Students’ Training for the Realization of the Principle of Continuity in the Development of Children's Cognitive Abilities

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Abstract

Background/Objectives: The article justifies the parameters of the implementation of the principle of continuity in the development of cognitive abilities of preschool and primary school children, based on the following principles: Natural conformity, complementarity, cultural conformity. Methods: The leading idea of the appropriate training of students is improving vocational and pedagogical thinking of future professionals in the aspect of the ideas of developmental education. Findings: Methodological guidelines of the available technology of the principle of continuity in the development of cognitive abilities of children have been revealed, the conditions of students’ appropriate training have been distinguished. An educational complex have been developed to improve students' vocational and pedagogical thinking based on the study of psycho-pedagogical and managerial foundations of implementing the principle of continuity in the development of children's cognitive abilities of pre-school and early school age. The content of students’ research work organization has been reflected in the manual Methodology and Pedagogical Research Methodology. An algorithm has been developed for students to compile programmed exercises for older preschool and primary school children. Learning about children's development helps understand what level for their teaching to choose, and what is the movement of children's thought. Special courses The Development of The Conceptual and Creative Thinking of Children, Continuity in the Development of Cognitive Abilities of Children have been developed. Methodological advisement to improve students’ research skills has been organized. Applications/Improvements: The algorithm of the development of problematically developing exercises for children has been presented, based on the idea of the formation of scientific concepts, taking into account the dominance of figurative, emotional and sensory components of thinking.

Keywords: Cognitive Abilities of Children, Continuing Education, Principle of Continuity, Vocational and Pedagogical Training.

1. Introduction

Existing changes in the life of Russian society put in the forefront the idea of enrichment and opening each person's inner potential and its creative renewal, development and improvement throughout life. This is possible only in conditions of continuous education that ensures the continuity not only from the point of interconnection of educational system links, but also of compliance with personal fulfillment, flexibility and professional dialectical thinking.

The development of cognitive abilities of children is highlighted by us as one of the main objectives of a coherent interaction between pre-school and primary school education. Today such questions as: “How to help a child cope with the ever-increasing flow of information and to learn to navigate in a rapidly changing environment? How to achieve a harmonious combination of information and meaningful and emotionally-creative component in the process of academic knowledge?” sound particularly acute. The process of knowledge of the world around is not limited by the development of ideas, but is
determined by the process of comprehension the essence of the study subjects, that is, the development of certain concepts about them. The concept integrates in itself the process and the result of knowing the essence of things and phenomena, it includes reflective thinking processes, ensuring their irreversibility, convolution, stage-by-stage approach and systematicity. However, all of these features of the concept in the thinking of preschool and primary children have a unique form, characteristics associated with a significant role of imaginative, emotional and intuitive aspects.

A special role in the implementation of a continuous process of knowledge belongs to preschool and primary school teachers- these are they who will ensure continuity between kindergarten and school, developing a system of concepts, taking into account the above features of the child’s thinking and the need to prepare children for self-knowledge, self-education in the future.

The hypothesis of the study suggests that an effective training of students for the realization of the principle of continuity in the development of cognitive abilities of children of preschool and primary school age will be provided by implementing the concept, the key positions of which are the following provisions:

- As a methodological basis for the construction of corresponding concept, it is necessary to use an integrative unity of personal-active, conceptual and synergistic, context-reflexive and competence approaches.
- Indicative basis for successful realization of the idea of the study are the following principles: Humanistic orientation of education; continuity of education; complementarity, natural conformity and cultural conformity of developmental education; cooperation.
- Pedagogical conditions ensuring the process of preparing students for the realization of the principle of continuity in the development of cognitive abilities of children are intended to include such components as: Designing the content of vocational and pedagogical preparation of students of principles of continuity and complementarity; implementation of the special psychological and pedagogical training of students through the appropriate training complex; improving the vocational and pedagogical thinking of students, aimed at conceptual and continues development of cognitive abilities of children, at the complementarity of knowledge and self-knowledge; maximum use of active learning methods in different areas of students’ activity with the activation of their creative and reflective abilities.
- Technological support of students’ training for realization of the principle of continuity in the development of cognitive abilities of children should include modern educational technologies, ensuring the development of value-motivational, theoretical, professional and practical components of professional readiness for pedagogical activity.

In accordance with the stated hypothesis, the following objectives were set in the study:

- To expand the content of parameters of the principle of continuity in the development of cognitive abilities of children.
- To identify and justify the pedagogical conditions of successful vocational and pedagogical preparation of students for the realization of the principle of continuity in the development of cognitive abilities of preschool and primary school children.
- to develop science-based technology to prepare students for the implementation of the principle of continuity in the development of cognitive abilities of children of preschool and primary school age, ensuring the realization of the revealed pedagogical conditions, to experimentally test its effectiveness.

1.2 Explore Importance of the Problem
Reforms of modern education are originally reflected on the process of interaction between pre-school and primary school education. It should be emphasized that it is in the preschool and primary school years that the groundwork for the personal development is laid, cognitive abilities are intensively developing.

Today's educational situation is necessary to ascertain the deep contradiction between the need to ensure continuity and consistency of all parts of the educational system and obviously inadequate reflection of the aspects of continuity of successive levels of education of the individual in the vocational training of future teachers. The need to resolve this contradiction determines the research problem: Which leading methodological, theoretical, technological bases, conditions determine the nature and process of vocational and pedagogical training of students to realization of a principle of continuity in the development of cognitive abilities of preschool and primary school children?

The object of study is the vocational training of teaching staff in the higher education system.
The subject of research is training the students for the realization of the principle of continuity in the development of cognitive abilities of preschool and primary school children.

The purpose of the study is to develop and substantiate the concept of vocational training of students to the implementation of the principle of continuity in the development of cognitive abilities of children of preschool and primary school age.

1.3 Describe Relevant Scholarship

In our study, we took into account the provisions of theories of and others. In child psychology, studies of and others can be distinguished here. In recent years, issues of concept development methodology involved investigations of and others.

Concept development methods and diagnosis of their development in the works of and others were analyzed.

Various aspects of continuity of preschool and primary school education in the works of etc., were studied. In recent years, this trend is being developed in investigations of and others. However, the aspect of the implementation of the principle of continuity in the development of cognitive abilities of preschool and primary school children remains poorly known.

Our research, continuing the direction of the above-mentioned studies, highlights the vocational and pedagogical training of specialists to implement the principle of continuity in the development of cognitive abilities of preschool and primary school children. In this regard, studies of on the vocational and pedagogical training of the future teacher etc. have special significance for our work as well as research on the organization of educational process in high school of author.

In the theoretical meaning, we used the idea of vocational readiness of the future teacher covered in works of domestic researchers and others.

The principle of continuity is paid attention to in works of foreign scientists. They underline the fact that “sound educational experience involves, above all, continuity and interaction between the learner and what is learned”. In the process of cognition, the person’s experience is enlarged and as claims that “this experience is educative only to the degree that it rests upon a continuity of significant knowledge and to the degree that this knowledge modifies or “modulates” the learner’s outlook, attitude and skill”. In author opinion, the growth which is equaled to developing (physical, moral, intellectual) is an illustration of the principle of continuity. An important factor here is the direction in which growth develops. Continuity suggests using the previous experience and its modification due to new conditions.

Continuity in education is considered in close connection with discontinuity. Author underlines those continuity vs discontinuity may be investigated both in external (e.g., laws and national curricular) and internal school structures. This principle should also include the methods of teaching and learning, student initiative and independence in learning, links between school levels.

The notion of continuity is connected with the idea of development. Its importance is proved by existence of various organizations and associations implementing it in practice.

The development education is understood in broad and narrow sense. The development education takes into consideration individual differences and learners’ special needs. It includes tutoring, mentoring, etc., that is all forms of learning assistance; personal, academic and career counseling; academic advisement, etc. Some think of the development education as of refresher courses in different subjects for underprepared students. But it is not limited to it.

In a broader sense the development education is a kind of an umbrella term, denoting a wide range of learning-centered activities having several key-goals. Among them are preservation and making possible educational opportunity for each postsecondary learner, developing skills and attitudes necessary for attaining life goals, promoting the continued development and application of cognitive and affective learning theory.

1.4 State Hypotheses and their Correspondence to Research Design

In the basis of developed by us continuity parameters in the development of cognitive abilities of children lays natural conformity, cultural conformity, complementarity of substantial components. Natural conformity parameters include the following:

- Individual peculiarities. These include congenital peculiarities of visual and auditory analyzers, typological properties of the nervous system, on which the speed of the formation of temporary
neural connections, their strength, power of the focused attention, nervous system endurance, mental performance is depended.

- **Age-related peculiarities of the development of cognitive abilities.** In this age period there is an intellectualization of mental processes, development of theoretical thinking that occurs as a result of internal, deep, integration processes in the psyche of the child. Children of preschool and primary school age are characterized by “the imagination realism, the ability to see the whole earlier than the parts, emotional richness and expressiveness as the basis of personal knowledge, its supra-situa-tional-conversion character, mental and practical experimentation as the ability to include the subject in new situational contexts”39. It should be noted that age peculiarities of development of cognitive abilities of the preschool and primary school children are associated, primarily, with the dominance of imagery, emotion, natural curiosity of a child, irrational mode of cognition.

- **Age-related mental growths.** Transition of the child to school education is associated with the age development crisis, with a qualitative restructuring of the psyche of the child. The basis of the content of the psychological age crisis is subjectivation of growths of previous stable period in the subjective ability of the individual40. The age growths of over-fives in the cognitive field are: Affective generalization, arbitrariness and reflection, and their derivatives are understanding and manipulation of semiotic and symbolic means, elements of learning activities.

- **Cultural conformity parameters of continuity in the development of preschool and primary school children cognitive abilities include the following substantial components:**

- The aim of development of cognitive abilities: To prepare the child to master the system of scientific concepts in the school, given the relatively stable asymmetrical harmony of cognitive abilities with the dominance of imagery, emotion, irrational components of the child’s consciousness.

- **Means of cognitive development: A combination of different types of activities, building on the leading type of activity and creativity of the child.** Research, experimental work is of particular importance. Here, the child by himself compares, analyzes, summarizes the existing conditions, changes, comes to understanding of essential properties of objects (phenomena), identifies causal links and relationships. The most important peculiarity of the experiment is the ability to control the course of studying the phenomenon.

- **Methods of development of cognitive abilities of preschool and primary school children.** The leading role is played by methods of developing education, raising children’s cognitive activity, degree of independence, determining the child’s subjective position in the activity. Methods of realization of continuity in the development of cognitive abilities of preschool and primary school children should take into account the unity of image, word, action in the child’s activity using the semiotic and symbolic means as interlink of figurative and verbal thinking components. This should involve a variety of activities to support the leading activity and creativity of the child.

Our study substantiated, approved and implemented the following pedagogical conditions of realization of the principle of continuity in the development of cognitive abilities of children: Designing the content of training students of principles of continuity and complementarity; improvement of vocational and pedagogical thinking of students on the basis of the complementarity of knowledge and self-knowledge; implementation of the special psychological and pedagogical training of students through the developed training complex; activation of creative and reflective abilities of students in various fields of activity.

The first condition involves highlighting of elements of knowledge (basic scientific concepts), their classification, as well as the establishment of connections and relationships between them. In this regard, we have identified two main areas of implementing the principle of subsidiarity and continuity in the appropriate education of students: On the one hand, the psychological readiness of the child to school and, on the other, – teacher’s professional competence, with “pedagogical thinking” which is characteristic to each person as a linking category of these areas41.

Improving vocational and pedagogical thinking of students, aimed at implementing the principle of continuity in the development of cognitive abilities of children, at the complementarity of knowledge and self-knowledge is a systemically important condition. We believe that students’ training includes substantial lines of knowledge and self-knowledge relationship on the basis of
vocational and pedagogical reflection and subjective and emotional experience of the individual. For example, the essence of process of continuity of preschool and primary education and objective laws of one's own continuing education; the specificity of the cognitive abilities of children and especially the development of cognitive abilities of students; the essence of categories of “concept”, “understanding” and understanding of these categories by students in their own vocational and pedagogical thinking; understanding of the driving forces of process of understanding and comprehension of the leading components of their own personal knowledge. The interlink of knowledge and processes of self-knowledge is the vocational and pedagogical reflection, serving as the core of vocational and pedagogical thinking.

Another condition is the implementation of a special psychological and pedagogical training of students through the developed training complex. In accordance with the conceptual model of our research, the stages of formation of students' readiness to implement the principle of continuity in the development of children's cognitive abilities have been designed:

Stage 1 – Preparation: The formation of the initial knowledge about the nature of the continuity process, the child's readiness for school. The course "Propaedeutic Basis of Training the Child for School", methodological advice for improving research abilities of students correspond this stage.

Stage 2 – A basic one: The formation of integrative concepts about the process of realization of continuity in the development of children's cognitive abilities. Special courses: “The Development of The Conceptual and Creative Thinking of Children”, “Continuity in the Development of Cognitive Abilities of Children”. Methodological advisement to improve students' research skills.

Stage 3 – The final one: Identification of ties and relations with the various aspects of the educational activities, specification of the essence of management fundamentals in the context of our study. A special course “Organization of Interaction of Preschool And Primary School”. Methodological advisement for improving students' research skills.

The basic scientific concepts are invariant, meaningful part of the teaching complex. They are lifelong learning, continuity, child readiness for school, etc.

The elective part includes methods and forms of its realization, as long as they are aimed at developing education and self-improvement.

Special importance, in our view, in terms of recommendations for teachers to implement the educational complex on the formation of students' readiness to implement the principle of continuity in the development of cognitive abilities of children is the development of problem-developing exercises for students and teaching students the algorithm of making similar exercises for preschool and primary school children.

Experimental study of the conditions outlined above is presented in detail in our study[42]. The original research of post-graduate students, carried out under our supervision should be particularly emphasized: In[43] explores the emotional and cognitive child's readiness for school, reveals the specifics of the relationship of emotional and cognitive sphere of personality, reflecting it in the content characteristic of indicators of emotional and cognitive development of over-fives and younger students. The author reveals the essence of the cognitive activity of children and methods for its development, a special place among which occupies a child's experimentation. In this regard, a system of experimental work with children of preschool and primary school age developed by the author, special assignments and exercises for the development of concepts of air, water, light, soil at the preschool and primary school children should be emphasized. In[44] considers patriotism as moral value of people. On the basis of her own experimental study the author identifies the necessary and sufficient conditions for the formation of local history concepts by primary school children. Particular attention is paid to planning children's educational activities, the substantive content of the corresponding concepts. Technique of formation of local history concepts among primary school children is presented in the context of classical studies of formation scientific concepts among pupils. The author has developed and presented problem-developing exercises for the formation of concepts of “Motherland”, “Small motherland” in the appendix.

G.V. Tuguleva, in the context of problem of our study, explores features of the development of mental abilities of children and approaches to their study, reveals the didactic conditions to ensure continuing development of mental abilities of preschool and primary school children. The author's particular attention is paid to the methods and techniques of motivation of cognitive activity, enhancing...
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The author has developed problem-developing exercises for the formation of the concept of “friendship” for preschool and primary school children, for the development of the concept of “thinking skills” for students and teachers.

Author justifies the need for training future specialists of physical culture and sports in the conditions of continuous physical training of the younger generation, in the context of such main areas as the accentuated development of physical qualities; teaching motor actions; upbringing and education. Describing the current approaches to the implementation of the principle of continuity, the author proposes a methodology for implementing pedagogical conditions of formation of students’ readiness to implement the principle of continuity in the physical qualities of children’s development. The author has developed problem-developing exercises of “physical quality”, “students’ readiness to implement the principle of continuity in the development of physical qualities of the preschool and primary school children”, questionnaire for teachers. Currently, our research team is actively engaged in scientific research to enrich the designed concept in terms of the synergistic and axiological methodological approaches.

2. Method

2.1 Identify Subsections

Experimental work on the formation of students’ readiness to implement the principle of continuity in the development of cognitive abilities of children was performed by us in the following areas:

- Study of the problem of formation of corresponding students’ readiness (at the following faculties: Of preschool education, pedagogy and methodology of primary education) for the development of cognitive abilities of children of preschool and primary school age.
- Study of readiness of teachers at preschool centers and primary school to implement the principle of continuity in the development of cognitive abilities of children.
- The following objectives were set during the experiment organization:
  - To determine the state of students and teachers’ readiness to implement the principle of continuity in the development of cognitive abilities of preschool and primary school children.
  - To develop pedagogical maintenance of process of formation of students’ appropriate readiness, taking into account the selected pedagogical conditions.
  - To test experimentally the effectiveness of the developed concept and technologies of students’ training for the realization of principle of continuity in the development of cognitive abilities of preschool and primary school children.

During the experimental work the following methods were used: The study of teaching experience, observation, questioning, testing, individual and group interviews with teachers and students, test sample surveys, modeling, ranking, methods of mathematical statistics.

In our experimental study, we tried to maintain the conditions ensuring similarities and immutability of educational processes in the experimental and control teams; to vary and dispense controlled conditions and the intensity of the factors that influence the final results; systematically evaluate, measure, classify and record the frequency and intensity of the current events of the experimental process, particularly those moments when the object of study gains resistant target characteristics.

2.2 Participant (Subject) Characteristics

Characterize the research base. At different stages of the experimental work, 65 kindergartners and primary school teachers were involved; 699 students of faculties of pre-school education and pedagogy and methodology of primary education also participated in the experiment. It was conducted on the basis of pre-school faculties and the faculty of pedagogy and methodology of elementary education at Magnitogorsk State University. The pilot study involved the municipal pre-schools No. 23, 25, 28, 29, 111, 118, 115, municipal educational institutions No. 8, 61, 64 in Magnitogorsk.

The formation of the experimental and control groups was carried out in accordance with the approximate parity enrollment, educational qualification of teachers, approximately the same working conditions.

In the process of theoretical understanding of the problem of our study, the following initial assumption requiring experimental verification was made: The identification of the real situation of students and teacher’s readiness to implement the principle of continuity in the development of cognitive abilities of preschool
and primary school children, as well as highlighted pedagogical conditions probably allow planning ways of improving vocational and pedagogical training of students and carrying out their experimental verification.

The formative stage of the experiment followed the definition of the initial data on the readiness level of the future teachers for the implementation of the principle of continuity in the development of cognitive abilities of children of preschool and primary school age. Once again, we note that we view the students' readiness studied by us as integrative holistic combination of motivational-value, theoretical and professionally practical components providing this activity success.

In the process of ascertaining the experimental stage it was necessary to solve the following problems:

- To develop the content and mechanism of diagnostics of students and teachers' readiness for the implementation of the principle of continuity in the development of cognitive abilities of preschool and primary school children.
- To identify the appropriate level of students and teachers' readiness.
- To develop objectives of formative stage of the experiment.

As a result of the qualitative analysis of the object of study, the corresponding components, their parameters, criteria and indicators of students' readiness to implement the principle of continuity in the development of cognitive abilities of children and their corresponding diagnostic materials, shown in Table 1, were identified.

Important criteria for professional knowledge assessment were: The amount of knowledge, the level of assimilation, awareness, effectiveness. As diagnostic indicators of these criteria, the following indicators: completeness, knowledge, strength, as well as depth of knowledge were chosen.

Coefficient of completeness of concept content mastering was calculated using the formula: $K(n) = \frac{n}{N}$, where $n$ is a number of mastered essential features of the concept by all students (correctly named and characterized); $N$ is a total number of essential features to be mastered by all students.

The coefficient of completeness of mastering the concept's volume was calculated using the formula: $K(o) = \frac{n}{N}$, where $n$ is the number of objects of the concepts mastered by all pupils (students) (correctly called the objects covered by this concept, and are characterized by their classification attributes); $N$ is the total number of objects covered by this concept, multiplied by the number of students.

The coefficient of completeness of mastering practical actions reflected by the concept was calculated using the formula: $K(p) = \frac{n}{N}$, where $n$ is the number of mastered (correctly named and characterized) practical actions; $N$ is the total number of practical actions, reflected by the concept.

Ratio the learned concepts durability was calculated using the formula: $P = \frac{K_1}{K_2}$, where $K_1$ is coefficient of completeness of mastering the content (volume, characteristics of practical action) of concept of the first verification; $K_2$ is coefficient of completeness of mastering the content (volume, practical action) of the concept of the subsequent verification.

When assessing the professional skills, an integrative quality of gnostic, organizational, structural, communication, reflective skills highlighted by us was

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Table 1. Characteristics of the diagnostic components of students' readiness to implement the principle of continuity in the development of cognitive abilities of children

| Readiness components | Parameters | Criteria | Indicators |
|-----------------------|------------|----------|------------|
| Theoretical knowledge | Professional knowledge | The volume of knowledge, assimilation level, awareness, effectiveness | Completeness, Depth, Strength |
| Value-motivational relation to the activity | Value-motivation relation to the activity | The nature of the process of self-discovery, availability of the requirement for self-education | Focus on self-development, creative self-realization, self-education |
| Professional skills | Professional skills | Integrative quality of gnostic, organizational, structural, communication, reflective skills | The focus of vocational and pedagogical actions creative, reflective, research |
an important criteria which in this study is defined by an aggregate of creative, reflective, research oriented professional actions.

When assessing the value-motivational relation to the relevant activities, the following criteria were necessary for us: The nature of the self-knowledge, the presence of the need for self-education. As the indicators of these criteria diagnosis, the following indicators have been selected: Focus on self-development, creative self-realization, self-education.

In this study the main methods of diagnosis of the developed criteria and their indicators were: observation, survey, testing and problem solving and research tasks.

Generalized result was determined as follows: Selection of intervals for grouping data on distributing students according to levels of readiness to implement the principle of continuity in the development of cognitive abilities of children was based on techniques developed by⁴⁸ according to which the average level of 25% is determined by the deviation of assessment from the average score ratings range, then the estimate from the range of R (min) to 0.25 R (max) allows stating a low level of development of personality. Assessments, exceeding 75% of the maximum possible indicate the high level. Based on this methodology, the levels of development of students’ readiness to realize continuity in the development of cognitive abilities of children was defined by the following intervals shown in Table 2.

| Table 2. Levels of students’ readiness development for realization of continuity in the development of children’s cognitive abilities |
|---------------------------------------------------------------|
| Apprentice  | Methodical  | Searching |
| Points       |             |           |
| 12-17        | 18-30       | 31-36     |

Introduction of scores for each indicator allows determining the efficiency coefficient of the conceptual model realization for training students to realize the principle of continuity in the development of cognitive abilities of children, which is defined by the formula:

\[ E_{eff} = \frac{m}{n} \]

where \( m \) is the actual number of points of all students.

\( n \) is the maximum possible number of points.

The level of efficiency of the conceptual model of students’ training developed by us for the implementation of the principle of continuity, in the development of cognitive abilities of children was determined by the method of⁴⁹ according to which the activity cannot be carried out effectively if the ratio is less than 0.7. The rule for determining the level of efficiency is shown in Table 3.

| Table 3. Efficiency level of model of students’ research culture |
|---------------------------------------------------------------|
| Efficiency coefficient value \((K_e)\) | Levels of efficiency of implementation of research culture development model |
| 0.9 ≤ K ≤ 1.0 | optimum efficiency (high) |
| 0.8 ≤ K < 0.9 | effective (average) |
| 0.7 ≤ K < 0.8 | minimally effective (low) |
| Less than 0.7 | ineffective (very low) |

The data obtained and their comparison at the ascertaining stage showed that most of students and teachers have an apprenticeship readiness level for the implementation of the principle of continuity in the development of cognitive abilities of children. The number of respondents on average is 53.16%; 28.16% of the study group have methodical readiness level for the development of cognitive abilities of children, only 18.68% of respondents on average have the search level. Thus, in general, at the beginning of the experiment, the number of students and teachers, with a search readiness level for the development of cognitive abilities of children on the basis of continuity, was by 2.85 times less than the number of respondents who have apprenticeship readiness level and by 1.89 times less than the number of students and teachers having a methodical readiness level. This is fully confirmed “the urgency” of problem under study in practice.

In addition, the comparative data on students and teachers who have some work experience in preschool have convinced that the results do not differ much from each other. Thus, the average number of teachers with the apprenticeship readiness level for the development of cognitive abilities of children on the basis of continuity, was by 2.89% less than the number of respondents who have apprenticeship readiness level and by 1.89 times less than the number of students and teachers having a methodical readiness level. These data suggest that in the course of professional work the teachers’ readiness level for the development of cognitive abilities of children has slightly changed without specially created pedagogical conditions.
During the analysis of the first phase of the experiment we conducted the comparison of results among students of different university courses. It was found that as for this criterion the majority of students have the apprenticeship level (53.66%) and only 18.36% on average have the searching level. Moreover, the number of students of the fourth year, with a searching level of readiness, on average, just by 0.74% more than the number of second-year students who have this level. At the same time, the number of second-year students who have (on average) the apprenticeship level of readiness, is by 0.19 more than the number of fourth-year students with the same level of readiness.

The data on the students of different faculties were analyzed. It turned out that the number of fourth-year students of the Faculty of pre-school education, with a search readiness level, on average, is just by 0.70% less than the number of the fourth year students of the Department of Pedagogy and Methods of Primary Education having this level. The data on the number of the fourth-year students of the Faculty of Preschool Education with apprenticeship readiness level are little varied; their number, on average, is just by 0.24% less than the number of the fourth year students of the Department of Pedagogy and Methods of Primary Education having this level.

On the basis of the results of the ascertaining stage of our experiment, the following conclusions were made:

- In the traditional conditions of work at high school, the students’ readiness to implement the continuity in the development of cognitive abilities of children has a relatively low level (apprenticeship).
- At pre-school and primary school educational institutions, teachers’ readiness to realize continuity in the development of cognitive abilities of children is also of a quite low (apprenticeship) level.
- For more effective implementation of the principle of continuity in the development of cognitive abilities of children of preschool and early school age, it is necessary to introduce special educational conditions.
- The difficulties that we had to face, is due partly to the very specific nature of cognitive activity, as well as the composition and multi-level readiness for these activity and teaching experience of our respondents.
- Results of the ascertaining stage of the experiment allowed determining the objectives and methodology of the formative stage of the experiment. The tasks of the formative stage of the experiment were determined as follows:
  - To improve the technology for students’ training to this activity.
  - To check the effectiveness of the implementation of the main elements of the developed conceptual model for students’ training to realize a principle of continuity in the development of cognitive abilities of preschool and primary school children.
  - In the course of the highlighted teaching conditions, the following areas of work can be defined:
    - To develop a training complex for the formation of students’ readiness to implement the principle of continuity in the development of cognitive abilities of children.
    - To simulate the developing educational space, in which a developed conceptual model and highlighted pedagogical conditions of training are implemented.
    - In the context of the objectives and the identified areas of work, we remind the highlighted pedagogical regularities of students’ training to realize the principle of continuity in the development of cognitive abilities of children:
      - Students’ training to implement the principle of continuity in the development of cognitive abilities of children depends primarily on accounting the specific circumstances of complementarity of rational and irrational components of children’s thinking, as well as in the knowledge of their own pedagogical thinking.
      - Appropriate training will be more effective in terms of the integrative unity of four approaches: Personal and active, conceptual and synergistic, contextual and reflexive, competency-based ones, which in many ways dominate in children and students' education.
      - The content of students’ training to realize the principle of continuity in the development of cognitive abilities of children should include the basic (invariant) and dynamic (variative) components.
      - The mutual dependence of the logic of material content with the methods, tools and guidelines for its implementation.

During the experimental work we have also used methods of studying of pedagogical experience, observation, questioning, testing, individual and group interviews with teachers and students, test sample surveys, modeling.
The formative stage of the experiment allowed us to test the developed concept of students' training for realizing the principle of continuity in the development of cognitive abilities of children, to determine the results effectiveness. The highlighted pedagogical conditions acting as a consequence of this concept include:

- Designing principles of complementarity and continuity in the content of the relevant training of future specialists.
- Implementation of the special psychological and pedagogical training of students through the developed training complex.
- Improvement of vocational and pedagogical thinking of students, aimed at conceptual and successive development of cognitive abilities of children, at the complementarity of knowledge and self-knowledge.
- Maximum use of active learning methods in different areas of students’ activity with the activation of their creative and reflective abilities.

These conditions were taken into account in the developed educational complex, whose main purpose was to improve vocational and pedagogical thinking of students on the basis of the study of psycho-pedagogical and managerial foundations of implementing the principle of continuity in the development of cognitive abilities of children of preschool and early school age.

In accordance with this purpose, the following tasks have been identified:

- To examine and assess the specificity of the relationship of pre-school and primary school education at the present stage.
- To generalize and systematize the available empirical approaches to the study of the child's readiness to school.
- To prove experimentally informative and organizational and methodological aspects of the principle of continuity in the development of cognitive abilities of children.
- To improve the vocational and pedagogical skills of students in the aspect of continuity in the development of cognitive abilities based on the formation of concept and imaginative children's thinking.
- To strengthen the independence and research skills of students in the course of creative tasks and program exercises.

A significant place during the training experiment has been given to the organization of students’ research work. The content of the organization of students’ research work has been reflected in the educational-methodical manual Methodology and Pedagogical Research Methodology. This guide is intended not only for students but also for graduate students, teachers; it is focused on improving research skills and methodological culture as a whole. Considering the development of research skills, we highlight the following related groups:

- Ability to work with the main categories of scientific knowledge: Levels of scientific knowledge, structural units of scientific knowledge (facts, ideas, hypotheses, concepts, laws, theories), etc.
- Ability to take into account the requirements of the methodology of scientific research.
- Ability to organize the logical sequence of work.
- Ability to recognize, evaluate their own level of methodological culture.

It should be noted that the abilities have a conceptual framework: the ability is the concept about the method in a reflexive action. The nature of their formation is influenced by not only the proposed training content, but also by the features of its construction, methods of its deployment. Awareness of the internal contradictions of this phenomenon, activation of mental operations and interpretation of the material according to its own study makes the content personally meaningful, allowing preventing hasty judgments.

Control and evaluation stage of the experiment included: Analysis of the obtained results; correlation of results with indicators of the ascertaining stage, goals, objectives and the research hypothesis, drawing graphs, charts, tables, reflecting students' readiness to conceptual and continuous development of cognitive abilities of children of preschool and primary school age, understanding of analysis and conclusions.

The results of the final diagnosis using K. Pearson non-parametric criteria \( \chi^2 \) have shown that the effect is due to changes in experimental learning technology: \( \chi^2_{\text{obs}} > \chi^2_{\text{crit}} \) (6.17> 5.99).

Thus, revealed and proven pedagogical conditions of students’ training to realize a principle of continuity in the development of cognitive abilities of preschool and primary school children make a certain contribution to the theoretical understanding of a complete picture of a single vocational and pedagogical training for pre-school and primary school education.
3. Results and Discussion

Developing the above-mentioned ideas in our study, we have made an algorithm for students for working out a programmed exercise for older preschool and primary school children:

- Identify the main ideas, goals, exercise of programmed tasks.
- Make a sequence of questions of a programmed exercise, denoting actions dominating at each stage of learning (stages of knowledge: 1. Base, 2. Core, 3. Consequence, 4. Total critical interpretation):
- Perception of the properties, attributes of objects, phenomena.
- Generalization of ideas (their abstraction).
- Dedicating essential and non-essential properties.
- Definition of the concept.
- Identification of connections and relationships with other concepts.
- Clarifying the scope, the extension of the notion.
- Are such semantic-symbolic and figurative means used in your formulation of questions and answers of programmed exercise?
- Pick up images, art word, riddles, proverbs, problem situations, etc. related to issues to enhance the conceptual and figurative thinking of children.
- Adjust created questions based on different types of mental feelings prevailing at each stage of the development of this concept: The similarities and differences of mental stress, surprise, expectation, astonishment, doubt, confidence, irreconcilable contrast, mental success. It is important to use the mechanism of change, switching the emotions of children.
- Check the contents of each issue of programmed exercise, taking into account the properties of concepts: generality, irreversibility, convolution, stage-by-stage approach, systematicity, reflexivity.
- Consider answers (3-4 variants), leave place for the creativity of the child in the responses of individual questions, based on the recommendations of [50];
- Programmed options of responses:
  - Define the boundaries of the field of mental action.
  - Indicate objects or certain aspects of the same object, on which thought should be concentrated.
  - Set a sequence of thoughts transition from one object to another at the initial stage.

- Contribute to the penetration of ideas in the essence of the object.
- Which pedagogical function implements each of the questions?
- What is the degree of autonomy, children's creativity answering each question?
  This algorithm directs students to the understanding of the movement of children's thought, allows connecting the independence and creativity in the process of the formation of scientific concepts.

4. Conclusions

Results of the conducted study confirmed the suggested hypothesis and allowed formulating general conclusions:

- The students' appropriate training should be organized, consisting in their readiness for the realization of the principle of continuity in the development of children's cognitive abilities.
- Pedagogical conditions of students training for the realization of a principle of continuity in the development of cognitive abilities of preschool and primary school children have been substantiated.
- Technological ensuring the appropriate training of students have been developed and tested, including target, structure, informative, functional, methodical, diagnostic, effective components based on the advanced developing education technologies, ensuring the development of value-motivational, theoretical, professional and practical component of professional readiness for pedagogical activity.
  In the course of the study its basic tasks have been solved, theoretical and experimental data supporting the original hypothesis have been received.
  Further investigation of problem of the study will contribute to the improvement of vocational and pedagogical training in the aspect of solving the problems of continuous pre-school and primary school education implemented in terms of distance education; it will expand opportunities for the scientific substantiation of the principle of continuity in personal self-realization of preschool and primary school children.

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6. References

1. Vygotsky LS. Educational Psychology. St. Lucie Press; 1997.
2. Galperin PYa. Lections on Psychology. Textbook. Moscow: AST; 2007.
3. Venger LA, editor. Didactic games and exercises in sensory education of preschool children. Moscow: Education; 2008.
4. Menchinskaya NA. Issues of education, upbringing and psychological development of a child. Moscow: MPSI, Voronezh: Modek; 2004.
5. Bukharova GD. Development of a complex of educational and visual aids for vocational guidance of students during teaching practice. Conduct of the Institute of Education and the Education of Young People; 2002.
6. Granatov GG. Modern natural science concepts (basis concepts system). Moscow: MPSI; 2005.
7. Davydov VV. Definition of mentality. Cultural and Historic Psychology. 2006; 2:3–16.
8. Leontyev AN. Lectures on general psychology. Moscow: Smysl; 2000.
9. Bezuglaya TI. Pedagogical conditions of maintenance of psychological health of children in preparation for school [Extended abstract on PhD on Pedagogy Science]. Kaliningrad; 2000.
10. Gutkina NI. Psychological readiness for school in the context of the problem of continuity between pre-school and school education. Psychological Science and Education. 2010; 3:106–16.
11. Lykova Vya. Morality and freedom in education. Proceedings of the International Slavic Academy of Education. 2004; 2:115–21.
12. Trubaychuk IV, et al. Competence model of preschool education. Monograph. Chelyabinsk: UMC Education; 2009.
13. Slastenin VA. Professionalism of the teacher as a phenomenon of pedagogical culture. Teacher Education and Science. 2004; 5:4–15.
14. Barabanschchikov VA. System organization and determination of the psyche. Monograph. Moscow: Russian Academy of Sciences; 2009.
15. Verbitskiy AA. Cross-cultural contexts in contextual training. Higher Education in Russia. 2007; 4:16–20.
16. Kuzmina NV. Philosophy and psychology: Methodological aspects of the theory of interaction. Pedagogy. 2001; 5:8–12.
17. Broström S, Wagner JT, editor. Early childhood education in five Nordic countries: Perspectives on the transition from preschool to school. Århus: Sytemic Academy; 2003.
18. Carver RL, Enfield RP. John Dewey’s philosophy of education is alive and well. Education and Culture. 2006; 22(1):55–67.
19. Einarsdottir J, Wagner JT, editor. Nordic childhoods and early education. Philosophy, research, policy, and practice in Denmark, Finland, Iceland, Norway and Sweden. Greenwich, CT: Information Age; 2006.
20. Elkjaer B. The continuity of action and thinking in learning: Re-visiting John Dewey. Outlines: Critical Practice Studies. 2000; 2(1):85–101.
21. Gribel W, Berwanger D. Transition from primary school to secondary school in Germany. International Journal of Transitions in Childhood. 2006; 2:32–8.
22. Hargreaves D. Personalising learning: Next steps in working laterally. London: Specialist Schools Trust; 2004.
23. Oskarsdóttir GG. Frá skóla til atvinnulífs. Rannsóknir á tengslum menntunar og stars [The transition from school to work. Research results]. Reykjavik: The University of Iceland Press; 2000.
24. Pianta RC, Cox MI, Snow KL, editors. School readiness and the transition to kindergarten in the era of accountability. Baltimore, MD: Paul H. Brooks; 2007.
25. Dewey J. Experience and Education. Available from: http://ruby.fgcu.edu/courses/ ndemers/colloquium/experienceducationdewey.pdf
26. Oskarsdottir GG. Educational transitions: Continuity or discontinuity. Available from: http://menntavisindastofnun. hi.is/throun_skolastars/educational_transitions_continui ty_or_discontinuity
27. Physical and Cognitive development. Available from: http://highered.mheducation.com
28. Good Practice Guidelines for Development Education in Schools. Available from: http://www.developmenteduca-
29. Journal of Developmental Education. Available from: http://ncde.appstate.edu/publications/journal-developmental-education-jde
30. Dice Project. Development and Intercultural Education. Available from: http://www.diceproject.ie
31. Institution for Development Education and Advancement. Available from: https://phillippincompanies.com
32. Definitions: Developmental Education. Available from: http://www.lsche.net/?page_id=86
33. Arendale D. Terms of Endearment: Words that Define and Guide Developmental Education. Journal of College Reading and Learning, Spring, 2005; 35(2):66–82.
34. Rubin M. A glossary of developmental education terms compiled by the CRLA task force on professional language for college reading and learning. Journal of College Reading and Learning. 1991;33(2):1–13.
35. Boylan HR. Developmental Education: Demographics, Outcomes, and Activities. Journal of Developmental Education. 2000; 23(2). Available from: http://ncde.appstate.edu/sites/ncde.appstate.edu/files/Developmental%20Education%20Demographics%20Outcomes%20and%20Activities.pdf
36. Development Education. Available from: http://www.icu.ie/globalsolidarity/education
37. NADE (National Association for Development Education). Available from: http://www.nade.net/aboutdeved.html
38. Developmental Education. Available from: http://www.thecb.state.tx.us/reports/PDF/1592.PDF?CFID=44856120&CFTOKEN=77621818
39. Kudryavtsev VT. Continuity of steps of the developing education: V.V. Davydov’s plan. Psychology Questions. 1985; 64.
40. Polivanova KN. Psychology of Age Crises. Moscow; 2000.
41. Rashchikulina E, Stepanova N, et al. Continuous Education in the Period of the Childhood. Magnitogorsk; 2013.
42. Rashchikulina E. Students’ training for realization of continuity principle in children’s cognitive abilities development. [Doctoral dissertation]. Russia: Magnitogorsk State University; 2006.
43. Stepanova N. Teachers training for development of emotional and cognitive readiness of the over-fives children for school training [PhD thesis]. Russia: Magnitogorsk State University; 2002.
44. Kondrashova E. Pedagogical conditions of local history concepts of formation at younger school students [PhD thesis]. Russia: Magnitogorsk State University: 2005.
45. Tuguleva G. Didactic conditions of continuity in thinking abilities development of preschool children and younger school students [PhD thesis]. Russia: Magnitogorsk State University; 2014.
46. Ilyina G. Realization of the continuity principle in physical qualities development of preschool and younger school children [PhD thesis]. Russia: Magnitogorsk State University; 2006.
47. Usova AV. Formation of learning and cognitive skills in the study of natural cycle subjects. Physics. 2006; 16. Available from: Fiz.1september.ru/article.php?ID=200601602
48. Kovervalga AA. Research methods in professional pedagogy. Tallin: Valgus; 1988.
49. Bespalko VP. Basics of the theory of pedagogical systems (problems and methods of psychological and pedagogical support for practical learning systems. Voronezh: VSU; 1997.
50. Tushkov MN. Didactic functions of students’ knowledge assessment and their realization by the multiple choice method [PhD thesis]. Leningrad; 1973.