

**EdCW 2020****International Scientific and Practical Conference Education in a Changing World: Global Challenges and National Priorities****PSYCHOLOGICAL STRUCTURE OF PROFESSIONAL RELIABILITY AS UNIVERSITY STUDENTS' METACOGNITIVE QUALITY**

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**Abstract**

The article examines the professional reliability of university students as a complex, multicomponent level education, invariant in its composition to the professional activity system. Professional reliability is viewed from the standpoint of metacognitivism as a meta-education, which is a system with a “built-in” metasystem level. Professional reliability can be investigated in a strict sequence of research plans – metasystem, structural-level, functional, genetic and integrative. The structure of professional reliability is isomorphic to the components of the professional activity system and is represented by the goal, motivation, professionally important personality traits, the information basis of the activity and the activity program. The functional plan reveals the mechanisms of reliability functioning. The genetic study plan shows the dynamics of the reliability development in time according to the system genesis and metasystem genesis laws. The integrative study plan assumes a holistic view on professional reliability as a conceptual scheme, reflecting its component structure and the relationship between components and their dynamics. The scientific novelty of the research lies in defining the content of the professional reliability structure as a metacognitive quality, clarifying the meta-reliability construct, in describing its structural and functional organization and genesis.

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## 1. Introduction

The high dynamism of modern life is a challenge for professionals. Their work requirements are paradoxical – high speed of activity performance, multitasking without quality loss and performance reliability.

This results in formulating new research task – considering professional reliability not as a separate property or professionally important quality along with others, but as a systemic education, a metacognitive personality quality, which combines secondary processes and personality qualities – self-regulation, reflection, subsystems of professionally important qualities. Studying reliability as a metacognitive quality allows us to raise the question of its structure and functional purpose.

Of particular importance is the study of students' professional reliability. The professional reliability system formed at this stage will ensure quick adaptation to new conditions and the employee functioning at the expected efficiency level when moving to the next stages.

## 2. Problem Statement

The analysis of theoretical approaches to the study of a person's professional reliability allows us to conclude that, to date, a significant amount of theoretical and empirical knowledge about professional reliability has been accumulated in psychology: reliability factors have been studied (Kruk, 2010; Nebylitsyn, 1964; Nikiforov, 1996; Osadchuk, 2008a); different reliability types have been distinguished (Bodrov, 1989; Kruk, 2010; Nikiforov, 1996; Osadchuk, 2008a); personality traits providing professional reliability have been described (Nikiforov, 1996); violations of professional reliability have been studied in detail (Nebylitsyn, 1964); the mechanisms underlying individual' professional reliability have been described – self-control (Nikiforov, 1996), self-regulation (Konopkin, 1995; Morosanova et al., 2019; Morosanova & Sagiev, 1994; Morosanova, 2013; Osadchuk, 2008b); psychodiagnostic study methods have been developed (Sidorenkov, 2013).

However, insufficient attention is paid to the study of reliability at the stage of future specialists' professional training. Although this period is a sensitive one for students to actualize their professional reliability.

The existing theoretical and empirical prerequisites allow us to solve the problem of possible interconnection between the professionally reliable person's metacognitive processes and the interpretation of its functioning patterns. The assumption that there is such a relationship has quite strong prerequisites.

First of all, the aspect uniting two categories being considered is that both professional reliability and metacognitive processes and personality traits act as operational means of information processing. In relation to professional reliability, the result of such processing is systemic education. Metacognitive processes perform a regulatory function. Consequently, both professional reliability and metacognitive processes and qualities are components of the psyche cognitive subsystem and must somehow be co-organized in it as a metacognitive quality – meta-reliability.

Secondly, both professional reliability and metacognitive processes are united by the presence of a regulatory component, which ensures the regularity of the professional reliability system components and their integration (Osadchuk, 2008b).

Thirdly, reliability can be directed both to the external environment and determine the success of any activity, and to the internal one, that is, it can be addressed to itself and influence the content and organization of the psyche components, in particular, metacognitive processes and qualities – self-reliance from Kruk (2013). The latter provides grounds for considering reliability as a factor in the internal organization processes.

Currently, research on the formation of various meta-qualities and personality processes is being actively conducted (Karpov & Karpov, 2016; Karpov et al., 2017, 2018). Creativity, personality's regulatory abilities (Karpov, 2013), self-organization and modeling (Klimontova, 2009), reflection of professional activity (Karpov, 2015; Shadrikov, 2013; Karpov & Klimontova, 2016; Shadrikov & Kurginyan, 2015) have been studied. Methodological principles of system genesis, metasystem genesis and metacognitivism make it possible to describe the essence of professional reliability as meta-reliability, its structure and levels, and to present its genesis. It is worth noting that such studies on professional reliability were conducted within the framework of the system approach, but not at the level of metasystemic and metacognitive approaches (Osadchuk, 2008a).

### **3. Research Questions**

- What is the structure of professional reliability at the level of components, subsystems, systems and metasystems?
- What is the dynamics of the professional reliability structure as a metacognitive quality among students from the 2nd to the 4th year?
- What are the patterns of professional reliability development among university students?

### **4. Purpose of the Study**

The aim of the research is to describe the structure of professional reliability as a metacognitive personality trait.

### **5. Research Methods**

The organization and conduct of empirical research were aimed at studying the structure of professional reliability as university students' metacognitive quality.

The methodological apparatus of the study included the following methods:

- Multidimensional professional psychological personality test (MPPPT), developed by Sidorenkov (2013);

- “Students' self-regulation style –SSS” method by Morosanova et al. (2019),
- the activityreflectiontest by Shadrikov and Kurginyan (2015);
- method of metacognitive knowledge and metacognitive activity self-assessment by Yu. V. Poshekhonova, M.M. Kashapova (as cited in Karpov, 2016).

Methods of mathematical data processing: Spearman correlation coefficient, U-Mann-Whitney test, and factor analysis.

The empirical study was carried out on a students' selection, in the number of 61 respondents, including 2<sup>nd</sup> year students (21 people), 3<sup>rd</sup> year students (20 people), 4<sup>th</sup> year students (20 people).

## 6. Findings

As a result of theoretical and empirical research, a conceptual scheme of professional reliability in an attributive form is presented, which allows us to conclude: professional reliability, as a metacognitive quality, is of complex nature, it is the result of secondary processes co-organization (self-regulation, professional activity reflection), metacognitive characteristics, and first-order mental qualities. And it can be represented as a system with a built-in metasystem level.

To prove it, the empirical study was built from the standpoint of a complex systemic study and touched upon the structural-level implementation, functional and genetic plans in the system analysis algorithm.

The structural-level study plan implied a detailed study of the professional reliability structure at the levels of components, subsystem, system and metasystem.

For this purpose, factor analysis was carried out. Based on the results of the analysis and understanding of the factor analysis results, Figure 01 shows a conceptual diagram.



Depicting the pyramid of levels “on its side” helps to overcome the idea of a hierarchical structure of meta-reliability levels.

Reliability, as a system property, is represented in all factors, forming intra- and inter-level relationships. This proves the structural integrity of professional reliability as a metacognitive quality.

The content of the professional reliability structure is isomorphic to the components of the professional activity system, which is reflected in Table 01.

**Table 1.** Summary table of indicators of professional reliability structural analysis as a students’ metacognitive quality

Year (group)	2	3	4
Number of elements in the structure	28	28	23
SCI	252	130	368
SDI	106	62	151
SOI	146	68	217
Homogeneity / heterogeneity (express $\chi^2$ values for a pair of subsequent groups)	0.185	–	–
Average arithmetic components weight	9	4,6	13
Basic components (weight)	R (19)	Pr (13)	MK (32)
	C (19)	MK (11)	RI (30)
	M (19)	RI (10)	MA (29)
	ER (18)	I (10)	Pr (28)
	SC (17)	MAGS	R (26)
	SMS (16)	(9)	C (26)
	TM (14)	M (8)	PI (26)
	I (14)	MA (7)	MAGS
	MAGS	MIS (7)	(23)
	(12)	PM (7)	I (23)
	Pr (10)	ER (6)	TM (22)
	MK (10)	Ma (6)	MIS (21)
		SC (6)	ER (20)
		R (5)	M (14)
			SC (14)

Note: SHI – structure coherence index; SDI – structure differentiation index; SOI – structure organization index; PI – Planning; M – Modeling; Pr – Programming; RE – Results evaluation; I – Independence; R – Reliability; MA – Motivation for achievement; SC – Self-confidence; SMS – Social and mental stability; IAB – Information Activity Basis; MAGS – Motivation and activity goal-setting; MK – Metacognitive knowledge; MA – Metacognitive activity; C – Concentration; RI –Receiving information; MIS – Main ideas selection; TM – Time management

The implementation of the functional plan of the study implied considering the dynamics of the professional reliability structure as a second-to-forth-years students’ metacognitive quality. Using Spearman's rank correlation coefficient, the inter correlation matrices of secondary processes and personality traits indicators were calculated.

The 2<sup>nd</sup> year students’ structural chart is characterized by numerous interconnections of components at a high level of significance ( $p \leq 0.01$ ). It can be assumed that the inclusion of a large number of components in the functioning of professional reliability is due to the inclusion and adaptation to new conditions, an increase in the proportion of independent work with a decrease of teacher’s control.

Significant quantitative and qualitative changes are observed in the 3<sup>rd</sup> year students' structural chart. There is a significant decrease in the integrating and organizing professional reliability structure, a decrease in the components inclusion (while maintaining their total number) and a decrease in their weight in the structure. This is evidenced by a decrease in the coherence index and structure organization. The structural organization of professional reliability is due to the transition to practically applying knowledge.

In the 4<sup>th</sup> year students' professional reliability structure there is an increase in the system coherence and organization, an increase in the weight of components in the structure, which reflects the integration processes in the professional reliability structure. At this stage, the components are combined into a complex system and, at the same time, the differentiation of individual subsystems increases. Such a system becomes capable of forming its own goals based on the changing situation.

In the genetic aspect, professional reliability as a system with a built-in metasystem level obeys the principles of system genesis and metasystem genesis:

- the principle of simultaneous system components laying (the full professional reliability structure was already recorded among 2<sup>nd</sup> year students);
- the principle of uneven development (in dynamics, there is a change in the number of the structure components and the relationships between them, integration indicators fluctuations, system organization, the average components weight in its composition);
- the principle of target determination (at each stage, those components which can ensure the achievement of goals have a greater weight in the structure);
- the principle of situational determination (the system becomes able to form its own goals based on the changing situation);
- the principle of heterarchy (types of reliability are not implemented sequentially, but in the totality of connections and mutual transitions between levels).

## 7. Conclusion

Therefore, based on the analysis of empirical research data, it is possible to summarize. Person's professional reliability is a systemic structural-level education, including component, subsystem, system and metasystem levels.

The level organization of the professional reliability structure as a person's metacognitive quality obeys the principle of heterarchy and is not implemented sequentially, in the totality of connections and mutual transitions, has the following levels: metaactive reliability, regulatory reliability, cognitive reliability, command reliability (dependence on a group), resultative reliability and reflexive reliability...

As a result of this interaction, a mechanism of a systemic productivity is formed, which transforms the systemic quality of reliability into meta-reliability. It is determined by a meta-goal, which organizes and selects system components to solve multitasking problems, to overcome the subject areas complexity and professional self-determination in any field of activity.

The development of the components of the personality's professional reliability structure as a personality's metacognitive quality occurs according to the laws of system genesis (simultaneity of laying

the main system components, asynchronous formation, and target determination), and metasystem genesis (heterarchy, situational determination, actual and potential in the component content of the structure).

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