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## STAGES OF THE FORMATION OF EDUCATIONAL EMPLOYMENT SCHEDULE AND TEACHING STAFF LOAD DISTRIBUTION

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*The system of drawing up an academic schedule does not seem to be a single solution, but a set of individual decisions. These solutions can be based on separate software products, interacting with each other through the sharing of databases. Each individual decision is the implementation of a single step or a separate operation in the process of scheduling.*

Successful organization of the learning process of any educational institution is based on a competently created schedule of educational employment, as well as on the effective teaching staff load distribution.

Despite all the advances in information technology, for many applications, including a scheduling problem, precise algorithms to obtain an optimal solution have not been developed yet so far [1]. In this regard, the formation of schedules in many universities, including Polotsk State University, is still largely carried out manually. This is laborious and consistent work of qualified staff which requires many man-hours for completion. The human factor in solving such elaborate problems will inevitably affect the increase in the probability of errors, besides, manual labor makes it difficult to make operational alterations in the already formed decision. And without the use of algorithms and methods applied in solving optimization problems in scheduling theory, one of the sections of discrete mathematics, such a solution cannot be not optimal [1].

Scheduling theory is a section of operation research, where mathematical models of scheduling (i.e. ordered in time) of various purposeful actions, are constructed and analyzed taking into account the objective function and various restrictions. The aim of solving such problems is the formation of satisfactory schedules in which all restrictions are met, or, what is more difficult, to find the optimal admissible schedule for a particular optimality criterion. "Optimality" usually means a minimum or a maximum value of the efficiency function, and the schedule "admissibility" is understood as an implementation meeting all the conditions [2].

Modern universities, including Polotsk State University, are sorely in need of creating a system that allows to plan and form a schedule of educational employment for students and lecturers. The schedule of educational employment is a logical completion of the process of automation of a university educational process. The system of formation of an educational employment schedule, like any complex system, includes a set of individual decisions, subsystems. Modeling of the organizational system of the educational process with the use of graph theory and further development of optimization algorithms and methods for forming a final table is just one of the solutions, carried out at the last stage of the schedule formation (Figure). The key point is the system of data preparation.



Fig.

The system of data preparation can be considered as the first stage of optimization. Properly prepared data will reduce the number of iterations made by optimization algorithms used at the last stage of schedule formation. While incomplete data or data with errors, on the contrary, increase the required number of iterations in times, or make the use of algorithms impossible.

The system of data preparation can be divided into a series of separate operations performed either sequentially or parallel by the corresponding structures. These include: the formation of all the loads that are to be distributed, the regulatory reference information, and so on. That is all that is necessary for lesson assignment and the distribution of the teaching staff load by contingents.

The preparation of regulatory reference data is a separate complex operation of data gathering, describing the provided possibilities and the necessary requirements while forming the schedule. A part of these data will be constant for a long time, and the other part will require permanent adjustments. It is enough to input the minimum necessary data for the initial formation of the schedule, and further, if required, to extend or enlarge them. This includes the following information:

1. The training contingent (groups, streams of students).
2. The teaching contingent.
3. The organizational and personnel structure (faculties, departments, lecturers).
4. Forms of training, specializations, courses.

5. Semesters/modules – indication of periods.
6. Types of work, learning activities.
7. Series of disciplines, disciplines.
8. Information about the auditorium fund (an auditorium type; its capacity; an auditorium predetermination to the faculty, department; limitation on types of work; limitation on disciplines).
9. Property base.
10. Nets of lessons, bell timetables.
11. And other information, up to the temporary remoteness of buildings.

The next step of schedule formation, after feeding all the initial data into the system, will be the process of planning. Planning begins in March of the previous academic year with the scheduling of the educational process in all its forms. At the same time the initial version of the teaching staff load is being formed.

In accordance with the model curricula and the schedule of the educational process working curricula are formed.

The calculation of teaching load at the department is carried out in accordance with "The norms of time for the calculation of the work of a teacher". This document is worked out by the University on the basis of the labor legislation of the Republic of Belarus.

The last three stages of schedule formation are: presentation of requirements, design and optimization.

Presentation of requirements is the imposition of restrictive rules, and each requirement is important. The list of requirements for different schedules may vary. Requirements are divided into three groups: methodical, organizational and the others.

At the stage of design data obtained from the previous three stages are combined in one model of the initial version of a schedule. Work with the constructor is carried out in two modes: manual or automatic.

The last stage of schedule formation is optimization which consists of applying of algorithms and methods of scheduling theory to the initial version of a schedule.

The vast majority of problems studied in scheduling theory are NP-hard. There exist several approaches to solve them.

The first approach is the working out of polynomial heuristic algorithms. For some heuristic algorithms error estimates of the obtained solution are known [3, 4, 5]. There are approximate algorithms that guarantee both the relative error [6, 7], and the absolute error [8].

Currently, metaheuristic algorithms which find a solution close to the optimal one within an acceptable time have also become widely spread. The disadvantage of these algorithms is lack of assessment of the solution quality. It is unknown to what extent the solution is different from the optimal one in the worst case.

In some cases, as well, the positive effect comes from the use of several methods. Such algorithms are called "hybrid" [9]. Currently, the use of hybrid algorithms gives the best result.

Having explored the subject area of the problem, we can make the following conclusion.

Firstly, the system of formation of educational employment schedule should consist not of a single solution, but of a complex of separate solutions. These can be solutions based on individual software products, interacting with each other through databases sharing. Each individual solution is the implementation of a single step or a separate operation in the process of schedule formation.

Secondly, it is clear that at the current level of information technology development it is impossible to create a fully autonomous system that forms a schedule at request only. This process still demands consistent work of qualified employees. However, some of the stages, as well as separate operations, not only can but also must be taken offline. This will significantly reduce both labor costs and the probability of error, and, what is more important; the solution obtained in this way will be more optimal in comparison with the solution obtained entirely manually.

At the initial examination, without splitting stages into separate operations, such stages as data acquisition, planning and presentation of requirements, remain in the manual mode.

Semi-automatic mode is the stage of design. The computer monitors tolerances and prevents or corrects separate operations.

Automatic mode is the stage of optimization, that is the use of algorithms and methods of scheduling theory for solving optimization problems.

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## STUDENTS' ATTITUDE TOWARDS CHILD PSYCHOLOGICAL ABUSE

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*Most people are convinced that domestic abuse is an extremely rare phenomenon; it is typical of a small part of population, of people of lower class and of those who have psychological violations and destructive dependences (alcohol, drugs, religious sects, etc.) but domestic violence can exist in any kind of family and can affect anyone. It generates a wide range of social problems: asocial and aggressive behavior, suicides, difficulties in adult relationship, dependence on alcohol and drugs and mental disorders (including dissociative identity disorder, bulimia and some others).*

Children are the most vulnerable and unprotected social group. According to the UN about 2 million children annually suffer from domestic abuse, 10 of them die, and 2 thousand commit suicide [5].

Monthly about 30 thousand messages on domestic violence and conflicts come to law-enforcement bodies in Belarus [6]. Low awareness of the actual extent of domestic abuse, of its types and reasons, absence of legislation in Belarus encourage the investigation of the domestic abuse issue, and it is very urgent to take necessary measures to deal with violence.

It is very important to assess students' awareness of domestic violence because they are prospective parents and when they get to know more about the issue and reasons that can make for models of wrong upbringing of children, they will have a choice.

At the beginning of the XX century the National Society for the Prevention of Cruelty to Children published the following data: 428 thousand abused children were reported; of them 61 thousand had wounds, bruises and burns left by shovels, whips, leather belts, boiled water; 11 thousand children were raped; 18 thousand died of ill treatment. These statistical data determined the direction of sociological research on the theme of violence against children and adolescents [1].

According to a great number of researches, modern society is characterized by gender-based conflict; women face unequal treatment all over the world. Gender-based conflict often leads to domestic violence. There are considerable changes in the structure of a family as well as in the relations towards each other among its members [2].

Since the second half of the XX century, there have been some new approaches to this phenomenon study. So, in 1961 Henry Kempe offered the concept of "a syndrome of beaten children", where he described pediatric, psychiatric and legal aspects of violence against children. This concept gained further development in Zh. Garverino's work (the concept of "a syndrome of children, beaten in a psychological sense") and researches by E. Trive-Beker. These studies touched upon the subject of psychological abuse of children in families and its consequences for further development of children [2].

In the Soviet Union at the state level domestic violence was a "closed" issue, some kind of taboo, while in the United States of America and in Europe there was a wide discussion of the problem of domestic violence.

As a rule, the study of the issue of child abuse was reduced only to the consideration of physical abuse according to the articles of the Criminal code. Multifaceted nature of this social phenomenon and its various forms were mentioned only in the context of interrelation with physical abuse.

Public discussion of domestic abuse has started quite recently. In 1993 on the initiative of women's public organizations the first publications devoted to this issue came out. It was the beginning of the setting up of the first telephone hotlines, crisis centers, shelters for victims of domestic violence.

Thus it is important to note that in Belarus, meanwhile, there is no special law on the prevention of domestic violence. Standards of the Criminal code of administrative offences aim at eliminating consequences of an act of violence rather than at its prevention and take effect only after the registration of the fact of its commission.

The Belarusian state has no right to interfere with private life before the commission of acts of violence in order to prevent abuse.