

Digitalization of Technology for Expert Project Management of The School Environment Progression

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Abstract. The article presents the issues of school environment expertise and discusses the possibilities and prospects of using digital tooling for its assessment in mass educational practice and scientific research. The proposed method of vector modeling of the environment of personality development allows determining the activity of the individual in mastering educational resources in various types of environments. This digital tooling allows school management teams and organizational consultants to conduct management and pedagogical analysis of the current status and complementarity of various system components of school environments with each other, as well as with the school's mission, and implement their managerial and vocational design; to develop programs for the progression of school organizations based on environment methodology using expert project management technology; to carry out organizational and pedagogical consulting of schools taking into account the "built-in" nature of environments of various levels (the environment of the lesson, class, club, school, and educational complex).

1 Introduction

Since the seventies of the last century, environmental issues have been returning to the national pedagogical science. The environment is defined as a complex system that includes the very person, as an active subject, and an actor in the environment, who, by his actions activates and builds up various components of the environment, and thereby lines up the environment for himself.

Gradually, the environment is understood as a critical factor influencing the development of the individual. An entire series of empirical studies is launched, where the subject of special analysis is a variety of environments, such as the surrounding, social, socio-cultural, educational (pedagogical), teaching (didactic), information and communication environment of the community that involves the child, as well as the family, reference group, class [1], where an individual goes through socialization, individualization and cultural identification.

The executives of educational management bodies often explain disregard of environment indicators of various schools by contemporary rating systems, by the need and methodology

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for creating tool complexes for expert assessment of the quality of the school environment. Today, methodological developments of the corresponding tooling, dictated precisely by its absence, are acquiring ever greater validity.

The active search for adequate tools to assess the quality of the educational environment and the development of all its subjects continues. Thus, one of the laboratories of the Institute of System Projects of the Moscow City Pedagogical University has adapted the School-Age Care Environment Rating Scale (SACERS), which is offered as a scale for studying the school environment in international practice [2]. Here it is important to pay attention to the fact that foreign research in this area, in their mass, are focused on ways to solve local problems, and are based on a social and psychological, rather than environmental (ecological) methodology.

Among foreign instrumental developments, the most popular methodological complex for studying the educational environment is Questionnaire on Teacher Interaction (QTI) [3, 4], Science Laboratory Environment Inventory (SLEI) [3-7], Constructivist Learning Environment (SLEI) [6], and What Is Happening in Class? (WIHIC) [6, 7]. The QTI questionnaire is aimed at analyzing the nature of interpersonal relationships between teachers and students. The SLEI method allows evaluating the educational environment in high schools based on the criteria of cohesion, openness, integration, clarity, and quality of the material to study. Employing CLES survey materials, it becomes possible to analyze the activity of students in educational dialogues and discussions. The WIHIC questionnaire includes scales of student cohesion, teacher support in learning, participation in classwork, etc. As can be seen from the content of these methods, they are fully focused on the socio-psychological aspects of the educational process and do not even pretend to be a systematic study of the educational environment. The same can be attributed to P. Moos's Classroom Environment Scale (CES), widely known abroad [6; 7].

In the present article, the school environment is understood as an institutionally limited set of opportunities for the development of students' personality that arise under the influence of pedagogically designed organizational, technological, spatial and subject-based conditions, as well as random factors in the context of event-based interaction of the school community members. To expand the criteria base for assessing the quality of school organizations, a digital "Software and diagnostics complex was developed to ensure the process of expert project management of innovative development of educational institutions" involving the following methods: 1) vector modeling of the personal development environment, 2) expert assessment of quantitative parameters of the school environment, 3) expert description of the organizational and technological component of the school environment, 4) expert evaluation of the personal development potential of the school educational program, 5) diagnostics of subjective attitudes to school, 6) expert assessment of relationships between different categories of the educational community members.

It is important to emphasize that the fundamental substantive expansion of criteria for evaluating the activities of school organizations is hindered by the absence of a unified methodology and tools for evaluating the school environment.

This problem is solved by creating appropriate pedagogical tooling. For example, the "Model for evaluating the quality of educational services", presented by E.V. Orlov, includes three parameters: the conditions for organizing the educational process, its effectiveness, and customer satisfaction. Indicators for these parameters are based on regulatory requirements. "The model of monitoring the educational process implemented in the logic of the environmental approach" characterizes the level of implementation of pedagogical technology from goal setting through achieving the result, as well as the skills of teachers [8].

The expert assessment method of quantitative parameters of the school environment allows for its systematic description. The idea of creating the methodology has been based

on the assumption that the main criteria that characterize complex social systems can be adapted to pedagogical practice. Based on the theoretical construct of this data, the methods of expert assessment of the educational environment of preschool institutions and expert assessment of the university environment were also developed.

2 Methods

The authors have developed a digital "Software and diagnostic complex to ensure the process of expert project management of innovative development of educational institutions", which contains original tooling for system analysis of school environments, including a set of complementary methods [9].

The method of vector modeling of the environment of personal development allows determining the activity of the individual in the mastering of educational resources in different types of environments. The idea of creating the method was based on the typology of "upbringing environments" by Ya. Korchak [10].

Based on the synthesis of the main methodological approaches to the study of the personal development environment [11-13], the authors defined the school environment. The school environment is understood as an institutionally limited set of opportunities for the student's personality development, manifested under the influence of pedagogically designed organizational, technological, spatial, and subject conditions, as well as random factors in the context of event-based interaction of the school community members [9].

Besides, the authors developed methods of expert assessment of the educational environment of preschool institutions and expert assessment of the university environment.

The method of expert description of the organizational and technological component of the school environment allows analyzing the personal development potential of the school's educational subsystem, and the degree of complementarity of the school's educational and organizational subsystems. The method was created by developing and introducing a mathematical apparatus to the methodology for determining the organizational and educational model of a school [15], as well as adapting the stimulus material of this method to the realities of Russian educational practice.

The method of expert assessment of the personal development potential of the school's educational program allows analyzing the orientation of the education content in the school to the formation of key competencies of schoolchildren. The idea of creating the methodology was based on the assumption of the possibility to synthesize culture-congruent and competence-based approaches within a single model of educational content.

The diagnostics method of subjective attitude to school allows conducting a comparative analysis of the attitude of various members of the educational community to students, teachers, educational processes, school premises, and equipment, as well as to identify hidden psychological problems caused by these subjective relationships. The idea of creating the method was based on the use of a system of parameters of subjective relationships of the individual [16, 17].

The expert assessment method of relationships between various categories of the educational community members allows analyzing the orientation of these relationships to cooperation, sympathy, tolerance, or aggression. The idea of creating the method was based on the concept of tolerance as an attitude to another [18].

The developed digital expert diagnostic tooling has been successfully tested in several thousand Russian schools. Currently, this tooling is becoming increasingly popular in education management practice.

3 Results

Digital tooling allows school management teams and organizational consultants to conduct a managerial and pedagogical analysis of the current state and complementarity of various system components of school environments with each other, as well as with the school's mission, and implement their managerial and pedagogical design; develop programs for the progression of school organizations based on environmental methodology using expert project management technology; to carry out organizational and pedagogical consulting of schools taking into account the "built-in" nature of various level environments (the environment of the lesson, class, club, school, and educational complex).

Methods of vector modeling of the environment of personal development and expert assessment of quantitative parameters of the school environment provide systematic managerial and pedagogical analysis in the course of designing organizational and pedagogical activities aimed at strengthening the personal development potential of the school environment. Methods of expert analysis of the organizational and educational model and pedagogical expertise of the school educational program content provide analysis and design of the organizational and technological component of the school environment. Methods of diagnostics of subjective attitude to school, assessment of relationships (tolerance) of various categories of the educational community members, and diagnostics of the organizational culture of the teaching staff provide analysis and design of the social component of the school environment.

Expert-project technology of pedagogical management of development of school environment created based on a digital "Software and diagnostic complex to ensure the process of expert-project management of innovative development of educational institutions", methodically provides the schools' self-analysis process and preparation of programs for their systemic development by management teams. All school development programs created using this technology were highly evaluated by education authorities, while two educational organizations, based on expert evaluation of development programs created using this technology, became finalists in the "Best schools of Russia" competition.

The developed digital methodological tooling provides both empirical and historical-pedagogical environmental research, allows monitoring the quality of school environments, and represents a set of environmental indicators for building a rating of school organizations.

Besides, the proposed digital tooling creates a methodological and methodical basis for the formation and development of a new scientific direction called "environmental psychopedagogy". The problematics of further developments and empirical quests of the scientific direction considered in the article can be based primarily on the structural and content analysis of the educational environment; the study of environmental determinants of personality formation; identification of psychological mechanisms and patterns of personality development in the educational environment; comparative analysis of various educational environments; humanitarian expertise of educational environments; typology of educational environments; study of the perception of the educational environment; study of subjective relations to the educational environment and in the educational environment; pedagogical design of innovative educational environments; pedagogical organization of effective new educational environments, etc.

The implementation of the developed digital expert and design tooling in educational practice is most effective at creating regional and municipal expert communities, which include leaders of school organizations and teachers trained in specific professional development programs, elaborated by the authors, as well as training at schools, developing and implementing programs of their development based on the given expert design tooling.

4 Conclusion

Further research is seen in terms of instrumental expert analysis of the educational environments succession at different levels of general and professional education, as well as the pedagogical design of innovative socio-educational environments. On the one hand, the relevance of this research is due to the special pedagogical significance of psychologically comfortable transition of students to the next educational stage, while and on the other hand, it is due to the lack of comparative studies of educational environments based on a single methodology. It is proposed to conduct a comparative analysis of environments of preschool, primary general, basic general, secondary general, and higher professional education in the context of their pedagogical, psychological, and social succession. The research is supposed to be carried out in the university-based educational districts and territorial educational complexes in various regions of the Russian Federation. Empirical data for the examination are supposed to be obtained by including the study of the educational environment in the research and teaching practice of undergraduates, graduate students, and students, as well as trainees of advanced training courses of pedagogical and psychological-pedagogical specialties, according to the curriculum involving the discipline of "Psychologically comfortable and safe educational environment" (or other disciplines, similar in content). As a result of such research, unique comparative data on the pedagogical characteristics of various educational environments can be obtained based on a single methodological approach.

Studying the development of students' personality in the context of the influence of various microenvironments on their life (family, class, club, network community, etc.) with the method of coordinate-wise addition of vectors that model each of the actual microenvironments, can be a distinct area of further research.

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