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Preparing Elementary School Teachers to Conduct Diagnostic Testing of the Elementary School Children Development

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This article aims to design the theoretical and technological framework for preparing elementary school teachers to conduct diagnostic testing of elementary school children. The key research methods used in this work included testing, expert evaluation; direct, indirect and participant observation; analysing the output of the students', educators' and elementary school children's activity, the study of best innovative practices, summative and formative experiments which allow to prepare the students to evaluate the development of elementary school children. The article deals with methodological, theoretical and technological aspects of preparing students to evaluate the development of elementary school children; identifies the information, values and tool inventory necessary to prepare the students to conduct diagnostic testing of the development of the elementary school children; defines psychological and pedagogical conditions and experimentally presents the components of such preparedness: intellectual, operational and practical.

Keywords: teachers, children, diagnostic testing, development, learning process, preparedness, interdisciplinary approach

INTRODUCTION

The relevance of the topic stated in the article is due to the increase of social, economic and scientific and technological changes in the world community and the fact that Russia adopted the Bologna Accord. Russia's participation in the Bologna process, asserting the personal development of the student as a primary goal of education, imposes new requirements upon the educational

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system both on higher education and primary education stages. Prioritizing the personal development of the student necessitates high professional competence of elementary school teachers in developing and assessing elementary school children. To accomplish this task we analyzed the evolution of the pedagogical views on preparing teachers to analyze the development of students.

The results of this analysis are presented in the form of theoretical and factual knowledge, reflecting the sequence of accumulation of ideas, as well as conceptual and methodological viewpoints in Russian pedagogic science and psychology, which in their entirety serve as informational and value-related basis for preparing teachers to evaluate the development of elementary school children: anthropology – the basic component of scientific pedagogic science (Ushinsky, 1952) et al., the idea of environment influence on nurturing and teaching a child (Kapterev, 1881; Maltsev, 1881); setting a social and pedagogical diagnostic experiment, aimed at creating a model of implementing already known ideas about the study of children development (Shatsky, 1962); a focus of psychological and pedagogical evaluation on the notion of development as a comprehensive phenomenon, incorporating biological and social characteristics of a child, a growing human being (Pavlov, 1949; Vygotsky, 1996); experiments to design a toolkit for the analysis of a child's personality (Bleikher, 1978; Burlachuk, 1978; Luriya, 1966; Ravich-Scherbo, 1981); the idea of holistic individualization of the process of nurturing, educating and analysing a child (Blonsky,1961; Teplov, 1961); emergence and development of cultural approach in pedagogic science (Gaysina, 2002) enriching the understanding of such aspects of a teacher's personal and professional philosophy: methodological (Asadullin, 1999; Khodusov, 1997; Bida, 2003); historical and pedagogical (Klarin, 2005; Ravkin, 1986); innovational (Slastenin, 1997; Podymova, 1997; Hadfield, 2002; Kellow, 2002; Day, 2002); elementary school teachers' training (Brundrett, 2006; Rhodes, 2006; Gkolia, 2006; Sharifzyanova, Shtreter & Nauryzbayeva, 2015; Gromova & Alimbekov, 2015; Sadovaya, Khakhlova & Reznikov, 2015); the correlation of development, teaching and nurturing (Rubinstein, 1958).

A set of distinguishing features can be established based on historical and genetic analysis of the evolution of Russian psychological and pedagogical school of thought on the child's development: its proponents (Ushinsky, 1952; Kapterev, 1881; Shatsky, 1962) laid the foundations of the pedagogical understanding and approaches to solving this problem in a complex historical context, characterized by a shift in the paradigms of collective consciousness, by emergence of the approach to teacher's work as a service for the welfare of a child both in professional circles and in the society in general.

MATERIALS AND METHODS

Research Methods

The following research methods were applied: theoretical analysis - historiographic, comparative and contrastive; diagnostic - testing, the method of expert evaluations; observational - direct, indirect and participant observation; archival - analysis of the output of students', educators' and elementary school children's activity, the study of best innovative practices, summative and formative experiments, sociological and pedagogical methods.

Experimental facility

Experimental part of the research was carried out in Bashkir pedagogical university named after M. Akmullah, Institute for Education Advancement of the Republic of Bashkortostan. In terms of comparative study, wide-scale experiment was used. The research encompassed 184 people. 100 students out of this number participated in the experiment.

Research stages

The rationale behind the research was to analyse and synthesize methodological, theoretical and technological types of resources, which enabled us to define the following requirements to optimizing the capacity of the learning process in preparing elementary school teachers to evaluate the development of elementary school children:

Methodological: selecting ideas, concepts, approaches, analysing their capacity to complement each other in terms of practical usage, which includes implementing an approach as a system of interconnected modes and methods of research, as a way of representing and transforming the object of the study.

Theoretical: developing a system of ideas, presented in scientific and methodological literature, to ensure the implementation of informational, explanatory and guiding functions of scientific and methodological knowledge, used in examining specialist training;

Technological: a system of features characterizing the current state of the object, that is to be transformed according to certain guidelines:

- the interaction of the ascertaining and design aspect components;
- functional, conceptual and value-related validation of the means and conditions for the progress from ascertaining aspect to design;
- the validity of the parameters, indicators and criteria of the measurement of the above-mentioned progress - formative and summative;
- determining the quality of training and preparedness based on certain measurable characteristics.

RESULTS

Components of the students' preparedness to evaluate the development of elementary school children

The following components of students' (future elementary school teachers) preparedness were determined: intellectual, operational and practical.

Understanding the goals of didactic diagnostic testing constituted the intellectual part of the students' preparedness for such evaluation; operational aspect of the preparedness consisted of mastering the methods and techniques of didactic tests, while the practical preparedness lay in mastering the certification of the methods and techniques, theoretically and experientially.

A ten point scale was designed to measure the students’ ability to conduct diagnostic testing.

Stages of the experiment

The first stage of the experiment was directed at motivating and guiding the students. Its purpose was to motivate the students to internalize the theory and practice of pedagogic diagnostic testing, to set up and develop the ability to

navigate the professional field of contradictions, resolving which constitutes the essence of the educator's personal and professional growth. The value-based significance of this stage was to develop in students the intellectual component of diagnostic testing, as a means of ensuring the necessary conditions for the development of the child.

The second, "operational", stage aimed at students mastering the means of practical implementation of ideas and values underlying the method of diagnostic testing.

The third stage, that is practical, was designed to further actualize the potential of the learning process in preparing elementary school teachers to conduct diagnostic testing of elementary school children.

Table 1. The scale of students' intellectual preparedness to conduct diagnostic testing

Points	Intellectual aspect components
1.	the student knows the goals and objectives of diagnostic testing;
2.	the student is able to distinguish between diagnostic testing and traditional evaluation of the quality of teaching;
3.	the student is able to identify the objects and means of diagnostic testing;
4.	the student is aware of the peculiarities of presenting instructional material to elementary school children and means of diagnostic testing of its retention;
5.	the student understands the purpose of diagnostic testing as a form of formative assessment of a specific learning scenario, he/ she knows the parameters of such a scenario;
6.	the student knows the characteristic features of the start of the scenario, of the period fixed by the testing and can (variably) predict the end of the scenario;
7.	the student understands the relationships between all those stages of the learning scenario and can corroborate them;
8.	the student is able to determine the focus of the specific diagnostic testing method by correlating it with the goal and purpose of diagnostic testing as a unique means of analysing the learning process at a specific stage and the level of pupils' attainment;
9.	the student is aware of another objective of diagnostic testing, i.e. to reveal the contradictions between the teacher's activity and its results, he/ she knows examples of such contradictions, of which a most widely-spread one is pupils' low achievement.
10.	The student knows why it is both necessary and expedient to reveal such contradictions.

Summative stage

At first stage the students' attitude towards diagnostic testing of elementary school children's development was assessed. The purpose of the parallel use of the terms "study" and "diagnostic testing" was to get the students used to relevant terminology even before they start learning about diagnostic testing. Similarly, the assessment itself was targeted at making the students aware of the method of diagnostic testing, since freshmen students (the experiment started in freshman year), the majority of whom (70%) graduated from village schools, might have been unfamiliar with the concept. The students were asked to "Evaluate the significance of the study/ diagnostic testing of the development of the child". The average score given by the students equalled 2.9.

This stage aimed at creating systematic knowledge about the child as elementary school pupil, based on interdisciplinary approach. In terms of content it encompassed medical, biological, psychological, pedagogical and methodological knowledge which serves as a foundation for the study of the child's development and as an informational part of a teacher's research work.

Interdisciplinary approach is a traditional means of enhancing the teaching process. The rationale behind resorting to interdisciplinary approach was to remove certain contradictions which exist in general professional training and affect the students' preparedness to conduct diagnostic testing, since in many cases students lack a scientific understanding of the reasons why the children fail to progress efficiently, and to acquire the necessary knowledge.

It may be illustrated by the following contradiction:

- medical and biological section contains information about human morphology and physiology, body organ functions, including the structure and functions of the brain;
- psychological and pedagogical section contains information about the structure and functions of human psyche, reasoning, behaviour, activity, which also applies to children of different age groups.

However, students often do not correlate these two sections and, thus, fail to realize, that human brain is the home of psyche, that destruction of brain functions, even that which does not result in a pathology, affects the child's consciousness, reasoning, perception, speech, memory, etc, which, in their turn, impact learning and comprehension. The experimental idea was to overcome this contradiction.

Within the framework of the experiment as a whole, this task served as a means of integration of the training content into a methodological tool during freshman and sophomore years (syllabus aspect - child's personality and development). To this end the following psychological and pedagogical conditions were created:

- engaging the faculty, involved in implementing the basic educational curriculum "Elementary school teacher", in preparing teachers to conduct diagnostic testing of the elementary school children's development, and in actualizing the potential of the learning process in preparing the students;
- ensuring that understanding of the significance and value of developing students' research skills, their connection with teacher's diagnostic activity, and developing reasoning skills of the teacher, gets the required psychological, informational and methodological support.
- introducing rating scale system of evaluating knowledge attainment as a means of teaching diagnostic skills;
- activating the existing level of readiness (as "an inclination", "willingness") to conduct diagnostic testing of elementary school children within the framework of the lecture course;
- introducing the requirements to learning assignments based on the following algorithm: information (on topic, issue), its analysis, evaluation, student's justification of his perspective on the problem;
- applying interdisciplinary approach on methodological level in order to enhance the explanatory potential of educational disciplines and their compensatory function;
- equipping students with a systematic understanding of elementary school children; designing an integral criterion as a fundamental benchmark in determining the level of the child's development;
- developing reciprocal connection between students' general professional training and their preparation to conduct diagnostic testing of elementary school children in the context of growing scientific and methodological interest to the issues of students' diagnostic activity on the part of educators.

Formative stage

At this stage the instrumental function of interdisciplinary approach was implemented. Its significance lies in the fact that interpretation is able to become an instrument of understanding the phenomenon, when descriptions of the mechanism of this phenomenon are found within a somewhat different knowledge field.

The experiment revealed that physiological data is used as a foundation by the teachers of "Methods of teaching Russian language and calligraphy" when preparing the students to teach writing to elementary school children. Moreover, the importance of correcting the breathing patterns of elementary school children is emphasized during lectures, discussions and lab sessions. Lecturers emphasize this physiological and valeological aspect due to the fact that at the initial stage of learning writing skills children strive to complete the writing task after inhaling, holding their breath until they finish writing a letter, part of the word or the whole word. Oxygen supply to the brain is disrupted, the fatigue increases, while the effectiveness of the exercise decreases.

The students, who worked on correcting their breathing with a choir director, overlooked this peculiarity of children's breathing pattern while they learn writing. Only during their classes in "Methods of teaching Russian language and calligraphy" did they realize that helping children to develop correct breathing demands expertise and consistency, that this is a methodological as well as valeological issue.

One of the key principles was a possibility of in-process correction of the content of academic disciplines. This possibility was ensured by the interdisciplinary approach to student training.

The need for such corrections arose when detected contradictions could hardly be resolved without introducing into the content of the learning process of the new knowledge aimed at appraising of or explaining certain contradictions that a teacher might face. An example of such a contradiction is a situation when educators overlook the physiological foundations underlying certain mechanisms, facilitating or interfering with the child's learning and, thus, their development. This mistake results from teachers being unaware of the link between the functions and processes taking place in a single complex "body, its organs - personality, its psyche", and, in particular, in a complex essential for practical pedagogic science, i.e. "child's brain - child's cognitive and learning activities".

The students' methodological and value-based understanding of the purpose of didactic diagnostic testing

Students' retention of didactic testing knowledge was assessed with the help of scales, which measured the students' understanding of the purpose of diagnostic testing, their knowledge of examples and methods of analysis of didactic tests and their retention of techniques related to certification of methods and procedure of didactic testing.

Experimental verification of the students' preparedness to conduct didactic diagnostic testing

Thus, the results of assessing intellectual, operational and practical components of the students' preparedness to conduct diagnostic testing revealed that: 2/3 of the students displayed sufficiently and highly developed levels of preparedness; these levels integrate the potential of a holistic learning experience, characterized by focus on further enhancement of functional and operational preparedness.

The formative stage of the experiment is characterized by exercises targeted at reinforcing in the students of certain personal and professional qualities, critical for conducting diagnostic testing of primary school pupils. The objective is to find out whether a child is able to organize his/her activity in compliance

with its goal (i.e. whether they have acquired the skill of organizing their activity); whether a child is able to correlate the results and the purpose of his/her actions (whether they are able to control their actions); whether a child strives to discover concealed, not self-evident properties of the objects, interrelations between phenomena in the world around (i.e. cognitive motivation).

Table 2. The results of diagnostic testing of the intellectual component in 100 participating students

The parameter tested	**Stages of development**									
	Initial			**Marginally developed**		**Sufficiently developed**			**Highly developed**	
	The number of students									
Scoring scale	1	2	3	4	5	6	7	8	9	10
Understanding the goal of didactic testing… (first parameter)	-	-	-	4	6	9	11	15	25	30
Understanding the meaning of didactic testing… (second parameter)	-	-	-	7	7	12	13	14	22	25
Understanding the connection between a specific method and the goal and purpose of didactic testing… (third parameter)	-	-	-	8	9	11	18	15	19	20
Understanding the key value-related parameter of the didactic diagnostic testing (fourth parameter)	-	-	-	2	8	9	12	11	27	31

Table 3. Stages of the methodological understanding of the purpose of didactic diagnostic testing

The parameters of the content of methodological and value-related understanding of the purpose of diagnostic testing	**Stages of development**			
	Initial	**Marginally developed**	**Sufficiently developed**	**Highly developed**
Fist parameter	-	17	38	45
Second parameter	-	22	30	48
Third parameter	-	28	35	37
Fourth parameter	-	16	26	58

Table 4. Operational component of preparedness to conduct didactic diagnostic testing

Instrumental function of the methods	**Points**				
	1	2	3	4	5
Measuring	-	-	12	46	42
Analytical	-	-	25	28	47
Ranging	-	-	20	39	41
Learning	-	-	21	41	38
Stimulating feedback between the testing scenarios	-	-	17	36	37
Guiding	-	-	15	46	39
Nurturing	-	-	12	41	47
Developing	-	-	13	42	45

The number of students with this score

Table 5. Practical component of preparedness to conduct diagnostic testing Diagnostic test certification parameters

Diagnostic test certification parameters	**Points**				
	1	2	3	4	5
Defining research goal with the understanding of the "goal" as a component of methodological and value-related notion of the purpose of diagnostic testing (goal-setting)	-	-	12	45	43
Assessment of the functions of this testing method structural composition	-	-	14	44	42
Instruction validation	-	-	15	43	42
Sequence of diagnostic actions	-	-	15	43	42
Validation of the derived data processing method	-	-	15	43	42
Validation of recommendations on the use of the research results	-	-	15	43	42

DISCUSSIONS

We have encountered certain challenges in practice-focused analysis of the conceptual construct, which led us to believe that the terms most widely used in theoretical and practical fields, that is "development", "diagnostic testing" etc., reflect the objective reality of the phenomenological nature, the study of which is carried out within the framework of the observer's methodological perspective.

"Child's development" is a phenomenon of "dual action", since both the child and development are inexhaustible. Overall personal and professional philosophy of a future educator should be engaged while preparing a primary school teacher to conduct diagnostic testing, which will enable him/ her to become a competent "observer" and to determine: which features develop and how, what the causes and conditions of the phenomenon in question are, and of what an educator as a subject of a child's development is capable.

CONCLUSION

It was determined that the designed theoretical, methodological and technological system for preparing students to conduct diagnostic testing defines the course of subjective development of a future primary school teacher in the context of activity-based learning process. It also provides informational, value-based, and instrumental aspects of preparing the students to conduct diagnostic testing of primary school children.

Child's development was declared a key value and goal of teaching and nurturing activity at all stages of the experiment: motivational and guiding, training, and practical. Functional and semantic identification of the stages as motivational and guiding, training, and practical was corroborated by their structuring.

In terms of preparing the students to conduct the diagnostic test, the experiment was constructive, informative and operational, since it raised the quality of psychological and pedagogical environment, increased the subjectivity of the students in this process, set the focus on future professional activity as a space for students' personal actualization and development.

The components of the students' preparedness to conduct diagnostic testing were identified: intellectual, operational and practical. The research highlights

the problem of creating psychological and pedagogical knowledge unit - "diagnostic testing in primary school" - adapted for the tasks primary school teacher training in terms of content and methodology. It opens opportunities for further research: creation of pedagogical and culturally-adapted system of theoretical and applied components of diagnostic testing, intended for primary school teachers; creation of dictionaries and reference books devoted to the study of primary school children, their activity and development intended for various categories of educators.

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