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Relationship between school staff's adaptation models and the dynamics of teachers' attitudes towards
technology in the context of the urgent transition to distance learning

Summary of the thesis

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Information about the applicant and the dissertation research

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The main findings of the research are reflected in the following publications by the author:

1. Koroleva, D. O., Andreeva, A. A., Khavenson, T. E. (2023) Shock Innovation: Conceptualization of the process of digital transformation in education during the pandemic. *Obrazovanie i samorazvitie*. 18(2). 100-117.
2. Andreeva, A. A. (2022). Adaptation of school staff to the urgent transition to distance learning through the prism of organizational coping strategies. *Mir psikhologii. Nauchny i metodologicheski zhurnal*. 110(3). 10-25.
3. Andreeva, A. A., Korotkova, M. D., Miroshnikova, D. I., Slautina, E. A. (2024). Forced transition to distance learning: How teachers' attitudes towards

technology changed depending on the adaptation strategy of their school. *Obrazovatel'naya politika* (in press).

4. Andreeva, A. A., Koroleva, D. O., Kosaretsky, S. G., & Frumin, I. D. (2024). Pandemic Lessons: Story of Cooperation and Competition in Russian Education. In: F.M. Reimers (Eds.), *Schools and Society during the COVID-19 Pandemic*. Springer. (pp. 169—192).

5. Koroleva, D., & Andreeva, A. (2024). The conceptual framework of shock innovation in education: non-diffusive spread of innovations triggered with the pandemic. *Innovation: The European Journal of Social Science Research*, 1-15.

The results of the dissertation research were presented at the following scientific conferences:

1. International diversity in teacher and higher education research in the 21st century: insights from doctoral students, supervisors, and doctoral school leaders. Breakout session report: "Russian schools' strategies to cope and innovate as a response to COVID-2019." 4th December 2020. Budapest, Hungary.

2. Trends in Education Development. Session report: Urgent transition of schools to distance learning as a shock innovation." 18th February 2021. Moscow, Russia.

3. X Scientific Conference: Neighbors in science. Breakout session report: "Reaction of school staff through the prism of coping strategies: dilemmas of urgent transition to distance learning." 14th February 2022. Online conference.

4. 19th Annual international conference "Trends in education development," Session report: "Coping strategies of schools in the context of the pandemic: focusing on control or teacher agency?" 19th March 2022. Online conference.

5. Science with a thousand faces. Session report: "Models of coping strategies in schools: how school staff addressed the challenges of the pandemic?" 22nd April 2022. Moscow, Russia.

6. European conference on educational research (ECER). Session report "Coping strategies of school teams: getting ahead of themselves versus survival and forgetting." 24th August 2022. Yerevan, Armenia.

7. Russian national scientific and practical conference "Russian society in the period of global turbulence." Session report: "Adaptation of school staff to the urgent transition to distance learning through the prism of organizational coping strategies." 22nd September 2022. Online.

8. 20th Annual international conference "Trends in education development," "Modern Education: Choosing the Future." Session report: "How the pandemic changed teachers' attitudes towards technology and how it was influenced by the school staff's adaptation strategy to the pandemic?" 17th March 2023. Moscow, Russia.

The progress of the project was regularly discussed at meetings of the Laboratory for Innovation Education Research at the National Research University Higher School of Economics (HSE), as well as at the research seminar for graduate students at the Institute of Education of HSE. The applicant also participated in an internal seminar at the Institute of Education of HSE, where the research prospects were discussed with colleagues from other departments. Feedback was also received from the following international advisors: A.M. Sidorkina, Dean of the College of Education at the University of California (USA), and Gábor Halász, a professor at Eötvös Lóránd University (Hungary).

Key concepts

Diffusion of innovation is the spreading of a new idea (Rogers, 2003).

Innovation is an idea or practice that is perceived as new to a particular individual (or other unit of analysis, such as an organization or locality) (Rogers, 2003).

School staff are all individuals participating in the activities of an organization based on a labor contract (Romantsev, 2005). In this research, the school staff refers to the combination of educational and administrative staff in schools.

Coping strategies are a set of measures aimed at reducing stress and other negative consequences associated with the need for extensive organizational transformation (Callan, 1993).

Technology attitude is an individual characteristic that reflects one's predisposition to adopting new technologies, involving a combination of positive and negative attitudes towards technology as a whole (Parasuraman, 2000; Ottenbreit-

Leftwich et al., 2018).

Adaptation model of school teams to shock innovation is a set of measures (actions) taken by the school staff to reduce stress and other negative consequences, as well as to create conditions necessary for the dissemination of innovations in the context of extensive organizational transformation (Andreeva, 2022). It is an integrative concept that combines the concepts of coping strategy and organization of the innovation process.

Organization of the innovation process strategy is a set of measures that contribute to creating conditions necessary for the dissemination of innovations within an organization (Ramanujam & Mensch, 1985).

Digital technologies are technologies for collecting, storing, processing, retrieving, transmitting and presenting data in electronic form (Federal State Statistics Service, 2023).

Shock spread of innovations is an extremely rapid and compressed (conducted as a whole) process of adopting innovations by members of a community (Koroleva et al., 2023).

Urgent transition to distance learning is a temporary change in the implementation of educational programs from traditional in-person learning to distance learning (involving education outside the school premises) due to the need for social distancing in order to reduce the risks of spreading the coronavirus infection (Ministry of Education, 2020).

The relevance of the research topic is determined by the following factors

The process of computerization, informatization, and digitization of schools has been ongoing for several decades (Karakozov, 2018; Uvarov, 2011). However, it remains one of the key directions of Russian and international research in education. The number of works on digital transformation published in the Google Scholar has been continuously increasing since 2018. According to the results of reviews and meta-analyses (Dvoretzkaya et al., 2020; Venkatesh, 2020; Wohlfart & Wagner, 2023), previous studies have addressed various aspects of digital transformation and gradually refined approaches to studying and managing digitization processes in education,

opening up new perspectives for expanding and deepening understanding of this phenomenon.

The focus of current research is shifting from infrastructure to subjective factors of the digitization process: teachers' beliefs about technology, psychological discomfort associated with technology, belief in the necessity of technology, and so on. It is assumed that studying the psycho-social factors of digital technology implementation has great potential for expanding fundamental understanding of the interaction between humans and digital technologies, as well as for developing practical solutions that contribute to the successful advancement of digitization reforms in education (Choi et al., 2023; Karakozov & Manyahina, 2020; Nazarov et al., 2021; Tondeur et al., 2017; Wilcox & Lawson, 2018).

The scientific discussion on the digitization of education has taken a new turn in the context of the COVID-19 pandemic, due to the acceleration of digital transformation processes (Nazarov et al., 2021; Davis, 2019). Widespread measures were implemented to limit social interaction, including the temporary closure of educational institutions, which forced schools to abandon their traditional face-to-face format and transit quickly to distance learning (Ministry of Education, 2020). The pandemic has triggered an expansion in the use of digital technologies by individuals both in work and personal life, including even those who previously had a negative attitude towards technology (Tyrväinen & Karjaluoto, 2022). The intensive immersion in the use of digital technologies in the context of the urgent transition to distance learning may have potentially influenced teachers' attitudes towards technology.

However, the conditions under which teachers used new digital technologies varied from school to school, as the models for transitioning to distance learning in case of studied region was developed at the school level and teachers adapted to the emergency situation differently (Saprykina & Volokhovich, 2020). Prior to the pandemic, organizational changes were largely driven by top-down decisions (Kasparzhak & Isaeva, 2015; Koroleva & Naushirvanov, 2021), and this autonomy opened up new opportunities for studying the mechanisms of adopting digital innovations at the organizational level (Venkatesh, 2020). The importance of studying these mechanisms is associated with the fact that organizational support and mutual

reinforcement within the team can serve as a mechanism for overcoming individual barriers to digitization (Jimmieson et al., 2021).

At the same time, the results of research in this field are highly sought after for educational policy purposes. According to the Decree of the President of the Russian Federation No. 474 dated 21 07 2020 "National Goals of the Russian Federation until 2030," the achievement of digital maturity by educational organizations (among other organizations in the social and economic sectors) is a focus of state policy in the upcoming years. The implementation of the national project "Education" is underway, which includes programs aimed at developing conditions for the formation of digital competencies for all participants in the educational process, among them are federal projects "Modern School," "Digital Educational Environment," "Success of Every Child," and "Teacher of the Future."

In summary, the relevance of the research is established by two aspects. On the one hand, it is the prevalence of the problem of resistance among teachers towards the use of digital technologies in the educational process, which hinders the success of digitalization reforms in the Russian education system. On the other hand, it is the uniqueness of the urgent transition to distance learning, which is associated with the forced use of digital technologies by teachers under different conditions determined by the chosen models of adaptation among members of school staff.

An effective response from educational organizations to the need for deep transformation in response to external challenges and the expanding use of digital technologies in the educational process, achieved through the involvement of teachers who were not initially predisposed to accepting new technologies due to their individual characteristics, is a priority task. However, in order to take well-founded measures at the level of educational organizations and government policies, it is necessary to have complete and reliable information about the mechanisms by which organizational factors influence the subjective factors of educational digitalization, including teachers' attitudes towards technology.

Contradictions and gaps in scientific knowledge

A significant amount of Russian and international research is dedicated to the factors and mechanisms of involving teachers in the use of digital technologies. For

example, several researchers extensively discuss infrastructure indicators (Kashicin, Mertsalova, Uvarov, Warschauer et al.). Russian scientific literature also provides a systematic description of the ways digital technologies can be used in the educational process (Dvoretzkaya, Asmolov, Kondakov, Buzzard, Hamilton et al.). Another research direction in school digitalization focuses on the necessary competencies for effective technology utilization (Avdeeva, Kitaigorodskiy, Plekhanova, Caena., Redecker, Peñalva-Vélez et al.). However, subjective factors of digitalization have received less attention in Russian research. While some studies have shown that teachers' willingness to master digital technologies and apply them in their practice is one of the key factors in educational digitalization (Choi et al., 2023; Ertmer, 2005; Tondeur et al., 2017).

The most significant scientific results in studies addressing the subjective factors of digitalization focused on measuring these indicators among various participants in the educational process and clarifying the relationship between attitudes towards digital technologies and their actual use (Ottenbreit-Leftwich, Ertmer, Nazarov, Koroleva). However, the literature provides limited exploration of the factors influencing these attitudes and the mechanisms that contribute to increasing or decreasing teachers' individual predisposition towards the use of digital technologies (Blut & Wang, 2020).

This dissertation research aims to address the gap in understanding the relationship between school collectives' adaptation models to the emergency transition to distance learning and the dynamics of teachers' attitudes towards technology. By examining the broader framework of individual attitudes towards technology, it is possible to hypothesize that these attitudes are stable but not immutable traits, and are influenced by external factors such as social environment and the conditions under which individuals were introduced to new technologies (Hwang et al., 2018; Maio & Haddock, 2010; Karahanna et al., 1999; Triandis, 1971).

Existing studies have explored the dynamics of attitudes towards technology in the context of adopting new digital technologies, but they often treat the adoption experience as a "black box" without considering organizational factors that can facilitate or hinder individual innovation adoption (Maier, 2016; Chang & Kannan, 2006). While some studies have demonstrated the role of organizational factors in digital transformation processes, they primarily focus on the actual use of digital technologies

and do not specifically concentrate on teachers' attitudes towards technology (Duygan et al., 2023; Clohessy & Acton, 2019; Tokareva et al., 2019). Therefore, the relationship between organizational factors and the dynamics of attitudes towards technology in the context of innovation adoption remains understudied.

This dissertation research examines this relationship using the example of the emergency transition to distance learning. On one hand, this phenomenon provides a unique research opportunity to study the aforementioned relationship, as the forced intensive immersion of teachers in the use of digital technologies (Tyrväinen & Karjaluoto, 2022; Bond, 2021; Nazarov et al., 2021; Almazova et al., 2020) occurred under varying conditions from school to school, determined by the adaptation models of a region or a school (Shugal et al., 2023; Bolotov & Mertsalova, 2021). On the other hand, the emergency transition phenomenon itself is not fully understood: researchers demonstrate the applicability of different concepts and theoretical metaphors, highlighting specific properties of this phenomenon (Luik & Lepp, 2021; Azorín, 2020; Soudien, 2020; Xie et al., 2020; Xue et al., 2020), but do not use these concepts to deepen understanding of the processes occurring in education. In particular, a line of work relates the emergency transition to the concepts of "innovation" and "innovation process" (Ellis et al., 2020; Gyimah, 2020; Farrugia et al., 2020), however, only individual studies consider this phenomenon through the lens of innovation theories, despite the great potential of this theoretical framework for studying the adoption of new practices, including at the organizational and individual levels.

Thus, existing approaches do not allow for describing the relationship between school staff' adaptation models to the need for an emergency transition to distance learning and the dynamics of teachers' attitudes towards technology, which is **the problem** addressed in this research.

The objective of this research is to identify how the models of adaptation of school teams to the emergency transition to distance learning and the dynamics of teachers' attitudes towards technology are interrelated.on to distance learning and the dynamics of teachers' attitudes towards technology.

The tasks of the dissertation research were as follows:

1. Operationalize the key concepts of the research.

2. Identify the specifics of dissemination of new practices in the context of urgent transition to distance learning.
3. Conduct an empirical investigation to identify school staffs' adaptation models in the context of the urgent transition to distance learning.
4. Conduct an empirical study to assess the dynamics of teachers' attitudes towards technology.
5. Compare the dynamics of the school staff's attitudes towards technology based on their adaptation models.

Accordingly, **the key research questions** of this study are as follows:

- 1) What is the specificity of the urgent transition to distance learning as an innovation process?
- 2) To what extent are the existing methodological approaches to studying school adaptation models relevant to the situation of the urgent transition to distance learning?
- 3) What adaptation models were observed within school staff in the context of the urgent transition to distance learning?
- 4) How is the school staff's adaptation models to the urgent transition to distance learning related to the dynamics of teachers' attitudes towards technology?

The object of the study is the factors of teacher engagement in the use of digital technologies.

The subject of the study is the relationship between school staff's adaptation models and their attitudes towards technology in the conditions of the urgent transition to distance learning.

The theoretical and methodological framework of the study

This dissertation research examined the emergent shift to distance learning through the models and concepts of theories of innovation:

Based on Diffusion of Innovation Theory developed by Everett Rogers, a theoretical and methodological approach was devised to describe the innovation spread at three levels: individual, organizational, and systemic. This approach was employed to compare the characteristics of the diffusion of innovation within the context of the

urgent transition to distance learning.

In conceptualizing the adaptation models of schools, we drew upon theoretical developments in the realm of organizational factors influencing innovation adoption, specifically the concept of organizational innovation process strategy (Ramanujam & Mensch). However, the theoretical framework was expanded to incorporate the concept of coping strategies (Callan), adapted from organizational psychology taking into account the need to complement existing approaches in defining and measuring the adaptation models of school staff with coping strategies to mitigate negative consequences. Other studies have also employed this concept to describe organizational strategies in similar contexts (Fugate, Kinicki, Scheck, Salter, Criscuolo, Wal, Christensen, Hammond). The novelty of this study lies in the integration of both organizational innovation process strategies and coping strategies within a single investigation, forming an integrative understanding of adaptation models.

Furthermore, this dissertation research is grounded in works that examine the subjective factors of the innovation process (Evan, Gina O'Connor, McDermott, Parasuraman). These theoretical developments allow us, on the one hand, to propose a key assumption of the study regarding the existence of a relationship between organizational (team) support, which sets the conditions for the experimentation of new technologies, and teachers' attitudes towards technology. On the other hand, drawing on existing models, teachers' attitudes towards technology were measured as a subjective factor in the adoption of digital innovations.

A brief description of the research methodology and design:

The study is conducted with the implementation of a mixed-methods design, incorporating both quantitative and qualitative tools in data collection and analysis. Three research blocks were conducted, based on empirical data collected at different time periods.

1. To identify the specifics of the dissemination of new practices in the context of the urgent transition to distance learning (Research Question 1), semi-structured interviews were conducted between June and August 2020¹. The study involved

¹ Later cited Koroleva, D. O., Andreeva, A. A., Khavenson, T. E. (2023) Shock Innovation: Conceptualization of the process of digital transformation in education during the pandemic. *Obrazovanie i samorazvitie*. (in press).

respondents from five regions of the Russian Federation: Moscow, Krasnoyarsk and Perm Krai, Nizhny Novgorod, Orenburg, and Voronezh regions.

The sample was constructed based on the results of a study conducted prior to the transition to distance learning in March 2020 (Koroleva et al., 2020). It was important to organize the interview collection in both organizations with a high level of technological readiness, where employees generally had more positive views on technology than negative ones before the pandemic, and in schools with a low level of technological readiness, where negative views on technology were more pronounced among the members of staff before the transition to distance learning. The measurement of technological readiness dynamics (hereinafter) is based on the Technological Readiness Index 2.0 (TRI 2.0) measurement methodology (Parasuraman & Colby, 2015), and the Russian version has been validated and suitable for studying educational organization staff (Khavenson & Gizatullin, 2020). The sample includes schools located in both large cities with developed infrastructure and small towns, as well as general education schools and schools with specialized subject programs. The number of staff members in general educational organizations varies from 27 to 227 people, and the number of students ranges from 221 to 1124.

Ten in-depth interviews were conducted with principals or deputy principals of Russian comprehensive schools. The interviews were analyzed using the thematic coding method. The properties of Rogers' Diffusion of Innovation theory were used as a priori codes (see the theoretical and methodological framework of the study). Posterior codes were identified based on the narratives of the interview participants.

2. To develop the methodological approach for studying schools' adaptation to the urgent transition to distance learning (research question 2), interviews were conducted with principals and teachers of schools in June-August 2020 and April 2021.

The first round of qualitative data analysis was based on interviews with school principals (see sample description in point 1). The narrative form of the interviews allowed for obtaining information about the sequence of events and collective steps taken by the schools in the context of the urgent transition to distance learning, thus maximizing the inclusion of a spectrum of practices in the analysis. Open coding was used as the method of analysis at this stage. The results of the analysis were compared

with existing theoretical frameworks in the literature. The chosen framework served as the basis for interview guides for school principals and teachers.

The second round of qualitative data was based on interviews with teachers and school principals (description of the sample can be found in section 3), which were analyzed using thematic coding.

In the context of studying adaptation models of educational teams and the relationship between these models and the dynamics of teachers' attitudes towards technology (research questions 3 and 4), an empirical study was conducted using a mixed methods design (Tashakkori et al., 2015).

The study was carried out in the Nizhny Novgorod region, which can be considered a "typical" Russian region in terms of digitalization levels (Koroleva et al., 2020; Higher School of Economics, 2019) and the level of development of the education system (Vremya, 2023)²

The data were collected based on 12 schools. Many indicators suggest that these schools are similar to each other: they are urban schools with moderate enrollment (500 to 2000 students). The sample includes both general education schools and schools with specialized subjects, but all of them are considered typical schools in terms of educational quality, as they are not included in the list of top schools in the Nizhny Novgorod region (RAEX, 2022). This design provided us with the opportunity to "capture" external factors related to the educational organization (such as socio-economic context, support from local authorities, etc.).

The sample was constructed based on information about schools obtained from a study conducted prior to the transition to distance learning (March 2020) (Koroleva et al., 2020), which allowed for the inclusion of organizations with both high technological readiness (more positive views) and schools with low technological readiness (more negative views) in the sample.

The same data, selected from the aforementioned subsample, were used in a quantitative analysis as an indicator of the staff's technological readiness before the

² The following text is based on the work of Andreeva A.A., Korotkova M.D., Miroshnikova D.I., Slautina E.A. Forced transition to distance learning: how teachers' attitudes towards technology have changed depending on their school's adaptation strategy // *Obrazovatel'naya politika* (in press).

transition to distance learning (N1=572). A questionnaire survey was conducted again in the same schools in October 2021 (N2=475) to measure the technological readiness of the staff after the urgent transition to distance learning. In both cases, data were collected through a census approach, inviting all members of the educational organization's teaching and administrative staff to participate in the survey. The response rate averaged 65% for the first wave and 55% for the second wave, which is considered an acceptable level to analyze the distribution of technological readiness not only among individual employees but also among schools as a whole (Baruch & Holtom, 2008). The number of respondents in each school ranged from 29 to 87, depending on the size of their staff.

For the analysis of technological readiness composition, indicators such as median, first and third quartiles, and range were used for each school separately for the first and second measurements.

To identify adaptation models to the situation of urgent transition to distance learning, qualitative data collection methods were employed. Interviews were conducted in April 2021 in the same schools where the quantitative study took place. Informants retrospectively described the events of the first and second waves of school transition to distance learning (spring and fall 2020). At least three interviews were conducted in each school. When arranging the interviews, we requested the research coordinator from each school to invite at least one representative from the school administration (preferably the principal or one of the vice principals) and 2-3 teachers, including those who easily adapted to distance learning and those who encountered difficulties during the transition. The interviews involved teachers from different subjects and varying lengths of work experience.

The analysis of the relationship was conducted by comparing the dynamics of technological readiness compositions between groups of schools identified according to their adaptation models. Thus, by correlating the results of the questionnaire survey and the interviews, the aim was to examine whether there were consistent patterns of value dynamics depending on the school's adaptation model.

Research Findings

Research Question 1: What are the specific characteristics of the urgent transition to distance learning as an innovation process?

The analysis of Rogers' (2003) diffusion concept revealed specific characteristics of the diffusion process as a basis for comparison with the characteristics of innovation dissemination in the context of the urgent transition to distance learning. The detailed and extensive description was narrowed down to three main characteristics of innovation dissemination, which were correlated with different levels of analysis.

Firstly, at the individual level, there are five stages of innovation adoption: awareness of the innovation, formation of a subjective attitude towards the innovation, decision to try the innovation, trial of the innovation, and final decision to adopt or reject the innovation. Secondly, at the group level, innovation dissemination occurs sequentially from one segment to another in the following order: innovators, early adopters, early majority, late majority, and laggards. Thirdly, at the systemic level, social norms, values, and other factors can impede the process of innovation diffusion, leading to differences in the speed of innovation adoption in different social systems.

Based on the comparison of this theoretical model with empirical data (interviews with school principals), it was demonstrated that the process of transitioning to distance learning differs from the traditional innovation diffusion process and adds new properties to it.

Firstly, there was a lack of sequential stages in the innovation adoption process at the individual level. In response to the external challenge, teachers were forced to use digital technologies, "skipping" the stages of forming attitudes towards the innovation (the second stage according to Rogers) and making individual decisions (the third stage according to Rogers).

Secondly, the innovation dissemination process in the context of the pandemic equalized all participants in the educational process at the organizational level, blurring the boundaries between the segments identified by Rogers (innovators, early adopters, early majority, etc.) in terms of the speed of adapting to the new format. This was because the situation did not allow for resistance to innovation. Thirdly, at the systemic level, schools themselves could not remain inert and sluggish but had to be included in

the process of transitioning to distance learning and digitizing all processes on par with organizations from other sectors. The education system had to make an innovation leap and mobilize all resources to accomplish this. Overall, the process of urgent transition to distance learning as an innovation differed in its characteristics from the traditional diffusion process, showing a non-sequential adoption at the individual level, equalizing participants at the organizational level, and requiring the education system to undergo an innovation transformation.

Based on the analysis at three levels, it can be concluded that the specifics of the emergency transition to distance learning is that there was an extremely fast process of innovation adoption, characterized by the absence of some stages.

Research Question 2: To what extent are the existing methodological approaches to studying adaptation models of schools relevant to the situation of the urgent transition to distance learning?

Based on the review of empirical research, it can be concluded that the urgent transition process is characterized by duality, serving as a source of both negative consequences (see, for example, Zvyagintsev et al., 2020; Doyumğaç et al., 2020; Nazarov et al., 2021; Abankina et al., 2020) for the education system, as well as a driver of development (see, for example, Luik & Lepp, 2021; Reimers & Schleicher, 2020; Siegel et al., 2021; White et al., 2020).

However, the review of existing tools relevant to studying school adaptation to the urgent transition to distance learning (as a shock innovation) revealed a lack of approaches that account for this duality.

We propose an integrative methodological approach by combining the concept of coping strategies (Callan, 1993), which conceptualizes measures to overcome negative consequences, with the concept of innovation process organization strategy (Ramanujam & Mensch, 1985), which focuses on organizational measures that facilitate the dissemination of new practices in new conditions.

Based on this integration, a definition of *adaptation models for school staffs to shock innovation* has been formulated: a set of measures (actions) undertaken by the school staff to reduce stress and other negative consequences, as well as to create conditions necessary for the dissemination of innovations in response to the need for

extensive organizational transformation.

Furthermore, the aspects highlighted by Callan and Ramanujam&Mensch as important in terms of the staff's response to the need for extensive organizational transformation (communication and decision-making processes, changes in the responsibilities of the staff, workload associated with adopting a new working format, retraining, stress reduction) formed the basis for interview guides for school directors and teachers.

The aspects of adaptation laid out in the interview guides were operationalized based on the analysis of these interviews. The analysis revealed that schools' models within each aspect of adaptation can be diametrically opposed to each other. This allows us not only to describe the aspects of organizational adaptation but also to identify possible alternatives within these aspects (dilemmas): (1) quality control of the educational process or "lowering the bar," (2) focus on the well-being of the members of staff or mobilization of human resources, (3) openness to new tools or reliance on familiar ones, (4) directive or participatory decision-making, (5) methodological support aimed at technical assistance or the development of digital literacy, (6) replacement of "lagging" members of the staff or support for their integration into the new working format, (7) workload optimization or inaction.

Thus, based on the synthesis of previous research and analysis of the collected empirical data, a methodological approach was developed to uncover organizational adaptation measures in the context of the urgent transition to distance learning, considering its duality. This methodological approach can be further utilized for analyzing phenomena similar to the urgent transition to distance learning - forced, rapid, and large-scale educational organizational "leaps" (shock innovations).

Research Question 3: What adaptation models were observed in the context of the urgent transition to distance learning within school staffs?

Based on the application of the developed methodological approach to analyzing school adaptation models (based on interviews with teachers and administration), four adaptation models were identified for the urgent transition to distance learning. The basis for identifying these models was the recurring combinations of adaptation alternatives (dilemmas) observed across different schools, as well as the corresponding

distribution of roles between the administration and teachers (see Figure 1).

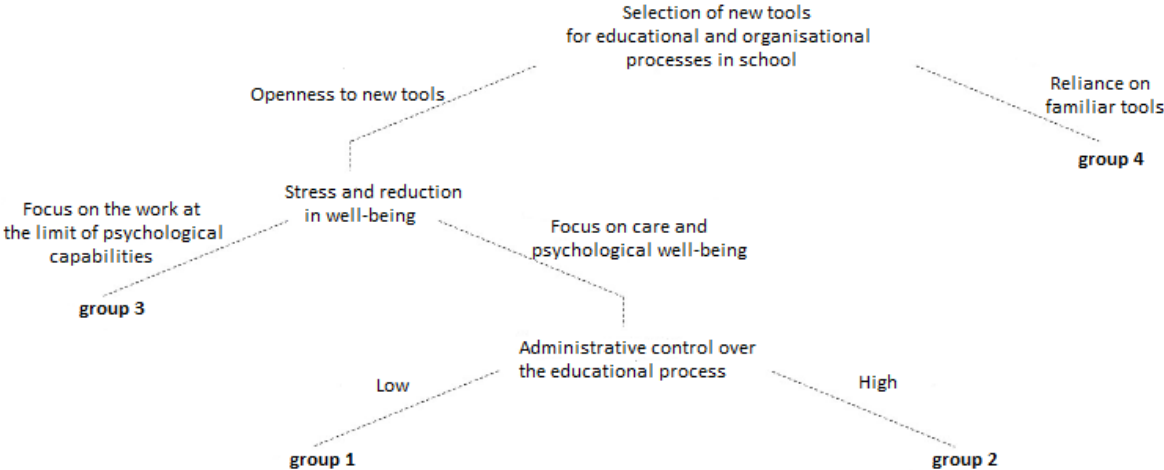


Figure 1. Combinations of adaptation alternatives (dilemmas) based on the analysis of interviews.

Within the framework of the "Mutual support and care for each other" model, the role of the administration was to maintain the psychological well-being of the staff and motivate employees to overcome new challenges. The implementation of adaptation measures, however, was primarily in the hands of teachers who made efforts in selecting and mastering tools, as well as resolving issues faced by school staff and families.

Within the framework of the "Creating conditions for teacher self-development" model, the leadership role in adaptation was assumed by the administration, which aimed to establish an environment that stimulates the professional growth of teachers. This was achieved through the organization of methodological support from teacher to teacher, which included addressing the substantive aspects of teaching in the new format, as well as a high level of monitoring by the school administration to provide feedback to each teacher. The teachers themselves engaged in mastering new digital tools and worked on building and improving online lessons.

Within the framework of the "Development and implementation of instructions" model, the leadership role in adaptation was assumed by the school administration. They developed "algorithms" for teachers on how to work in the new format and encouraged teachers to share instructions on using digital technologies. The administration also ensured that all teachers, without exception, met the standards of educational quality and guided the staff to operate within their psychological

capabilities.

In schools belonging to the "Minimization of adaptation efforts" model, both the administration and teachers demonstrated a desire to transition to distance learning with minimal adaptation costs. However, neither group showed initiative in creating organizational measures that would help the staff adapt more effectively. Furthermore, a key feature of this model is that these members of staff were oriented towards the use of familiar digital tools.

Research Question 4: How is the school staff's adaptation model related to changes in teachers' attitudes in the context of the urgent transition to distance learning?

To examine the dynamics of changes in teachers' attitudes towards technology, data were collected using a validated survey instrument called the "Technology Readiness Index" (TRI 2.0). The data collection took place before the transition to distance learning (N=572) and after the transition (N=475). The study encompassed teachers in the analyzed schools, allowing for a shift from the individual to the organizational level and describing the composition of the staff's technological readiness. Quartile indicators and their dynamics were calculated, which enabled an examination of how the level of technological readiness changed specifically for the group of teachers who had the most positive attitude among the staff (techno-optimists), as well as the group of teachers who had the most negative attitude among the staff (techno-pessimists).

The models of "Mutual support and care for each other" and "Development and implementation of instructions" are characterized by a reduction in the differences between teachers' technological readiness in the techno-pessimists and techno-optimists. Conversely, the models of "Creating conditions for teacher's self-development" and "Minimization of adaptation efforts" are characterized by an increasing gap between these groups of teachers.

An ideal model of dynamics could be considered as an increase in technological readiness in both the techno-optimists and techno-pessimists, which is observed only in specific cases but does not characterize any specific group of schools (adaptation

model) as a whole. In this sense, all adaptation models have their strengths and weaknesses.

The group of models in which teachers acted as a cohesive team ("Mutual support and care for each other" and "Development and Implementation of instructions") is characterized by the absence of negative impact from the pandemic on the attitude towards technology among teachers with the most negative attitude among the members of staff. However, a negative influence was found for teachers with the most positive attitude towards technology among the staff, which could be explained by the fact that the support system placed excessive burden and responsibility on them.

However, the group of models that provided greater autonomy to teachers ("Creating conditions for teacher self-development" and "Minimization of adaptation efforts") is characterized by a positive dynamics in the attitude towards technology among techno-optimist teachers and a negative dynamics among techno-pessimist teachers, which increased the gap between these groups of teachers. Within the context of the conditions set by these models, teachers tackled the mastery of digital tools individually, which was perceived as a positive experience by teachers with high technological readiness. On the other hand, this approach led to disappointment in technology for techno-pessimist teachers.

Statements to be defended

1. In the context of the urgent transition to distance learning, there was observed not a diffuse, but a shock-like spread of innovations, that is, an extremely rapid process, implying a non-staged adoption of new practices by educational organisations employees.

2. The adaptation of school staff to the urgent transition to distance learning includes: 1) Measures taken by the school staff to reduce stress and other negative consequences. 2) Measures taken by the school staff to create conditions necessary for the dissemination of innovations.

3. Four models of school staff adaptation to the urgent transition to distance learning were identified: "Mutual support and caring for each other," "Creating conditions for teacher self-development," "Development and execution of instructions," and "Minimizing adaptation efforts."

4. The models for school staff adaptation to the urgent transition to distance learning are closely related to the dynamics of teachers' attitudes towards technology. The mechanism, determining the dynamics for two groups of teachers (with negative and positive attitudes towards technology) is the presence or absence of 1) systemic mutual assistance between teachers, 2) orientation towards common practices for the entire staff team, in the adaptation model.

The **novelty** of the dissertation research is revealed in several aspects:

Firstly, in the considering the emergency transition to remote learning throughout the lenses of Rogers' theory allowed for the identification of the specificity of innovation diffusion in the context of this phenomenon: not a diffuse, but a shock-like process, that is, extremely fast and "condensed" processes at the individual, group, and systemic levels. On one hand, this expands the scientific understanding of emergency transitions: previous studies have documented the speed and scale of changes in education, but only this research shows that this speed is associated with a disruption of gradualness. On the other hand, it complements Rogers' theory, which is often used in educational research, by showing that the mechanism of innovation diffusion can be not only diffusive but also shock-like. In the context of educational research, the importance of this finding is explained by the increasing speed of technological progress and the turbulent environment in which modern educational organizations exist.

Secondly, in the development of a methodological approach to measuring school collectives' adaptation models to the emergency transition to remote learning, based on simultaneous evaluation of both the collective measures to reduce stress and other negative consequences, and the measures to create conditions necessary for innovation diffusion in the context of large-scale organizational transformation. The developed methodological approach is based on established concepts of coping strategies and strategies for organizing the innovation process, but their integration into an integrative concept is scientifically novel and represents a development of existing concepts, as it allows for consideration of the duality of effects accompanying shock-like innovations diffusion.

Thirdly, in the justification and expansion of understanding the relationship between school collectives' adaptation models and teachers' attitudes towards

technology: empirical data reveal differences in the dynamics of teachers' attitudes towards technology among techno-optimists and techno-pessimists depending on the level of teacher autonomy in the context of adaptation. This finding aligns with a range of studies examining the interrelationship between organizational and psychosocial factors in innovation implementation, while also developing them by revealing the mechanisms of this interrelationship and highlighting for the first time the variability of its relation for different groups of teachers.

The **theoretical significance** of the research lies in several aspects.

Firstly, the dissertation study complements theories of innovation diffusion with the new concept of "shock-like innovation": the process of innovation diffusion can be not only diffuse but also shock-like, characterized by extremely fast and condensed processes at the individual, group, and systemic levels.

Secondly, the findings refine the theoretical understanding of the relationship between organizational adaptation conditions and attitudes towards technology by adding variability to this relationship for groups of teachers with different socio-psychological orientations (e.g., techno-optimists and techno-pessimists).

The **applied problem** addressed by the research is a lack of understanding of the investigated relationship can lead to unpredictable changes in teachers' attitudes towards technology. The research aims to fill this gap by providing practical recommendations for addressing the technological readiness gap within school collectives and balancing the workload of teachers providing support.

Conclusion

The main conclusions are drawn based on the generalization of the research results:

1. In the context of urgent transition to distance learning there was observed a shock-like spread of new practices, i.e. an extremely fast process characterized by the absence of stage-by-stage acceptance of new practices by school teams. At the individual level, teachers "skipped" the stages of forming an attitude to the innovation and making an individual decision. At the organizational level, there

was no sequential adaptation by Rogers segments (innovators, early adopters, early majority, etc.); instead, it happened almost simultaneously for different groups. At the system level, there was no different rate of adaptation of the distance format between schools and organizations from other domains.

2. Based on the data of the empirical study, four models of school staff adaptation to the emergency transition to distance education were identified: "Mutual assistance and care for each other," "Creating conditions for teacher self-development," "Development and implementation of instructions," and "Minimizing adaptation efforts." The basis for their selection was the use of a methodological approach that integrates the concepts of coping strategy (Callan, 1993) and strategy for organizing the innovation process (Ramanujam & Mensch, 1985), which made it possible to analyze 1) measures of the school staff to reduce stress and other negative consequences, as well as 2) measures of the school staff to create the conditions necessary for the spreading of innovations.

3. On the basis of empirical research data, the polarizing and consolidating dynamics of school staff attitudes in the situation of emergency transition to distance learning were demonstrated. Some schools were characterized by the improvement of technology attitudes of techno-optimist teachers, but this was accompanied by the deterioration of techno-pessimists attitudes, which led to an increase in the differences between these two groups (polarization). Other schools, on the contrary, are characterized by deterioration of attitudes of techno-optimist teachers, but improvement of attitudes of techno-pessimist teachers, which reduces the differences between these two groups (consolidation).

4. On the basis of comparing the dynamics of technological readiness in the context of adaptation models of school teams, the relationship between adaptation models and attitude dynamics is demonstrated and revealed. Adaptation models in which teachers had greater autonomy are characterized by polarizing attitude dynamics within the staff. Models of adaptation, in which a support system within the staff was assumed, were characterized by consolidating dynamics. Given the developments in organization and innovation research, in the context of the digital transformation of schools, the polarization of teachers' views as a

characteristic of adaptation models seems more negative than teachers' views consolidation.

From the perspective of the limitations of the study, several aspects can be identified that define its scope:

1. The unit of analysis in the study is the school staff, and the research focuses on the adaptation measures that have been implemented at the team level. The role of individual teachers is beyond the scope of the study unless their actions deviate from mainstream practices. Additionally, the study does not take into account the role of external groups in relation to the school, such as families, communities, EdTech companies, governing bodies, and so on. However, the presence or absence of external partners in the context of school adaptation to emergency transition controlled for and did not have a significant bias.
2. The focus of the research is determined by its theoretical foundations. The definition of shock innovations is directly related to the theory of innovation diffusion (Rogers), as the identified properties of the shock process are illuminated through a specific theoretical lens. Similarly, the characteristics of the studied adaptation models stem from the methodological approach used in the research (Callan, Ramanujam & Mensch). The urgent transition to distance learning and the corresponding school staff adaptation models can be examined using other theories, which would shed light on additional properties of the phenomenon under investigation.
3. The research does not aim to generalize the results obtained within one region to the entire population of Russian schools. The identified adaptation models and compositions of technological readiness reflect the social reality and, in this sense, are of interest to practitioners and can serve as a basis for comparison in subsequent scientific research. However, the in-depth examination of school cases (three stages of data collection, representation of the entire team, extensive qualitative data) allowed the key objective of the research to be achieved, which is the analysis of the relationship between school staff adaptation models and the dynamics of their attitude towards technology.

4. The identified differences in the dynamics of technological readiness between the two groups of teachers were empirically discovered and are considered an important outcome of the research. However, they require further investigation in terms of verifying our interpretation of the differentiation mechanisms and quantitatively assessing them within a broader socio-economic context.

Based on the results of the dissertation research, all the set objectives have been accomplished, allowing the achievement of the research goal. The relationship between the adaptation models of school staff to the urgent transition to distance learning and the dynamics of teachers' attitudes towards technology has been identified and described.

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