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Psycho-Acmeological Features of the Intellectual Sphere of Students with Hearing Impairments

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***Abstract*—The article deals with the psycho-acmeological features of the intellectual sphere of students having hearing impairments, revealed using efficiency criterion of educational and professional activities. As a result of the research of the intellectual sphere of deaf students, a high level of eye-mindedness and spatial thinking and the ability to predict the consequences of their own behavior were identified as psychological and acmeological. Recommendations for psycho-acmeological features development of the intellectual sphere of students with hearing impairments are made.**

***Keywords*—psycho-acmeological features; intellectual sphere; hearing-impaired students; educational and professional activity; speech disorder; spatial thinking; eye-mindedness**

I. INTRODUCTION

At the moment professional education in Russia is one of the priority areas for investments into development of the state, and human development acts as the main strategic target and an essential condition of social progress [14, 11]. Higher education of persons with hearing impairments focused on the development of their personality is associated with the actualization of compensation abilities of mind, the development of qualities that characterize the process owner. First of all professional and personal development of the specialist takes place in the process of professional and educational activities and is considered by us as a purposeful upward movement aimed to achieve new heights (acme) and to realize internal human resources. In line with the psychological and acmeological approach it is required to pay prime attention to problems of professional development of students with hearing impairments that will improve efficiency of their educational and professional activities and existing educational programs [6].

The serious requirements imposed to the technician mean development of future engineers from among persons with hearing impairments of psychological and acmeological features that are associated with the presence of certain competencies, allowing them to compete fully with the hearing in the appropriate professional environment. The attitudes of students with hearing impairments to the process of constant self-education and self-development cause qualitative changes in their cognitive abilities. It is necessary to organize vocational education so that during the period of stay at the University deaf and hearing-impaired students not only have mastered professional skills and became in demand on the labor market under harsh conditions of the competition, but also were capable of productive socially useful activity in the society of the hearing and could qualitatively fulfill requirements imposed on them as specialists, without making allowance for health limitations [1].

The special relevance is acquired by a question of creating conditions at the University for developing psycho-acmeological features of deaf and hearing-impaired students, which will be focused on enhancing their internal resources and compensation abilities of mind. This will allow to develop mechanisms of self-actualization, ability for abstract reasoning and critical perception of reality [10].

B.V. Zeygarnik argues that the same psychological patterns or mechanisms which define process of healthy mental development are the basis of the abnormal personality becoming. All personality development deformations arise under the influence of pathological process which creates special conditions for functioning of psychological mechanisms, other than those that cause process of healthy growth. Thus, the pathology itself is not an immediate cause of impaired mental development. The appropriate features only change mental processes and more precisely, perform function of special (pathological) conditions in which there is a process of the abnormal personality becoming [8].

If we consider the deficit type of abnormal development associated with the pathology of the auditory analyzer, then hearing difficulty or absence of hearing leads to dysfunctions directly associated with this analyzer (to speech underdevelopment as higher mental functions), as well as to throwing back those functions that are indirectly associated with hearing (first of all, it is a kind of development of cognitive processes). In comparison with other cognitive processes persons with pathology of the auditory analyzer have most of all features of brain building. Its main feature is the focus in every intellectual action of those mental functions which provide knowledge of reality. In the study we consider intelligence as a result of interaction of the environment and innate cognitive abilities. Actualization and development of innate abilities take place in special conditions of this environment. Certain disproportionality has been identified in structure of the intellectual sphere of persons, having pathology

of the auditory analyzer during development process of eye-mindedness and verbal reasoning. This fact can be explained by the phenomenon of intersystem compensation of disordered functions: the visual analyzer plays a leading role in the development of eye-mindedness and, thus, compensates hearing difficulty and deafness.

Hearing defect belongs to the category of pluricausal disorders; its causes are quite diverse. The seeds of disease (etiological factors), the age at which hearing loss occurred (before or after the period of speech acquisition), as well as social and pedagogical conditions and other manifestations of the disease have direct impact on the degree of hearing impairment [2].

The correct differentiation of persons with hearing impairment is of great importance for the organization of their education. The basic postulates of the L. S. Vygotsky's theory of compensation of mental functions, justifying approaches to training and education of children with hearing impairments, are put in the basis of R. M. Boskis' psychological and pedagogical classification. R. M. Boskis introduced several criteria (degree of hearing impairment, time of appearance of defect and the level of speech), in accordance with these criteria, the following groups were identified: deaf (deaf or early deafened) are persons with permanent bilateral impairment of congenital or acquired hearing (before speech acquisition), not knowing speech without specially organized training; hearing impaired (deaf) is person with partial hearing impairment, which, depending on the level of hearing, is able to acquire speech individually (nevertheless it has several disadvantages and needs additional correction in process of education); late deafened (deaf who could preserve speech) are those who lose their hearing after a period of speech acquisition and having a different degree of its preservation and they possess the skills of oral speech communication and the opportunity to reflect reality with the help of speech [4].

II. Materials and Methods

The aim of our study was to identify the psychological and acmeological s of the intellectual arena of students with hearing impairments. The study was conducted on the basis of the Center for vocational education of disabled people, which is included into Vladimir State University. The second and third year students have participated in this study. The age of test subjects is from 18 to 25 years. The total amount of students is 161 people, 106 of them had permanent bilateral hearing impairment of different severity (deaf and hard of hearing), and 55 people had no hearing impairments (conditionally healthy). All students, participated in the experiment, are receiving higher education in the following fields of study: "automation of technological processes and production", "Information systems and technologies", "Technical engineering management". Students with hearing disabilities are taught in special groups independently from the hearing.

The study used the following psychological diagnostic tools: analysis of the products of educational activities (examination and academic record), R. Amthauer's test of mental abilities [5]; J. Gilford and M. Sullivan's diagnostic test of social intelligence [12].

The leading activity of the young is educational and professional activity. During this activity, students acquire professional and important knowledge, master necessary competences, just in it all mental processes and personal qualities of students are developed. The psychological structure of educational professional activity of students of higher education can be presented as the complete system of important professional and educational qualities that form steady interrelations. This system is based on the structural blocks, which content is determined by the specifics of educational and professional activity [9].

The activity of the second and third year students has an academic orientation. According to most researchers, the main and almost the only quality parameter of educational and academic activities is academic performance. By performance E.A. Boyko means "the compliance of training of students with the requirements of content of education fixed after any considerable period of training, i.e. chain of classes, devoted to the study of one topic or course unit, academic term, semester, year" [3]. As experience shows, further the majority of students of Vladimir University with high academic performance successfully receive a master's degree and study for PhD, take an active part in scientific research, and occupy leading positions at the international conferences, competitions of scientific projects.

III. Results

To highlight the psychological and acmeological features of the intellectual sphere of students with hearing impairments, it is necessary to identify its general parameters that will characterize those young people who have achieved high results in educational and professional activities, comparing them with the category of unproductive students. To solve this problem within each category (deaf, hard of hearing, hearing) we have divided students into three groups: deaf students (n = 51) with excellent academic performance (n = 11), good academic performance (n = 26) and satisfactory academic performance (n – 14); hard of hearing students (n = 55) with excellent academic performance (n = 13), with good academic performance (n = 26), with satisfactory academic performance (n = 16); hearing students (n = 55) with excellent academic performance (n = 11), with good academic performance (n = 32), with satisfactory academic performance (n = 12). We have defined a group of students with excellent academic performance as productive, with good – as average productive, and with satisfactory - as unproductive (figure 1).

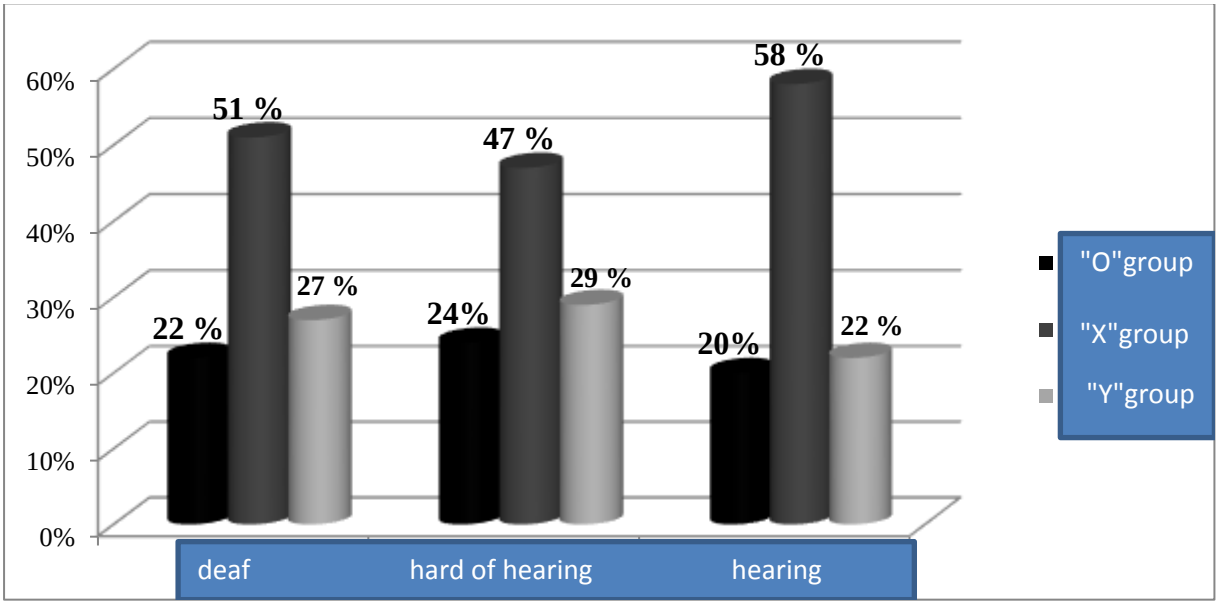

Fig. 1. The histogram of student grouping on the basis of the analysis of their academic performance. Note: "O" group – excellent academic performance; "X" group – good academic performance; "Y" group – satisfactory academic progress

Analysis of significant differences in intellectual performance was made between productive and unproductive students (with excellent and satisfactory academic performance) within groups of deaf, hard of hearing and hearing students. In addition, the differences were specified between deaf, hard of hearing and hearing students having the same category. For this purpose, we used the Mann-Whitney U test. The revealed differences will allow to establish the dominant indicators in the structure of the intellectual sphere of students with high productivity of educational and professional activity, performing acmeological function.

The logic of our study suggests that the number of psycho-acmeological features should include those intellectual features of students which are significantly higher in groups of productive deaf and hard of hearing students compared with low-productive ones. At the same time, the level of these characteristics should not differ from the same category of hearing or may even surpass them in these indicators. Successful students with hearing impairments are oriented in such a way to apply their abilities and internal mental resources to optimize their relations with the society, as much as possible to correspond to it and ultimately take a worthy place in it.

Self-isolation of deaf and hard of hearing students from society and speech problems complicate their social adaptation and successful integration into society of hearing, limit opportunities for interpersonal knowledge, understanding and predicting other people's behavior [7]. All of the above was the basis for the choice of the following methods of studying the intellectual sphere: R. Amthauer's Intelligence Structure Test (IST), J. Guilford and M. Sullivan's test "Diagnosis of social intelligence".

The results of the study indicate the great importance of intellectual abilities for carrying out productive educational and professional activities of students with hearing impairments. This is confirmed by a significant difference between the students, productive and unproductive in educational and professional activities according to general intelligence measure ($p \leq 0.01$) and to certain subtests of a test of mental abilities: definition of total (DT+; $p \leq 0.05$), exclusion of excess (EE+; $p \leq 0.01$), the determination of laws (DL+; $p \leq 0.01$), arithmetic (AR+; $p \leq 0.05$), the vectorial addition (VA+; ≤ 0.01), spatial awareness (SA+; $p \leq 0.01$). The results clearly indicate a high level of eye-mindedness development, which is based on the operation of spatial relationships and images. Eye-mindedness determines the general technical orientation of the intellect of deaf students (VA+, SA+) with their concrete thinking dominating the theoretical ones. Thus, as a leading psychological and acmeological indicator in the structure of mental abilities of deaf students, we take a high level of development of eye-mindedness and spatial thinking, firstly, because of the highest values of this indicator in the category of productive students in educational and professional activities of deaf students (average gradeis 110 on the IQ scale), and secondly, because of the predominance of statistically significant indicator value for the "vectoral addition" subtest (VA+) among productive deaf students compared with hearing ($p \leq 0.01$) and hard of hearing ones($p \leq 0.01$), and thirdly, as a cognitive sphere primarily affected by the hearing defect. Professional and important abilities of deaf students studying in technical fields are closely linked with the ability to handle spatial symbols and eye-mindedness development. Deaf students have significantly low values according to the general intelligence measure, all subtests related to the field of verbal intelligence (EE-, OS-, SA-, DT-) and mathematical subtests (DL-, AR-). Significant differences were not recorded in the level of development of verbal short-term memory (3). Such results indicate that the deaf students have a complex of problems causedby speech underdevelopment: low level of generalization and abstraction, difficulties with the formation of a scientific concept system (SA-, 80 points; DT-, 83 points on the IQ scale), a small stock of information and knowledge

(OS-, 88 points on the IQ scale), there are difficulties in the construction of logical thoughts and analytical and synthetic activity (DL -, 83 points; AR -, 82 points on the IQ scale).

Included in the structure of communicative abilities as a cognitive component, social intelligence determines the adequacy of the perception of other people actions, the ability to "read" their non-verbal reaction and, in certain circumstances, predict their behavior. Despite the fact that deaf students with excellent and satisfactory academic performance are characterized by an average weak level of social brain building (composite score according to the J. Guildford's test), in these terms significant differences are marked between them ($p \leq 0.05$). These differences are mostly caused by the unformed ability of the latter to predict the consequences of the other people's behavior and in accordance with this to build a strategy of their own behavior, to understand the intentions, thoughts and feelings of the participants of the communicative process (subtest "Stories with completion", average weak level; $p \leq 0.05$). However, deaf students are not far below hearing ones in the ability to analyze the situation of human interaction, to understand the logic of these situations (subtest "History supplement", the average rate; $p > 0.05$) and correctly assess the nonverbal reaction of the interlocutor (subtest "Group expression", the average rate; $p > 0.05$). Deaf students who are not proficient in oral speech, in contrast to the hearing have little difficulty in recognizing shades of meaning with the help of verbal messages in the context of certain social situations (subtest "Verbal expression", average weak level; $p \leq 0.01$), which determines a significant part of the differences in the general level of social intelligence ($p \leq 0.01$).

During the theoretical analysis of the literature, it was found that even a slight decrease of the level of auditory sense, but acquired in early childhood, will lead to speech development disorders, to the changing of the normal course of mental development of the child, will be the cause of psychological difficulties, which will necessarily affect the effectiveness of educational activities. At the same time, by the psychological characteristics of educational activities the hearing impaired students hold a borderline position between hearing and deaf.

Necessary conditions for mastering the basics of science are full interaction with the use of verbal means and the development of abstract thinking. As a result of the study it is established that hard of hearing students, as well as deaf have difficulties in formation of independent coherent speech, in mastering its grammatical system and a vocabulary. The study of the structure of intellectual abilities with the help of R. Amthauer's test revealed the following significant differences between productive and unproductive hard of hearing students: in the ability to form generalizations (DT+; p £ 0.01) and analogies (SA+; p £ 0.01), in the ability to establish logical laws (DL+; p £ 0.01) and to solve mathematical problems (AR+; p £ 0.01), in the ability to work on spatial symbols (VA+; p £ 0.05), and also in the general level of intelligence (p £ 0.01). In the process of observation, it was found that hard of hearing young people may have different levels of academic performance whether they speak at good level or approach the deaf by this characteristic. Obviously, for this reason, students with different levels of success do not differ in the volume of relatively simple information and knowledge from different areas of life (OS), the volume of verbal short-term memory (H), as well as the level of development of analytical and synthetic activity, which is expressed in the ability to perform the operation of comparing objects by abstract characteristics (EE).

L. I. Tigranova found that the level of verbal reasoning of hearing impaired students is inversely dependent on the degree of speech undevelopment [15]. The possibility of using residual hearing as a means of internal defect compensation is confirmed by the establishment of significant differences in the comparison of hearing impaired students with the same categories of deaf according to the verbal reasoning as the definition of laws (DL+; $p \leq 0.05$) and the search for analogies (SA+; $p \leq 0.01$). But, despite this, visual forms of thinking are prevalent in the hard of hearing students, productive in educational and professional activities, most have difficulties in forming an abstract concept system. Due to this characteristic hearing impaired students do not differ from the deaf. They reliably remain short of the hearing by every measures of verbal intelligence, which are presented in the R. Amthauer's test (OS-, IL-, SA-, DT). Deaf students have a tendency to template methods of solving mathematical problems (AR-, 85 points on the IQ scale) due to the inability to carry out a detailed analysis and synthesis of their condition.

Students with limited capacity for auditory sense have the potential to develop activities based on visuospatial thinking, such as the ability to engineer. Hearing impaired students with excellent academic performance are not far below the hearing in the ability to operate with two-dimensional images (VA+, 98 points on the IQ scale), the level of spatial awareness is also at a sufficiently high level (SA+, 98 points on the IQ scale) although its performance compared with hearing is significantly lower ($p \leq 0.01$).

The study found that the main part of the compensatory load in the structure of the intellectual sphere of hearing impaired students of Vladimir University corresponds to those cognitive processes that are associated with the reflection of socially significant objects (a person as a subject of communication or a group of people). The study of these processes was carried out using the J. Guildford's test. Students with excellent academic performance are significantly superior to students with hearing impairments in terms of social intelligence (p £ 0.01), which is at their level of average performance of the standardization group. Superiority is also noted in all structural components of social intelligence: the ability accurately to assess non-verbal reactions of the interlocutor (subtest "Group expression", the average rate; $p \leq 0.01$), the ability to anticipate the consequences of the behavior of others (subtest "Stories with completion", the level above average; $p \leq 0.01$), speech expression in the context of a certain communicative situation (subtest "Verbal expression", the average rate; $p \leq 0.01$) and the ability quickly to assess any changes in the structure of interpersonal interactions (subtest "History supplement", level above average; $p \leq 0.01$). The hard of hearing A-students more efficient than hearing students understand the intentions, thoughts and emotions of partners, follow the rules and norms of behavior; they are well-versed in facial expressions and gestures of the interlocutors, behave respectfully and tactfully towards others (subtest "Story completion"+; $p \leq 0.01$), and

then are successfully guided in all situations of interpersonal interaction (subtest "History supplement"+; $p \leq 0.05$). However, hearing impairment will prevent effective recognition of the true meaning of speech statements, which will depend on the context of the communication situation. In this regard, hearing impaired students often make mistakes by misinterpreting the words of interlocutors (subtest "Verbal expression"-; $p \leq 0.01$). According to this characteristic, they are approaching the deaf. However, this disadvantage is successfully compensated by the ability to understand nonverbal signals of the interlocutors.

IV. Discussions

Thus, in the process of studying the intellectual arena of deaf students as psychological and acmeological, we have identified two indicators: a high level of eye-mindedness and spatial thinking (subtest "Geometric addition" (GA) of R. Amthauer's test) and the ability to anticipate the consequences of their own behavior and the behavior of other people (subtest "Stories with the completion" of J. Guildford's test.)

As shown by the results of the study, the list of psychological and acmeological intellectual characteristics of the second- and third-year students with hearing impairment has been significantly expanded.In addition to the high level of development of eye-mindedness and spatial thinking (subtest "Geometric addition" of R. Amthauer's test), it was added characteristics of social intelligence (J. Gilford's test): the general level of social intelligence (composite assessment), the abilityquickly to assess non-verbal reactions of the interlocutor (subtest "Group expression"), the ability quickly to anticipate the consequences of the behavior of others (subtest "Stories with completion"), the ability effectively to recognize the dynamics of changes in the structure of interpersonal interactions (subtest "History supplement").

Thus, the intellectual sphere of the personality of hearing impaired students is the most effective psychological and acmeological direction of compensation of hearing pathology. In comparison with other structural components of the personality, it is just the most affected by the defect. Successful mastering fundamentals of sciences and effective communication skill formation in society becomes possible because of the fact that students have residual hearing, which primes the process of internal compensation.

To form a positive attitude to contact with others, we conducted a training of confidence in interpersonal relationships. During the training, the causes of uncertain behavior in situations of interpersonal interaction of students with hearing impairments were analyzed. As a result, students with disabilities were taught the skills of expressing their feelings, understanding themselves and their interlocutor, behavior was worked out in non-standard and conflict situations, students learned to defend their point of view in the discussion.

To develop the psychological observation of students with disabilities, we organized a training of sensitivity. Students learned to capture and memorize the signals coming from others; to overcome the interpretative limitations imposed by stereotypes of consciousness; to develop the ability to analyze and predict the behavior of other people, to predict the consequences of their own actions.

In the process of partner communication training it was supposed to master effective communication methods and techniques. Following the principles of partner communication helped to create an atmosphere of trust, openness and security in a student group [13].

To enhance the creative potential of students with hearing impairments and the development of creative thinking, special exercises were developed within the creativity training. In our opinion, creativity is an important factor that stimulates the individual to self-change and avoidance of patterns. During the training, students were able to realize the manifestations of creativity in their activities, it was identified the main barriers to the actualization of intellectual and creative resources of the individual.

One of the leading psychological and acmeological features of the intellectual sphere of students with hearing impairments is eye-mindedness and spatial thinking. Its development was carried out in additional laboratory and practical classes within the descriptive geometry course. A complex of mathematical exercises and special techniques, which are actively used by teachers of art and graphic schools, was formed.

V. Conclusion

On the one hand, it is reliably established that only those deaf and hard of hearing students who have a sufficient level of development of intellectual abilities, in particular spatial thinking and social intelligence, can show high results in educational and professional activities and effectively study at the University in the areas of technical profile. Their deficit cannot be compensated for by any other abilities, personal qualities or ways of carrying out activities. Thus, in the course of the study, the threshold model of intelligence was confirmed. In case of absence of these abilities it can be a question of student disablement. On the other hand, the active involvement of students with hearing impairments in educational and professional activities contributes to the development of the entire intellectual sphere and actualizes the corresponding compensatory qualities.

VI. Recommendations

According to the results of the study, recommendations for the development of psychological and acmeological features of the intellectual sphere of students with hearing impairments were developed. As tools for their development, it is proposed to use special psychological and acmeological technologies focused on self-actualization, development of personal potential, expansion of adaptive capabilities and growth of the level of professionalism. We have referred the following technologies to psychological and acmeological: developing and personality-oriented training with the use of active methods (problem-oriented laboratory and practical training, problem lectures), socio-psychological and acmeological training, project method. The listed Acme technologies should be aimed at the formation of a stable need for self-actualization, self-improvement and self-realization in the consciousness of a disabled student, what will make it possible to actualize a professionally oriented "I" of a person.

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