Abstract. The article deals with the maintenance, technique and representation of results of the ascertaining stage of the experiment devoted to defining the levels of future teachers’ pedagogical thinking formation. Criteria and indicators of future teachers’ pedagogical thinking formation that correspond the structure and informative, motivational, operational and reflective components of the personal integrative characteristic have been defined. The author has used the complex of diagnostic techniques, directed at the revealing of future teachers motivation to pedagogical activity, investigating the styles of pedagogical thinking, studying real abilities to solve problem situations. The results give the possibility to divide future teachers into three levels of pedagogical thinking formation: creative, productive, intuitive.

The content of the ascertaining stage of the experiment was coordinated with the defined criteria and indicators of future teachers’ pedagogical thinking formation that followed the structure and was correlated with cognitive, motivational, operating and reflexive components of integrative personal characteristics. The complex of educational methods was intended to measure ideas about the nature of future teachers’ pedagogical thinking and ways of their optimal implementation, to identify the motivation to educational activities.

Key words: pedagogical thinking, pedagogical thinking formation, components of the pedagogical thinking, future teachers, the ascertaining stage of experiment, diagnostic methods, a technique, criteria, indicators, levels.

Introduction

Formation of future teachers’ pedagogical thinking is an important part of their professional training. Only highly qualified expert, who has an unconventional way of scientific and pedagogical thinking, is able to solve professional tasks adequately and effectively, to transform the educational reality, to achieve effective results, to meet the requirements of modern times.

The analysis of scientific sources on the study of pedagogical thinking confirms the existence of different approaches to defining its essence. This demonstrates the complexity of this phenomenon and makes it difficult to determine the main parameters of the levels measuring development. In addition, the majority of works related to the pedagogical thinking study applies to employed teachers, at the professional activities stage when identified deficiencies are hard to correct.

This lack of attention is given to investigation of pedagogical thinking characteristics at the level of future teachers’ preparation in higher education, when conditions are favourable as for revealing its real state, as for making the necessary adjustments in the educational process of higher educational school.

Researchers, applying to disclosure of pedagogical thinking essence, understand it as the process of finding, identifying and resolving problems during a professional educational activities (O. Mikhailenko); hierarchical process of nomination and resolution of subordinate tasks by a teacher (D. Likhachev); a generalized and indirect reflection of educational reality different manifestations (V. Bezrukova); the ability to use pedagogical ideas in specific situations of educational activities (Yu. Kuliutkin, H. Suhobska).

Vilkeyev D., Kiseleva T., Kornilov Yu. study creative pedagogical thinking and intend that the creativity is essential as to address the educational problems related to unforeseen situations and circumstances, thus for the implementation of structural projective actions.

S. Kashapov considers it to be possible to distinguish two levels of professional thinking skills, the existence of which proves the formation of teacher’s pedagogical thinking – the situational level (solving of
the complex of current, relevant pedagogical problem situations) and oversituational level (solving problem situations related to the prospect of teaching process development) (Kashapov, 2000).

The evaluation of results and forecasting further stage is impossible without educational assessment, that’s why one of our research objectives involved the conduction of the diagnostics of future teachers’ pedagogical thinking formation. The level of a future teachers’ professional activity raises, if the process of preparation is built on the system diagnostics basis; levels of the main components of activity are defined at different stages of professionalization; the set of difficulties are turned out on various stages of future teachers’ professional development; the interpretation of these difficulties takes place as professional development provisions (Lazareva, 2000).

Educational diagnostics is observed as a process of recognition events and their state determination at the given time on the basis of necessary parameters (Inhenkamp, 1991).

The purpose of the article is to reveal the content, methods and results of the ascertaining stage of the experiment, dedicated to the study of the levels of future teachers’ pedagogical thinking.

**Method**

To obtain data about future teachers’ knowledge on the aspects of pedagogical thinking, the survey was conducted via questionnaire test. To understand the motivation of future teachers in the teaching profession, the method of "Study of professional activity motivation" (C. Zamfir) was used. To determine the style of future teachers’ thinking, the test “Individual style of thinking” was conducted; summarizing of the results was carried out through mathematical methods.

**Results**

Paying attention to modern scientific views on the nature of pedagogical thinking, we regard it as integrative characteristic of future teachers, based on a thorough knowledge about the peculiarities of educational activities, provides a generalized and indirect reflection of professional reality, adequate professional advancement and solving problems. Integrative in structure, this characteristic covers motivational and valuable, operational and reflective components.

There were determined the criteria (theoretical erudition, professional orientation, implementation of educational activities, evaluation of educational activities) and their indexes (knowledge of the essence of pedagogical thinking and ways of its implementation (analysis, goal-setting, forecasting, planning), main characteristics (independence, flexibility, reactivity, criticality), methods and styles of pedagogical thinking realization to address professional and pedagogical objectives; focus on mastering the methods, techniques, styles implementing pedagogical thinking, the necessity of creativity in solving professional and educational problems, the desire to identify autonomy, flexibility, responsiveness, critical thinking; ability to apply the techniques and styles of pedagogical thinking (number of actions, their sequence, the legitimacy and feasibility), compliance with independence, flexibility, responsiveness, critical thinking, ability to solve professional and pedagogical situation; self-assessment (reflection), introspection of methods, techniques and styles of pedagogical thinking in terms of its independence, flexibility, reactivity and critical thinking.

Independent thinking skills we understand as the ability to put forward new tasks and find adequate solutions independently; flexibility as the ability to change quickly actions under the influence of circumstances, to exempt from fixed stereotypes of past experience; reactivity of thinking as the ability to understand the difficult situation quickly, to ponder and make the right decisions; the criticality of thinking as the ability to evaluate own and other people's thoughts objectively, to check all the provisions and conclusions carefully and thoroughly.

The work was carried out with future teachers of Pavlo Tychyna Uman State Pedagogical University, Hryhory Skovoroda Perejaslav-Khmelnitsky State Pedagogical University, Bohdan Khmelnitsky Cherkasy National University, Rivne State Humanitarian University. Overall, the ascertaining stage of the experiment involved 853 future teachers.

Formation of future teachers’ pedagogical thinking for the performance of the cognitive component was tested by using the authoring questionnaire that contained 10 questions related to the basic concepts of pedagogical thinking. Each question had three possible variants among which respondents had to choose only one that, in their opinion, was correct.
The generalization of the results showed that 20.3% of future teachers have correct knowledge. 44.7% of future teachers had some mistakes (correct answers outnumbered). 35.0% of future teachers had incorrect answers.

“Focus on mastering the methods, techniques, styles of implementing pedagogical thinking” has been chosen as one of future teachers’ pedagogical thinking formation indicator due to the fact that motivation causes peculiar evaluation of objective circumstances and actions under the circumstances, which acquire personal meaning.

To understand the motivation of future teachers in the teaching profession as a precondition for the development of their orientation in their pedagogical thinking, there were used “Study of professional activity motivation” methods (C. Zamfir) based on the concept of responsible methods of internal and external motivation. Internal motivation deals with the evidence of educational activities, methods, techniques and styles of effective pedagogical thinking availability. If the foundation of professional activity motivation, and therefore pedagogical thinking is based on the desire to meet other requirements on the content of the external activities (reasons of social prestige and salaries and so on) it is external positive motivation. The external motives are defined as external positive and negative ones. External positive motives are considered to be more favourable.

Text of technique consisted of seven statements that future teachers had to evaluate with a certain number of points. The results of internal motivation (IM), external positive motivation (EPM) and external negative motivation (ENM) were counted separately and aligned with the key.

This made it possible to define motivation complex of future teachers as the relationship of three types of motivation (IM, EPM, ENM) and set the satisfaction of future teachers by the chosen profession, their orientation toward mastery of methods, techniques, adequate pedagogical thinking styles. The last one was proved by the high prevalence of internal and external positive motivation over external negative motivation.

The obtained results show that 19.7% of future teachers inherent motivation scheme IM > EPM > ENM. 43.8% of future teachers motivational characteristics looked like EPM > IM > ENM, EPM > ENM > IM, that is seen as generally favourable. Both of these motivational systems are declared to be generally acceptable for the development of pedagogical thinking, but considered to require significant external support. At the same time there was the group of future teachers (36.5%) whose external negative motivation was dominated over the positive external and internal motivation (ENM > IM > EPM or ENM > EPM > IM). In such a hierarchy of motives future teachers are not targeted (or poorly targeted) at future professional activities as well as at the development of their pedagogical thinking and need substantial external positive reinforcement. The more optimal motivation complex was, the greater the pedagogical thinking formation towards the criterion “professional focus” was obtained.

Test “Individual thinking styles” was intended to determine the style of thinking which future teachers preferred and to detect the method of asking questions and decision-making (indicators of “awareness of methods and styles of pedagogical thinking to address professional and educational problems”, “ability to apply techniques and styles of pedagogical thinking (number of actions, their sequence, the legitimacy and feasibility). The questionnaire consisted of 18 statements which had five possible answers. Future teachers had to evaluate each of the options, using a five point scale: from 5 (the most suitable to me) to 1 (the least suitable to me). After that, all the results were counted and aligned with the key. Five options had to be equal in the amount of 270 points: S (synthetic style) + I (idealistic style) + P (pragmatic style) + A (analytical style) + R (realistic style) = 270.

The way of results interpretation is enlighten below. When respondents had from 60 to 65 points, evaluating some style, this indicated that they provided it with reasonable advantage. Scores between 66 and 71 showed that the respondent provided a significant advantage to certain style and systematically used it. 72 points indicated the full advantage of the style.

Due to the fact that putting high scores to specific styles, future teachers simultaneously exhibited the lowest possible scores to the others, the score counting was conducted as follows: from 43 to 48 points - moderate neglecting the style, avoiding it in solving important problems; 37 - 42 points - a persistent disregarding of this style of thinking; 36 or less points - a complete denial of the style, even if it is the best one under the certain circumstances.
Synthetic style of thinking is characterized by the desire to create something new and original, combining sometimes opposite ideas, views, setting of thinking experiments, removing contradictions and trying to reconcile opposite positions.

This is theoretical way of thinking. People with this style notice the contradictions in the judgments of others, attracting attention of others, tend to aggravate contradictions and try to find fundamentally new solution possible to integrate opposite views.

Idealistic way of thinking is manifested in susceptibility to intuitive, global assessments without detailed analysis of the problem. Its feature is an increased interest to the goals, needs, values and moral dilemmas. People who have this style, pay attention to subjective and social factors, try to reduce disagreements and focus on similar moments in different positions. They easily perceive the various ideas, successfully solve the problems associated with emotions, feelings, values, and sometimes have a utopian attempt to reconciling and uniting. The pragmatic style of thinking is based on direct personal experience, the usage of the information that is the most affordable, seeking specific results as quickly as possible. The behaviour of people with this style of thinking is often marked by superficiality, disorder, but they successfully define the tactics of behaviour, using existing circumstances in their favour, show flexibility and adaptability.

Analytical thinking style is focused on systematic and comprehensive analysis of the problem in view of the objective criteria, tending to its logical solution. People with this style of thinking perceive the world as a rational, orderly and predictable, so try to find a way that would allow rationally justify the solution of a problem.

Realistic style of thinking is directed only to the recognition of facts, the “real” is only what can be directly felt, seen or heard. This style is characterized by concreteness and instruction on correction of the situation to achieve a certain result.

Thus, individual style of thinking affects the ways of solving problems and behaviour models. Summarized results obtained by these methods are presented in the table.

<table>
<thead>
<tr>
<th>Styles of thinking</th>
<th>High Score</th>
<th>Low Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt;72</td>
<td>66 – 71</td>
</tr>
<tr>
<td>Synthetic style</td>
<td>19,3</td>
<td>19,8</td>
</tr>
<tr>
<td>Idealistic style</td>
<td>15,5</td>
<td>14,1</td>
</tr>
<tr>
<td>Pragmatic style</td>
<td>28,3</td>
<td>21,2</td>
</tr>
<tr>
<td>Analytical style</td>
<td>18,6</td>
<td>20,5</td>
</tr>
<tr>
<td>Realistic style</td>
<td>18,3</td>
<td>24,4</td>
</tr>
</tbody>
</table>

As the table presents, the majority of future teachers provided a significant advantage (for the high estimates) to the pragmatic style of educational thinking. As for the low ratings, the pragmatic style was dominated (i.e. its complete denial).

Some respondents equally positively (or negatively) identified several styles. Without denying the possibility and feasibility of such a particular situation, we want to note that more than a third of respondents showed differences between the choices having high and low estimates. It is considered as confirmation of their lack of the style essential features awareness, the difficulty to relate their real actions with certain parameters.

In the process of teaching we used diagnostic method of educational problems solving and method of teaching situation analysis (the indicators are “the ability to apply the techniques and styles of pedagogical thinking (number of actions, their sequence, the legitimacy and feasibility)”, “adherence to independence, flexibility, responsiveness, critical thinking”, “ability to solve professional and pedagogical situations”). Future teachers were asked to consider some pedagogical situations, isolate signs that reveal the inner subtext of the situation and help to formulate hypothesis, to find a solution, to reveal causal relationships between the factors and circumstances.

The result interpretation was carried due to the following: 4 points - the respondent distinguishes essential features, justified its decision, forecasts and project results of his own actions and the actions of students; 3 points - the respondent distinguished only some essential features, offered solutions to the problem, but felt difficulty with the reasoning of the decision legality, could not predict results, operated on the model; 2 points - the respondent had significant difficulties with essential features determining, acted on intuition, could not explain the actions.
Overall, five pedagogical situations were suggested. The respondent could gain maximum 20 points, minimum - 10 points. Scores from 18 to 20 points indicated future teachers with a high level of pedagogical thinking formation; 14 - 17 points showed the average level of pedagogical thinking formation; 10 - 13 points – the low one.

The results show that 19.8% of future teachers belong to the high level, 45.6% of future teachers – to the average level, 34.6% of future teachers – to the low one. The most common deficiencies (except those estimated at 2 points) were the lack of skills to aware and pick out the essential features of a situation, wish to appeal to external conditions and circumstances, difficulties in forecasting results and ability to coordinate them to concrete actions, anxiety to go beyond the known behaviour algorithm.

Generalization of results allows to divide future teachers into three levels of pedagogical thinking formation: creative, productive and intuitive ones. 19.8% of future teachers belong to the creative level of pedagogical thinking formation. They have extensive knowledge of the pedagogical thinking essence, ways of its implementation (analysis, targeting, forecasting, design) and basic characteristics (independence, flexibility, reactivity, criticality), understand the techniques and adequate styles of pedagogical thinking, aimed at a constructive solution of vocational educational problems; show a constant focus on mastering the methods, techniques and styles implementing adequate pedagogical thinking, creative solving professional and educational problems and the desire for creative expression, flexibility, reactivity, critical thinking; constantly and creatively implement pedagogical thinking (the minimum number of actions, their sequence, the legitimacy and feasibility), are able to implement autonomy, flexibility, responsiveness, critical thinking, systematically committed reflection, self-examination of pedagogical thinking techniques and styles, its evaluation due to the parameters of independence, flexibility, reactivity, criticality. 44.6% of respondents belong to the productive level of pedagogical thinking formation. They have unstructured knowledge about pedagogical thinking nature, ways of its implementation (analysis, goal-setting, forecasting, design) and basic characteristics (independence, flexibility, reactivity, criticality), generally understand pedagogical thinking techniques and styles using them in solving professionally appropriate pedagogical tasks; are characterized by situational focus on mastering the methods, techniques, styles implementing adequate pedagogical thinking, at the same time they have no need to address the professional and educational problems creatively (e.g., preferring the familiar algorithm) desire for independence expression, flexibility, responsiveness, critical thinking; pragmatism; they sometimes implement pedagogical thinking unproductively (increasing the number of actions, inconsistencies and appropriateness of actions) are able to implement autonomy, flexibility, responsiveness, critical thinking; reflection, self-analysis of the pedagogical thinking methods and styles, its evaluation due to parameters of autonomy, flexibility, reactivity, criticality are carried out with the support of a teacher.

35.6% of respondents are taken to the intuitive level taking into consideration that future teachers have fragmentary knowledge of the pedagogical thinking essence, ways of its implementation (analysis, goal-setting, forecasting, design) and basic characteristics (independence, flexibility, reactivity, criticality); often do not realize their actions to address professional and educational problems; they are not focused on mastering the methods, techniques, implementing adequate pedagogical thinking styles; feel no need either the creative or constructive (due to particular model) solution to vocational and educational problems, do not seek expression of independence, flexibility, responsiveness, critical thinking; are not able to use ways of pedagogical thinking implementation or admit serious errors in the carrying out relevant activities (chaotic, inconsistent, contradictory actions / inaction) that do not contribute to the positive result but prompted deterioration of the situation. These future teachers are unable to express independence, flexibility, responsiveness, critical thinking; they showed the lack of skills to implement reflection, self-examination of pedagogical thinking techniques and styles, inability to assess the parameters of independence, flexibility, reactivity, criticality or implementation of necessary actions under continuous teacher’s monitoring and support.

Discussion

The content of the ascertaining stage of the experiment has been coordinated with the defined by author criteria and indicators of future teachers’ pedagogical thinking formation that fulfil its structure and correlated to cognitive, motivational, operational and reflexive components of integrative personal characteristics.

Complex of educational assessment methods has been intended to measure future teachers’ knowledge, ideas about the nature of pedagogical thinking essence, ways of optimal implementation, motivation identification in educational activities as the main scope of pedagogical thinking representation, to investigate
pedagogical thinking styles which respondents preferred in the professional and educational activities, to
study skills of solving problems in educational situations based on the pedagogical thinking basic techniques.
The results allow to divide future teachers into three levels of pedagogical thinking formation: creative (high),
productive (average), intuitive (low).

Prospects for further research are in expansion of ascertaining experiment stage limits to measure other
indicators of the future teachers’ pedagogical thinking formation by means of appropriate methodological tools.

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