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Impact of a group reflexivity on intellectual competence formation of students

Impacto de reflexividad grupal en la formación de competencias intelectuales en estudiantes

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Resumen

La presente investigación aborda el problema de la influencia de la reflexividad grupal en la formación de competencias intelectuales. Se ha sistematizado la dinámica de indicadores intelectuales en la actividad educativa conjunta de los estudiantes en correlación con el desarrollo de la reflexividad. Los indicadores empíricos de la investigación de la reflexividad se establecieron utilizando los métodos de Karpov y Sharov; la determinación de indicadores de autoconocimiento mediante el método de Leshinsky, Kase; y la determinación de indicadores de potencial intelectual utilizando los métodos de Raven, Wexler y Bruner. Las influencias reflexivo-psicológicas (como complemento del proceso educativo tradicional) crean la correspondiente interdependencia con el nivel de desarrollo de las capacidades intelectuales. Los autores desarrollaron cursos especiales y programas de formación práctica para configurar las cualidades de la reflexividad grupal, la reflexión sobre las capacidades personales, la comprensión del propio futuro profesional, la preparación para el cambio, la conciencia de los propios motivos, las aspiraciones y fuentes de actividad para una mayor revelación del potencial reflexivo personal. En consecuencia, la eficacia de los programas de cursos especiales, de sesiones de capacitación sobre la formación de cualidades

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de reflexividad grupal, reflejo de las habilidades personales de los estudiantes, comprensión de su futura carrera profesional, preparación para el cambio, conciencia de motivos, aspiraciones y fuentes de actividad para el desarrollo posterior del potencial reflexivo personal, han sido probadas experimentalmente.

Palabras clave: ambiente reflexivo, reflexividad grupal, actividad educativa conjunta, habilidades reflexivas, indicadores intelectuales de CI, competencia intelectual.

Abstract

This research analyses the problem of the group reflectivity influence on the intellectual competence formation. The dynamics of intellectual indicators in the joint educational activity of students in correlation with the development of reflexivity have been systematized. Empirical indicators of the reflexivity research were established using the methods of Karpov and Sharov; determination of self-knowledge indicators using the method of Leshinskyi, Kase; determination of intellectual potential indicators using the methods of Raven, Wexler, and Bruner. Reflexive-psychological influences (as a supplement to the traditional educational process) create corresponding interdependence with the level of intellectual abilities development. Special courses and practical training programs were developed by the author for forming the qualities of group reflexivity, personal abilities reflection, understanding of one's professional future, readiness for change, one's motives awareness, aspirations, sources of activity for further disclosure of personal reflective potential. The effectiveness of the programs of special courses training sessions concerning the formation of qualities of group reflexivity, reflexion of students' abilities, understanding of their future professional career, readiness for change, awareness of motives, aspirations, sources of activity for the further development of personal reflexive potential has been experimentally proven.

Keywords: reflexive environment, group reflexivity, joint educational activity, reflexive abilities, intellectual indicators of IQ, intellectual competence.

Introduction

The issue of developing intellectual competence with a corresponding reflective potential is an urgent problem in the sphere of social workers' training. The solution to this problem will allow future social workers to carry out their professional activities effectively in various spheres of social practice (Grünhut, 2019; Fu et al., 2021). It makes it possible to understand "changes in organizational structure and management modes" (Zammel & Najjar, 2021, p. 2809). In the modern world, "the share of intellectual activity in the professional and social life of the individual acquires a more pronounced form and plays a significant role in human activity" (Zhernovnykova et al., 2017, p. 32).

Nowadays, reflection and intellect are regarded as important competencies of a professional in the social sphere (Ackerman, 2018; Oh & Choi, 2020). In particular, coordination of various groups and providing the atmosphere of helping-performance relationship within groups and the whole society is proved to be positive when group/team reflection is high and negative in the case of low reflexivity (Fu, 2021). This allows him to carry out social activities successfully, ensure the adequacy of getting knowledge and understanding of social reality, and to manage social relations and situations. In this case, Zhernovnykova et al. (2017) interpret the concept of intellectual competence as consisting of intellect itself and perceptive-analytical abilities.

In other order, group reflexivity means the orientation of a group to analyze its activities, as well as changes in this activity based on the results of the analysis, processes, and states of real behavior aimed at self-analysis of intra-group interaction (Shmarhun, 2013). Thus, reflexivity as a group characteristic was highlighted as the most important feature of a collective (or group) entity, along with cohesiveness and group activity. In this case, West (1996) introduced the concept of group reflexivity. Under this concept, the author means a certain extent when the members of the group are inclined to discuss the goals of their joint activities, methods of solving problems, and group processes, adapting them to the expected changes in internal and external conditions. At the same time, reflection means the metacognitive knowledge about personal cognitive processes and skills regulation of cognitive activity, an individual tendency to self-analysis, the idea of the mental health of other people, and awareness of their behavior (Semenov, 2015; Shmarhun, 2013), as a reassessment of experience gained (Bloom, 2010; Dror, 2007); because reflection provides development of critical thinking (Alrubail, 2016; Carlton, 2013).

Having analyzed the scientific literature, we can distinguish several basic trends or approaches for studying group reflexivity. So, it is defined as a factor in the effectiveness of joint activities (Tjosvold et al., 2004); the ability of a group or organization to learn (Karpov, 2004; Nicol, 2006). Due to the gap in the theoretical categorization of the interaction of intellectual competence and group reflexivity outlined above, as well as the need to explore in practice how group reflexivity depends on intellectual competence and vice versa, there is a demand for multitasking research.

In light of the previous background, the purpose of the scientific paper is an empirical study of psychological and pedagogical conditions of students' intellectual abilities formation as the basis of intellectual competence, depending on the development of group reflexivity. For the most part,

these concepts are considered in isolation and are too theorized. At the same time, there is a need not only for their joint theoretical substantiation but also for practical research of these two concepts in the synergy of interaction. This not only emphasizes the relevance of the presented scientific work, but also highlights its novelty.

Methodology

Design

First of all, this paper mentions the individual psychological features of a student: the desire for awareness, comprehension of reality; the ideas about the essence, the structure of reflexive activity, its goals, objectives; the maturity of intellectual operations i.e. the operating base of reflexive actions; self-perception as an active subject of a reflexive act. External (pedagogical) conditions are the following: the process of a specially organized reflexive-educational and cognitive activity of students; correlation of the educational process and students' reflexive experience, personal reflexion that can be developed only in a person, who is oriented towards self-development and reflexive learning with the output of an individual in an active research (reflexive) position regarding to his activity and himself as the subject of this activity.

Participants

The participants of the research were the students of the first and second year of the Faculty of Social Work of Chernihiv National University of Technology. They made up the experimental and control groups. The research was carried out during 2011-2015. The total study sample size was 77 people aged 17-22 years. There were 38 respondents in Experimental Group and 39 respondents in Control Group.

Instruments

The program of the educational experiment included two special courses "Development of Group Reflexivity in the Educational Process" (1-2 semesters) and "Fundamentals of Communication" (3-4 semesters). The aim of the special course "Development of Group Reflexivity in the Educational Process" was to acquaint students with psychological peculiarities of their future professional activity in a modern society; to form an idea about self-realization of a personality,

the role of qualities of reflexivity in this process; to inform the students about the system of needs of a personality.

The aim of the special course “Fundamentals of Communication” was the following: to familiarize students with the main aspects of the psychology of communication; to develop skills in communication and interaction; to form the ways of acquiring knowledge of the humanitarian cycle in the learning process. The program included the use of interactive and training forms as effective means of influencing, and was aimed at getting knowledge, developing skills and experience in the field of interpersonal relations; reflection as a basis for the development of a professional position, self-organization, cognitive and professional motivation; monitoring of knowledge acquisition using the following forms of control: assessment of students’ activity in classes, students’ written papers (essay), colloquium, tests, oral credit.

Data collection

Before the implementation of the special course into the educational process and after its completion, the students were diagnosed with group reflexivity, cohesiveness and general intelligence. The empirical indexes of reflexivity research were found out by means of Leshinsky and Kase (2021); method of determining self-understanding indicators, Karpov (2004); methods of determining the reflexivity indicators, by Sharov (2000); and a method on “Reflexivity of a person in life activity”.

In order to determine the indicators of intellectual competence development the following methods were used: Bruner's method to determine types of thinking and the level of creativity (Psychology of a happy life, 2012); progressive matrices of Raven (1997); the method for measuring the intelligence of Wexler for adults (WAIS) (Fylonenko, 1995). The latter method allowed to determine the verbal, non-verbal and general intellectual indicators of the IQ of the students who were under the investigation.

Analysis of data

The results of the study were processed on the basis of statistical package Statistica 6.0., SPSS .11.0. Based on the obtained data, visualized materials (tables, diagrams) were prepared, which will allow systematizing and better understanding of the achievements of the study. Not only quantitative-statistical, but also qualitative analysis of the obtained empirical data was carried out.

Important theoretical conclusions about the interaction of intellectual competence and group reflexivity were also made.

Ethical criteria

While conducting the research, all fundamental research ethics requirements (i.e., scientific integrity, truthfulness, and accountability) were met. The participants of the experiment were informed in advance about the peculiarities of the study, as well as they were instructed thoroughly on the stages of the study. Special written consent were obtained as for the processing of personal data. The impartiality of evaluation was ensured, as well as guarantees of the anonymity of respondents.

Results

Self-awareness, self-management, social consciousness and relationship management are typical components of the so-called emotional intelligence, which at the same time directly affects the entire structure of intellectual competence. Information on the peculiarities of self-understanding and self-awareness of the investigated (the methodology by Leshinsky & Keiis) made it possible to see how well-known students know themselves (Fig. 1).

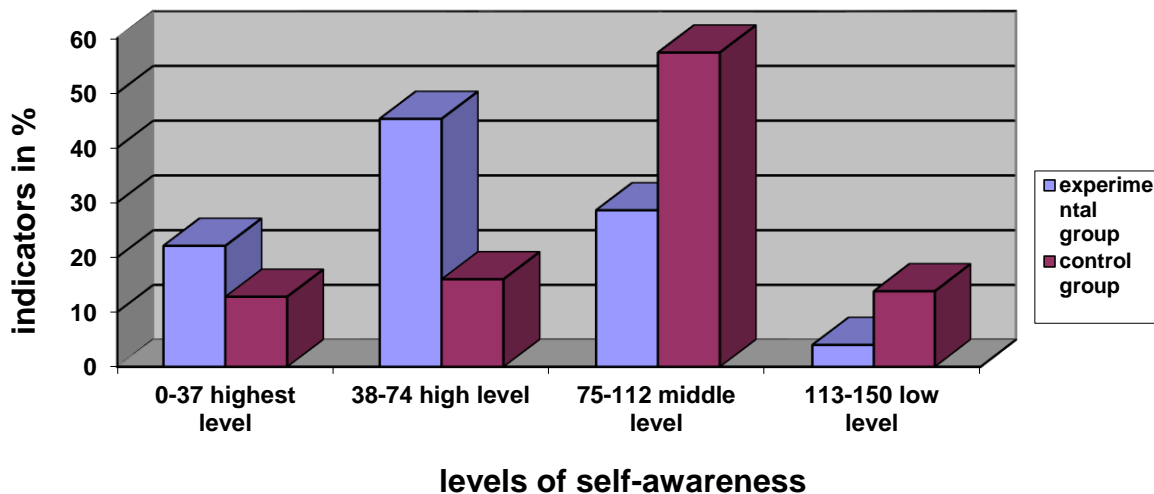


Figure 1. Indicators (%) of levels of self-awareness by Leshinsky, Kase method

As it can be seen from Figure 1, during the initial stage of survey, the biggest number of students turned to be those ones who felt that they knew themselves not so well, as they would like to. They would like to have a complete understanding of their own lives and specific steps to achieve their goals, but they have some hesitance due to the lack of a clear vision of their future. The students of the experimental group experienced probable changes in the indicators of self-understanding and self-awareness, in particular in the range of 75-112 points at the initial stage was 67% of the investigated, at the final stage - 28.6%, in the control group, respectively, 61.3% and 57.4% (significance level ($p < 0.01$) in the range of 38-74 points in the experimental group was 14.2% and increased to 45.3%. Regarding the control group, 13.1% and 16.0% of the investigated. So as one can see there is a significant difference (level of significance $p < 0.01$). We can state that the students had interest in their own personality and their development, the desire to master the methods and tools of self-awareness, self-understanding and self-development, i.e. knowledge concerning reflexive analysis.

One of the important characteristics of self-understanding is reflexivity that largely impacts the regulatory function of self-consciousness. The students of the experimental group in comparison with the initial measurement (Karpov method, Table 1) made the following changes: in the range of 7 stens the initial indicator was 31.2%, the final 57.6% (increase in 26.4%), in the control group, correspondingly, 32.3% - 41.7%. The difference is significant ($p < 0.05$). Moreover, significant difference was traced in the experimental group at the average level (from 4 to 7 stens, 48.2% - 31.4%, $p < 0.05$).

Table 1

The results of the diary of observations for writing

Levels (in stens)	(n = 38) Experimental Group		Control Group (n = 39)	
	1 assessment	2 assessment	1 assessment	2 assessment
High (from 7 stens)	31,2	57,6 **	32,3	41,7
Middle (from 4 till 7 stens)	48,2	31,4*	49,8	45,1
Low (less than 4 stens)	15,6	11,0	17,9	13,2

The significance of the difference at $P < 0.05$, ** at $P < 0.01$

It can be stated that during the experiment students from the control group, despite a certain dynamic, did not have significant changes according to this indicator. At the same time, while the

overwhelming majority of the students in the experimental group reached a high level of reflexivity during the two-year experiment, the control group remained on average regarding these indicators, some of them even at a low level. One can conclude that the students from the experimental group have better developed such processes of self- understanding as self-perception, self-observation, self-analysis, and, as a result, self-reflection. They have more objective knowledge about themselves than the students from the control group.

In order to study the influence of the designed and implemented special course on this particular aspect of reflexivity, the method by Sharov's (2005) "Human reflection in life" was used, aimed at identifying such qualities of reflection as self- management, awareness and validity, which according to Sharov theory are the stages in the development of the reflexive mechanism.

The study on students' reflexivity in life activity based on the method by Sharov showed that at the stage of initial testing students of the experimental and control groups did not differ significantly according to the level of development of all three reflexive signs, but at the stage of the final measurements a significant difference between the groups was found out in the level of self-management and awareness. As it can be clearly seen from the data presented, the dynamics of forming such a feature as a justification happened to be insignificant in both groups. This indicates that, in case when there is no corresponding reflexive environment, the students' reflectivity as integral and personal qualities can't be increased (Table 2 and Fig. 2).

Table 2

The dynamics of indicators of reflexivity in life activity (%) by A. S. Sharov method

Levels of reflexive signs	Experimental group n = 38		Control group, n = 39	
	1 assessment	2 assessment	1 assessment	2 assessment
Self-management	20,7	31,4 *	21,2,	24,7
Awareness	11,8	18,5 *	12,3,	15,3
Reasonableness	13,1	17,2	13,5	16,0

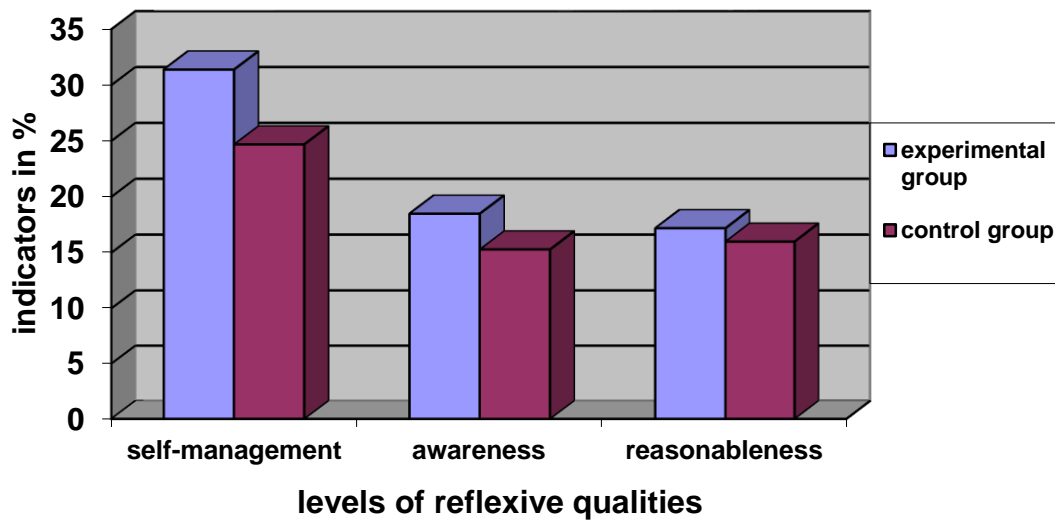


Figure 2. Change in the reflexive qualities by Sharova method “Reflexion in life”

Thus, reflexivity forms the person's perception of oneself, resulting in forming the relations of internal and external realities in a proper manner. It emerges as one of the mechanisms of human adaptation and development in a changing environment, which allows to be aware of the need for the transformation of individual consciousness and realize it for the purpose of productive activity. The special courses introduced in the educational process have contributed to getting new behavioral patterns characterized by activity and flexibility, which allows to supplement theoretical knowledge with practical experience from their own experience and experience of other participants. It develops significant personal qualities of a student, necessary for solving challenging educational case situations.

Regarding the indicators of intellectual development of students, one of the procedures aimed at measuring the level of development of creativity and general intelligence was to determine the dynamics of the formation of mental abilities studied by the method of Raven (1997). Having interpreted the scores for all series of initial and final tests into the IQ indicator, the following data was obtained confirming significant changes at the level of development of intelligence and general creative abilities of the students of the experimental group, while no significant changes in these indicators occurred in the control group. The average indexes of general intelligence in the experimental group at the initial testing were 109.48, with a total of 114.43 ($t = 2.16$, $p < 0.05$) (Table 3).

Table 3

The average indexes and confidence levels of the difference of IQ indicators (in points), method of Raven, progressive matrices

Group	Average group IQ indicators			
	1 section	2 section	t	P
Experimental, n =38	109,48	114,43 *	2,16	0,05
Control, n =39	107,86	109,07	1,13	0,11

* The significance of the difference $P < 0,05$.

At the stage of final testing of types of thinking and level of creativity studied by J. Bruner's method, it was found out that among the students of the experimental group the high level (interval from 10 to 15 points) was determined by the number of points in indicators of sign and figurative thinking. According to the indicators of subject thinking and creativity, we can state that the group has an average level (interval from 6 to 9 points). According to indicators of symbolic thinking – low level (interval from 0 to 5 points). For the students of the control group, the high level for all the analyzed indicators turned out to be unattainable. According to the indicators of subject, sign and figurative thinking, this group has an average level. The low level was based on indicators of symbolic thinking and creativity (Table 4).

Table 4

Types of thinking and creativity levels of the researched ones (points) (J. Bruner's method)

Types of basic thinking and levels of creativity	The subject thinking	Symbolic thinking	Iconic thinking	Figurative thinking	Creativeness
Experimental, n =38					
High			12	13	
Medium	7				9
Low		4			
Control, n =39					
High					
Medium	6		7	8	
Low		3			5

According to the average meanings of the coefficients of variation, the students of both groups differ greatly. Regarding the dynamics, it can be claimed that the largest changes in the

indicators of general, verbal and nonverbal intelligence for the indicated period were seen in the experimental group. The most significant difference was traced in the scales “general awareness”, “similarity”, “dictionary”, “smart”. It should be mentioned that the students of the experimental and control groups differ to the great extend according to these verbal scales. Concerning non-verbal functions, it should be noted that the greatest differences in the indicators among the compared groups were observed in Kohs Block Design Tests, “making figures”, “missing details”, so to say in perceptive indicators. In the experimental group, positive dynamics was also observed in the perceptual skills and abilities $p < 0.078$ and $p < 0.040$ (Table 5).

Table 5

Average indexes of the difference and its reliability according to the initial and final measurements IQ (2012-2014)

D. Weeksler's method indexes	Experimental n = 38	Control n = 39	P	P ₁
	difference			
IQ-general	3,429	-2,350	0,013	0,027
IQ-verbal	-5,971	-3,642	0,000	0,004
IQ-non-verbal	2,971	2,142	0,009	0,011
Awareness	1,238	-1,783	0,026	0,031
Stubbornness	-0,638	-2,135	0,024	0,037
Arithmetic	0,987	-0,294	0,039	0,673
Similarity	0,457	-0,551	0,058	0,427
Vocabulary	-0,618	-4,379	0,022	0,000
Digital series	1,713	-2,351	0,007	0,001
Missing details	-1,467	0,234	0,010	0,665
Sequence of pictures	-0,806	0,267	0,036	0,606
Cubes	-1,154	0,870	0,001	0,145
Assembling figures	-0,447	1,579	0,086	0,006
Coding	-0,800	2,890	0,037	0,000
Verbal comprehension	2,76	7,03	0,693	0,000
Spatial organization	4,33	2,87	0,039	0,078
Working memory/attention	4,13	4,68	0,048	0,040

Notice. P - the level of significance of the difference in the research group, P₁ - control level.

Discussion

In order to fulfill the comparative analysis based on W. Weeksler's methodology (WAIS) we included indicators of general, verbal and nonverbal intelligence, as well as the level of development of certain cognitive functions. In addition, the indicators were calculated by three structural components, factors which were outlined during factorization of the results of the study. The inter-text scattering (variation) indicators were also taken into account in the process of analysis. The coefficient of variation used as an indicator of the variability of cognitive functions, which clarified the peculiarities of the infrastructural organization of intelligence.

Thus, the following indicators were analyzed: IQ general; IQ verbal; IQ nonverbal; the success of each of the 11 subtests of Wexler Test; indicators of the factor "Verbal understanding" (amount of points for such subtasks as awareness, smart, similarity, dictionary); indicators of the factor "Spatial 14 organization" (the sum of points for subsets of Kohs Block Design Test, making up figures, missing details, sequential drawings); indicators of the factor "working memory/ concentration of attention" (sum of points by subtest arithmetic, digital rows, coding); coefficients of variation (general, verbal, nonverbal). These indicators were the subject to correlation and factor analysis.

The article presents average indicators in the groups under research and the level of significance of the difference (according to Student's t-test) at the stage of final testing. The students of the experimental group generally with a high degree of certainty differ from the students of the control group regarding the level of psychometric intelligence (general, verbal, nonverbal). The same results can be seen concerning a number of subtasks. Indicators of the manifestation of the three structural components of intellectual performance illustrate the following tendency: verbal abilities are the dominant integral component of the general intelligence while "spatial organization" and "working memory/ concentration of attention" are the factors of less significance. Moreover, we noted the following consistent pattern: the students of the control group have much bigger variability of cognitive functions comparing with the experimental one. It has been established that high variation is in direct relation with low productivity both in general, verbal, non-verbal IQ and as well as by individual subtests.

Limitations of the study

The current study took into account indicators of intellectual competence and indicators of group reflexivity. The criteria taken and the tools used are sufficient to draw reliable conclusions about the direct interdependence between intellectual competence and group reflexivity. However, a number of limiting factors need to be taken into account: the limited number of respondents, the fact that participants were taken from only one area of training and for a limited period of time. It is important to test the same research methodology within other specialties and track changes in empirical data. In addition, supplementary criteria might be taken into account (i.e. individual characteristics of group members, psychological climate within group, indicator of mental activity, etc.) as well as extra practices to stimulate reflexivity (for example, aesthetical reflection). The listed might be chosen for further researches.

Conclusions

The results of the research show that reflexive techniques allow to make a radical change and restructure the original intellectual structures. The leading dominant of this area of activity must be the design of psychological and pedagogical conditions for the formation of productive thinking, reflexive abilities and the activation of the self-consciousness of the students as carriers of reflexive and environmental influences.

It is proved that creating a reflexive environment in the educational process of a higher educational institution will allow to direct students towards the reflection of their educational and professional activities and transformation of reflexive experience into their future professional sphere. In sum, the research has shown that the development of reflexivity in a group contributes the obtaining of new behavior patterns, which are characterized by activity, flexibility, and allows supplementing theoretical knowledge with practical experience from their own experience and experience of others.

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