivity	Marked reduction	Moderate reduction	Comparatively stable
Overall fatigue pattern	Most pronounced	Intermediate	Least pronounced

The proof-reading assessment showed an increase in errors by the end of the academic day in all groups. The greatest increase occurred among technical-profile students. The coefficient of mental productivity was also lower at the end of the day, with the most marked reduction reported for the technical profile.

A moderate inverse correlation between total daily educational workload and the end-of-day coefficient of mental productivity was reported in the source study. In practical terms, students with greater cumulative educational load tended to demonstrate lower mental productivity at the end of the day.

DISCUSSION

The main feature of the present analysis is the distinction between the amount of educational activity and its functional outcome. A daily schedule may appear acceptable when only classroom hours are considered, while independent preparation and practical work increase the actual educational burden. The results suggest that this distinction is particularly relevant for technical-profile students.

The technical group combined the highest total daily workload with the largest decline in mental performance. The source study associates this profile with a greater proportion of practical and laboratory activities and a larger volume of independent work connected with technical disciplines. This interpretation is consistent with the observed workload pattern, although the study design does not allow the contribution of each individual component to be quantified separately.

Medical-profile students showed intermediate values for both workload and functional decline. Their position between the technical and pedagogical groups suggests that the composition and total duration of educational activities may contribute to different levels of end-of-day fatigue.

The pedagogical group had the lowest total workload and the smallest reported reduction in mental performance. The source study relates this comparatively stable pattern to a more balanced distribution of theoretical and practical components. Again, this should be considered an interpretation of the observed group differences rather than proof of a single causal mechanism.

From an educational-planning perspective, the findings support the use of functional indicators together with time-based assessment. A schedule should therefore be evaluated not only by the number of hours allocated to instruction but also by the distribution of demanding activities, opportunities for recovery, and the resulting changes in students' performance.

CONCLUSION

The comparative analysis demonstrated a clear difference in the educational burden experienced by students of different technicum profiles. Technical-profile students had the longest reported daily

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educational workload and the greatest decline in mental performance during the academic day. Medical-profile students demonstrated intermediate characteristics, while pedagogical-profile students showed the lowest workload and comparatively greater stability of mental performance.

The findings indicate that hygienic assessment of educational workload should combine quantitative timing observations with functional assessment of mental performance. Profile-specific scheduling, rational alternation of demanding activities, adequate recovery periods, and appropriate control of independent work may help reduce excessive cumulative educational strain.

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