

## The Main Characteristics of the Intellectual and Personal Development of Today's Primary Schoolchildren

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### ABSTRACT

**Background.** The relevance of this work is dictated by the concern of the pedagogical and psychological community with the difficulties in teaching children today. Psychology in the Russian Federation defines the child as a subject of educational activity, which implies not only an opportunity, but also a readiness to acquire knowledge. The changes in the environment of childhood in today's world associated with new technical capabilities, as well as new trends in education, cannot but affect the process of child development, requiring the assessment of specialists. The study of long-term changes in the intellectual and personal characteristics of a child's development makes it possible to assess the impact of new means of mediation on child development. Studying the long-term impact of the new technical reality is a task for the scientific community in the coming years. Analyzing the results of the Programme for International Student Assessment (PISA), the largest international study on students' educational achievements, S.N. Sirenko writes that a particular country score at approximately the same level of success in different subjects (in 2018, Russia on average ranked in the top forty), reflects not so much the mastery of individual subjects by the children, as the state of the country's educational system as a whole (Malinetsky & Sirenko, 2020; Sirenko, 2023).

**Objective.** To depict the development of today's primary schoolchildren through a comparison between two cross-sectional studies 10 years apart.

**Design.** We compared the intellectual and personal development of second graders who were assessed 10 years apart, in 2013 and in 2022–2023. Intellectual development was assessed by the “Animals in the Circus” technique of the “Creative Field” method (Bogoyavlenskaya, 1971), using the indicators “Number of Errors in the Creative Field Training Experiment (NE CFTE)”, “Time to Solve the Main Task in the Creative Field Main Experiment (TS CFME)”, and the “Standard Progressive Matrices” test by J. Raven, which

assesses overall intellectual development. As a regulatory indicator, “Sensorimotor Coordination”, studied in the “Animals in the Circus” method, was considered. The personal development of the children was assessed through the motivational–need sphere, in particular, the development of cognitive motivation, using the indicator “Ability to Develop Activities on the Initiative of the Subject” in the “Animals in the Circus” technique using the Creative Field method. A sample of 100 pupils was studied using these five indicators: 50 students in 2013 (sample No. 1) and 50 students in 2022–2023 (sample No. 2), from a standard class of a comprehensive school. The average ages were 8 years for sample 1 and 8.5 years for sample 2. The data were processed using the methods of descriptive statistics, the U–Wilcoxon–Mann–Whitney test, and correlation analysis.

**Results.** There was a decline in intellectual indicators in today’s schoolchildren, with a relative preservation of regulatory characteristics. The more significant decrease occurs in the lower range of the sample, that is, in today’s children, we see lower minimum values. It is more difficult for them than for their peers 10 years ago to keep the mode of action, and transfer it to new spatial and metric conditions using action generalization. All this in the absence of any difference in the samples’ level of sensorimotor coordination. In today’s younger schoolchildren, a change was found at the motivational–need level, which is expressed in a decrease in the number of children capable of developing activities on their own initiative.

**Conclusion.** The research reveals a trend towards a decline in the general characteristics of thinking in today’s 8-year-old children. The weak get even weaker. A change at the motivational–need level is characterized by a decrease in cognitive motivation, which ultimately leads to a decrease in the ability to develop activities on one’s own initiative. The identified differences probably need to be assessed in terms of pedagogical, social, and environmental factors in the child’s life. The data allow us to conclude that the social situation of a child’s development 10 years ago was more favorable than it is today.

**Keywords:** Intellectual development; cognitive motivation; development of activities on one’s own initiative; primary school age; retrospective study; contemporary study; change over time

### Highlights

- The ability to develop activities on one’s own initiative is formed only with the maturation of intellectual and motivational components, expressed in the level of intelligence that allows one to master an activity, and a level of cognitive motivation that provides the ability to independently move beyond external requirements. Significant differences in the intellectual level of the two samples make it possible to identify the decline in intellectual level as one of the reasons for the decreased ability to develop activities on one’s own initiative in the 2022–2023 sample.
- Another reason for the decreased ability to develop activities on one’s own initiative is a change at the motivational–need level, which is characterized by a decrease in cognitive motivation.
- Timely assimilation by the child of the required scope of the school curriculum should remain the main focus of the efforts of teachers and students, taking into account the individual characteristics of this development. The attention of the pedagogical and psychological community should be drawn to the emergence of educational achievements in a “weak” child and, through this, to the formation of a sense of well-being.
- It is necessary to pay attention to the types of activities that were cultivated in the preschool period and occupied the child’s greatest time and attention, to assess the pedagogical impact on him or her in the present period of development.
- Technical and digital tools that compete with real life and create an illusion of success replace the efforts and experience of communicating with the real world necessary for full development, which can have an adverse and delayed effect.

## АННОТАЦИЯ

**Актуальность.** Актуальность данной работы продиктована обеспокоенностью педагогического и психологического сообщества трудностями в обучении современных детей. Отечественная психология определяет ребенка как субъекта учебной деятельности, что предполагает не просто возможность, но и готовность к овладению знаниями. Изменение среды современного детства, связанное с появлением новых технических возможностей, новые тренды в образовании не могут не влиять на процесс развития ребенка, что требует оценки специалистов. Исследование длительных изменений во времени собственно интеллектуальных и личностных характеристик развития ребенка позволяет оценить влияние новых средств опосредования на развитие детской популяции. Изучение долгосрочного влияния новой технической реальности и ее результатов являются задачами научного сообщества на ближайшие годы. Анализируя результаты мониторинга PISA как крупнейшего исследования по оценке образовательных достижений учащихся, Сиренко С.Н. пишет, что примерно одинаковый уровень успехов школьников из конкретной страны по разным предметам (в 2018 году Россия занимает место в четвертом десятке) означает отражение не столько освоения ребятами отдельных предметов, сколько состояние системы образования в целом (Малинецкий, Сиренко, 2020; Сиренко, 2023).

**Цель.** Целью данной работы было показать особенности развития современных младших школьников через сопоставление характеристик развития, выявленных в рамках двух срезов с разницей в 10 лет.

**Дизайн.** По результатам ретроспективного и современного исследования проведено сопоставление интеллектуального и личностного развития детей 2 класса младшей школы с разницей в возрасте 10 лет. Интеллектуальное развитие оценивалось по уровню работы в методике «Звери в цирке» метода «Креативное поле» (Богоявленская, 1971) с помощью показателей «Количество ошибок в обучающем эксперименте» (КО), «Время решения основной задачи в основном эксперименте» (ВР) и тесту «Стандартные прогрессивные матрицы» Дж. Равена, который оценивает общий уровень интеллектуального развития. В качестве регуляторного показателя рассматривалась «сенсомоторная координация», исследуемая в методике «Звери в цирке». Личностное развитие детей оценивалось через развитие мотивационно-потребностной сферы, в частности, развитие познавательной мотивации, которая определялась с помощью показателя «способность к развитию деятельности по собственной инициативе» в методике «Звери в цирке» по методу «Креативное поле». По перечисленным 5 показателям исследовалась выборка составившая 100 человек: 50 учащихся в 2013 году (выборка №1) и 50 учащихся в 2022-2023 годах (выборка №2), которая представляла собой стандартные классы общеобразовательной школы. Средний возраст для каждой выборки составил для 1 выборки - 8 лет, для 2 выборки - 8, 5 лет. Полученные данные были обработаны с помощью методов описательной статистики,  $U$  — критерия Вилкоксона - Манна-Уитни и корреляционного анализа.

**Результаты.** Полученные результаты говорят о снижении интеллектуальных показателей у современных школьников при относительном сохранении регуляторных характеристик. Более значительное снижение происходит в нижнем диапазоне выборки, то есть у современных детей мы видим более низкие минимальные значения. Им сложнее, чем их сверстникам 10 лет назад, дается сохранность способа действия, его перенос в новые пространственные и метрические условия, обобщенность действия при отсутствии разницы в уровне сенсомоторной координации. У современных младших школьников выявлено изменение на мотивационно-потребностном уровне, что выражается в снижении количества детей, способных развивать деятельность по собственной инициативе.

**Выводы.** Проведенное исследование обнаруживает тенденцию снижения общих характеристик мышления у современных детей 8 лет. Слабые становятся еще слабее. Изменение на мотивационно - потребностном уровне, характеризуется сни-

жением познавательной мотивации, что в конечном итоге приводит к снижению способности к развитию деятельности по собственной инициативе. Выявленные различия, вероятно, нужно оценивать с точки зрения педагогических, социальных воздействий и средовых факторов в жизни ребенка. Полученные данные позволяют говорить о социальной ситуации развития ребенка 10 лет назад как более благоприятной по сравнению с сегодняшним днем.

**Ключевые слова:** Интеллектуальное развитие; познавательная мотивация; развитие деятельности по собственной инициативе; младший школьный возраст; ретроспективное исследование; современное исследование; изменение с течением времени

**Ключевые положения:**

- Становление способности к развитию деятельности по собственной инициативе происходит только при созревании интеллектуального и формировании мотивационного компонентов, что выражается в наличии уровня интеллекта, позволяющего овладеть данной деятельностью и уровня познавательной мотивации, обеспечивающей возможность самостоятельно в ней продвигаться за пределы внешних требований. Значимые различия в интеллектуальном уровне двух выборок позволяют определить падение интеллектуального уровня как одну из причин снижения проявлений способности к развитию деятельности по собственной инициативе в современной выборке.
- Другой причиной снижения проявлений способности к развитию деятельности по собственной инициативе в современной выборке является изменение на мотивационно - потребностном уровне, которое характеризуется снижением познавательной мотивации.
- Своевременное освоения ребенком необходимого объема школьной программы должно остаться главной точкой приложения сил учителей и учащихся при учете индивидуальных особенностей этого освоения. Внимание педагогического и психологического сообщества должно быть обращено на появление учебных достижений у «слабого» ребенка и посредством этого формирование ощущения благополучия.
- Необходимо обратить внимание на те виды деятельности, которые культивировались в дошкольный период и занимали наибольшее время и внимание ребенка, оценить педагогические воздействия на него в настоящий период его развития.
- Технические и цифровые средства, конкурирующие с реальной жизнью и создающие иллюзию успешности, подменяют собой необходимые для полноценного развития усилия и опыт общения с реальным миром, что может оказывать неблагоприятный отсроченный эффект.

**RESUMEN**

**Introducción.** La relevancia de este trabajo viene dictada por la preocupación de la comunidad pedagógica y psicológica por las dificultades de la enseñanza a los niños en la actualidad. La psicología en la Federación de Rusia define al niño como un sujeto de la actividad educativa, lo que implica no sólo una oportunidad, sino también una disposición para adquirir conocimientos. Los cambios en el entorno de la infancia en el mundo actual asociados a nuevas capacidades técnicas, así como a las nuevas tendencias en educación, no pueden dejar de afectar el proceso de desarrollo infantil, requiriendo la evaluación de especialistas. El estudio de los cambios a largo plazo en las características intelectuales y personales del desarrollo de un niño permite evaluar el impacto de los nuevos medios de mediación en el desarrollo infantil. Estudiar el impacto a largo plazo de la nueva realidad

técnica es una tarea de la comunidad científica en los próximos años. Al analizar los resultados del Programa para la Evaluación Internacional de Alumnos (PISA), el mayor estudio internacional sobre los logros educativos de los estudiantes, S.N. Sirenko escribe que un país particular tiene puntuación aproximadamente al mismo nivel de éxito en distintas materias (en 2018, Rusia se ubicó en promedio entre los cuarenta primeros), y esto refleja no tanto el dominio de las materias individuales por parte de los niños, sino el estado del sistema educativo del país en su conjunto (Malinetsky & Sirenko, 2020; Sirenko, 2023).

**Objetivo.** Describir al desarrollo de los alumnos de primaria de hoy a través de una comparación entre dos estudios transversales con 10 años de diferencia.

**Diseño.** Comparamos el desarrollo intelectual y personal de estudiantes de segundo grado que fueron evaluados con 10 años de diferencia, en 2013 y en 2022-2023. El desarrollo intelectual se evaluó mediante la técnica “Animales en el circo” del método “Campo creativo” (Bogoyavlenskaya, 1971), utilizando los indicadores “Número de errores en el experimento de entrenamiento en el campo creativo (NE EECC)”, “Tiempo para resolver la tarea principal en el experimento principal en el campo creativo (TR EPCC)”, y el test “Escala Estándar de Matrices Progresivas” de J. Raven, que evalúa el desarrollo intelectual general. Como indicador regulador se eligió la “Coordinación Sensoriomotora”, estudiada en el método “Animales en el Circo”. Se evaluó el desarrollo personal de los niños a través de la esfera motivacional y de necesidades, en particular, el desarrollo de la motivación cognitiva, utilizando el indicador “Capacidad para Desarrollar Actividades por Iniciativa del Sujeto” en la técnica “Animales en el Circo” utilizando el Método del campo creativo. Se estudió una muestra de 100 alumnos utilizando estos cinco indicadores: 50 estudiantes en 2013 (muestra n.º 1) y 50 estudiantes en 2022-2023 (muestra n.º 2), de una clase estándar de la escuela. Las edades promedio fueron 8 años para la muestra 1 y 8,5 años para la muestra 2. Los datos fueron procesados mediante los métodos de estadística descriptiva, prueba de U-Wilcoxon-Mann-Whitney y análisis de correlación.

**Resultados.** Hubo una disminución en los indicadores intelectuales entre los escolares de hoy, con una relativa preservación de las características regulatorias. La disminución más significativa se produce en el rango inferior de la muestra, es decir, en los niños de hoy vemos puntuación mínima más baja. Para ellos es más difícil que para sus pares hace 10 años mantener el modo de acción y transferirlo a nuevas condiciones espaciales y métricas mediante la generalización de la acción. Todo esto en ausencia de cualquier diferencia en el nivel de coordinación sensoriomotora de las muestras. En los escolares más jóvenes de hoy se encontró un cambio a nivel de motivos y necesidades, que se expresa en una disminución en el número de niños capaces de desarrollar actividades por iniciativa propia.

**Conclusión.** La investigación revela una tendencia hacia la disminución de las características generales del pensamiento en los niños de 8 años de hoy. Los débiles se vuelven aún más débiles. El cambio a nivel de motivos y necesidades se caracteriza por una disminución de la motivación cognitiva, lo que en última instancia conduce a una disminución de la capacidad para desarrollar actividades por iniciativa propia. Probablemente sea necesario evaluar las diferencias identificadas en términos de factores pedagógicos, sociales y ambientales en la vida del niño. Los datos permiten concluir que la situación social del desarrollo infantil hace 10 años era más favorable que hoy.

**Palabras clave:** Desarrollo intelectual; motivación cognitiva; desarrollo de actividades por iniciativa propia; edad de escuela primaria; estudio retrospectivo; estudio contemporáneo; cambian con el tiempo

#### **Destacados:**

- La capacidad de desarrollar actividades por iniciativa propia se forma sólo con la maduración de los componentes intelectuales y motivacionales, expresados en el nivel de inteligencia que permite dominar una actividad, y un nivel de motivación cognitiva que proporciona la capacidad de avanzar de forma independiente más allá de los requisitos externos. Diferencias significativas en el nivel intelectual de las

dos muestras permiten identificar la disminución del nivel intelectual como una de las razones de la menor capacidad para desarrollar actividades por iniciativa propia en la muestra 2022-2023.

- Otra razón de la disminución de la capacidad para desarrollar actividades por iniciativa propia es un cambio en la esfera motivacional, que se caracteriza por una disminución de la motivación cognitiva.
- La asimilación oportuna por parte del niño del plan de estudios escolar debe seguir siendo el objetivo principal de los esfuerzos de profesores y estudiantes, teniendo en cuenta las características individuales de este desarrollo. Se debe llamar la atención de la comunidad pedagógica y psicológica al surgimiento de logros educativos en un niño «débil» y, a través de esto, a la formación de una sensación de bienestar.
- Es necesario prestar atención a los tipos de actividades que se cultivaron en el período preescolar y ocuparon mayor tiempo y atención del niño para evaluar el impacto pedagógico en él en el presente período de desarrollo.
- Las herramientas técnicas y digitales que compiten con la vida real y crean una ilusión de éxito reemplazan los esfuerzos y la experiencia de comunicarse con el mundo real necesarios para el pleno desarrollo, lo que puede tener un efecto adverso y retardado.

## RESUME

**Origines.** L'importance de ce travail est dictée par l'inquiétude de la communauté pédagogique et psychologique face aux difficultés d'enseignement des enfants de nos jours. La psychologie en Russie définit l'enfant comme un sujet d'activité éducative ce que prévoit non seulement la possibilité, mais aussi la volonté de maîtriser les connaissances. Les changements dans l'environnement de l'enfance moderne associés à l'émergence de nouvelles capacités techniques et les nouvelles tendances en matière d'éducation ne peuvent que certainement influencer le processus de développement de l'enfant, ce qui nécessite l'évaluation de spécialistes. L'étude de l'évolution à long terme des caractéristiques intellectuelles et personnelles du développement d'un enfant permet d'évaluer l'influence de nouveaux moyens de médiation sur le développement infantile. Analysant les résultats du suivi PISA (Le Programme international pour le suivi des acquis des élèves) en tant que plus grande étude évaluant les résultats scolaires des étudiants, S.N. Sirenko écrit qu'à peu près le même niveau de réussite des écoliers d'un pays particulier dans différentes matières (en 2018 la Russie se classe dans la quatrième dizaine) ne signifie pas tant le reflet de la maîtrise des matières individuelles par les enfants, mais plutôt l'état du système éducatif en général (Malinetsky, Sirenko, 2020 ; Sirenko, 2023).

**Objectif.** Le but de ce travail est de montrer les traits spécifiques du développement des écoliers du primaire de nos jours à travers une comparaison des caractéristiques de développement identifiées au sein de deux études espacées de 10 ans.

**Mise au point.** Sur la base des résultats d'une étude rétrospective et moderne, une comparaison a été faite du développement intellectuel et personnel d'enfants du primaire 2e année avec une différence d'âge de 10 ans. Le développement intellectuel a été évalué par le niveau de travail dans la technique « Animaux dans le cirque » de la méthode « Champ Créatif » (Bogoyavlenskaya, 1971) à l'aide des indicateurs « Nombre d'erreurs dans l'essai d'apprentissage du Champ Créatif » (NE EACC), « Temps pour Résoudre le Problème Principal de l'Essai Principal du Champ Créatif » (TR EPCC) et le test Matrices Progressives Standard de J. Raven, qui évalue le niveau général de développement intellectuel. La « coordination sensorimotrice », étudiée dans la technique « Les animaux au cirque », a été considérée comme un indicateur régulateur. Le développement personnel des enfants a été évalué à travers le niveau de développement de la sphère des besoins et des motivations, en particulier le développement de la motivation cognitive, qui a été déterminée à l'aide de l'indicateur « capacité à développer des activités de sa propre initiative » dans la technique « Les animaux au cirque » en utilisant la méthode « Champ Créatif ». Selon les

5 indicateurs susmentionnés, un échantillon de 100 personnes a été étudié : 50 élèves en 2013 (échantillon n°1) et 50 élèves en 2022-2023 (échantillon n°2), qui représentaient des classes standards de l'école d'enseignement général. L'âge moyen de chaque échantillon était de 8 ans pour l'échantillon numéro 1 et de 8,5 ans pour l'échantillon numéro 2. Les données obtenues ont été traitées à l'aide de méthodes de statistiques descriptives, du test U de Wilcoxon-Mann-Whitney et de l'analyse de corrélation.

**Résultats.** Les résultats obtenus indiquent une diminution des indicateurs intellectuels chez les écoliers modernes avec une relative préservation des caractéristiques régulatrices. Une baisse plus significative se produit dans l'éventail inférieur de l'échantillon, c'est-à-dire que nous constatons des valeurs minimales plus faibles chez les enfants modernes. C'est plus difficile pour eux que pour leurs pairs d'il y a 10 ans de conserver le mode d'action, de le transférer dans de nouvelles conditions spatiales et métriques, généraliser des actions dans l'absence de différence de niveau de coordination sensorimotrice. Chez les écoliers du primaire moderne, un changement a été identifié au niveau des besoins et des motivations, qui se traduit par une diminution du nombre d'enfants capables de développer des activités de leur propre initiative.

**Conclusion.** L'étude révèle une tendance à une diminution des caractéristiques générales de la pensée chez les enfants modernes de 8 ans. Les faibles deviennent encore plus faibles. Le changement au niveau des besoins et des motivations se caractérise par une diminution de la motivation cognitive, ce qui conduit finalement à une diminution de la capacité à développer des activités de sa propre initiative. Les différences identifiées doivent probablement être évaluées en termes d'influences pédagogiques, sociales et de facteurs environnementaux dans la vie de l'enfant. Les données obtenues nous permettent de parler de la situation sociale du développement de l'enfant il y a 10 ans comme plus favorable qu'aujourd'hui.

**Mots-clés:** Développement intellectuel; motivation cognitive; développement d'activités de sa propre initiative; âge scolaire du primaire; étude rétrospective; recherche moderne; change avec le temps

#### **Points principaux:**

- La formation de la capacité de développer des activités de sa propre initiative ne se produit qu'avec la maturation intellectuelle et la formation des composants de motivation, qui s'expriment en présence d'un niveau d'intelligence permettant de maîtriser cette activité et d'un niveau de motivation cognitive qui offre la capacité d'avancer de manière indépendante au-delà des limites des exigences externes. Des différences significatives dans le niveau intellectuel des deux échantillons permettent d'identifier une baisse du niveau intellectuel comme l'une des raisons de la diminution des manifestations de la capacité à développer des activités de sa propre initiative dans l'échantillon moderne.
- Une autre raison de la diminution des manifestations de la capacité à développer des activités de sa propre initiative dans l'échantillon moderne est un changement au niveau des besoins et des motivations, caractérisé par une diminution de la motivation cognitive.
- La maîtrise en temps opportun par l'enfant du volume requis du programme scolaire doit rester le principal point d'application des efforts des enseignants et des élèves, en tenant compte des caractéristiques individuelles de cette maîtrise. L'attention de la communauté pédagogique et psychologique doit être portée à l'émergence d'acquis scolaires chez un enfant « faible » et à la formation d'un sentiment de bien-être.
- Il est indispensable de faire attention aux types d'activités qui ont été cultivées pendant la période préscolaire et qui ont occupé le plus de temps et d'attention de l'enfant, pour évaluer l'influence pédagogique sur lui dans la période actuelle de son développement.

- Les outils techniques et numériques qui rivalisent avec la vie réelle et créent l'illusion du succès remplacent les efforts et l'expérience de communication avec le monde réel nécessaires au plein développement, ce qui peut avoir un effet différé défavorable.

## **Introduction**

Changes in education, including its optimization and control, the introduction of digital technologies in the educational process, and the recent pandemic have confronted all participants in the educational process with the need to adapt to new conditions. Teachers and psychologists are now turning to analysis of the methodological and pedagogical aspects of teaching, asking themselves not only what to teach, but also how to teach in order to keep the child's interest. According to our data, cognitive motivation ensures the preservation and growth of the level of intellectual development (Bogoyavlenskaya & Joukova, 2020). T.O. Gordeeva and colleagues talk about the need to preserve the student's internal motivation, which is understood as the preservation of pleasure and joy from learning (Gordeeva, Sychev, & Lunkina, 2019). Expressed intrinsic motivation leads to increased satisfaction with school, to self-esteem, and is manifested in a sense of academic well-being. Modern ideas about the quality of childhood and its leading component of "well-being" shift attention to the personality of the children, their sense of self and satisfaction with school. With the reduction of psychological and speech therapy services at school, it is up to the teacher to solve this problem.

A recent study reports that 37.7% of fourth-graders experience difficulties in schooling at the time of graduation from elementary school (Kantorova & Gorbachevskaya, 2020). Chinese colleagues in their study of more than 10,000 children found a decrease in regulatory functions by the end of primary school age. After grade 4, the proportion of students with regulatory problems increased. Negative changes have been noted in the transition to higher grades, which are "reflected in the declining trend of agreeableness, intelligence, extraversion, and conscientiousness" (Yu & Zhang, 2021, p. 7). This is also noted by other authors (Soto et al., 2011; Van den Akker et al., 2010, 2014). Longitudinal studies have found that this period is particularly important because of its long-term effects. For example, Conte and colleagues (2022) indicate the presence of a "gravitational" effect, which is characterized by the ability to predict the future level of cognitive development in adulthood based on data obtained at the age of 11. The idea of intergenerational differences in the acquisition of knowledge is also expressed by university teachers.

Conducting research to compare the development of children today with their peers of the previous decade would make it possible to identify the causes of the changes that are occurring. A decade as a time period provides a sufficiently long period of time for the maturation of changes, and at the same time it is a duration that brings people together in a common life and common views. Longitudinal studies allowed us to collect material for comparing the indicators of intellectual and personal development in two groups of primary school children, with a difference of



10 years. The choice for the study of second graders was justified by a certain level of adaptation of the child to school education while maintaining the relative novelty of the activity, which should have been reflected in the preservation of interest in learning. Conducting two sections within the framework of one educational institution in Moscow provided relatively identical conditions for the pedagogical and educational process of these groups.

## **Methods**

The study of the special features of the children's intellectual development was carried out using the "Animals in the Circus" technique of the Creative Field method by D.B. Bogoyavlenskaya (1971, 2009), and the Standard Progressive Matrices test by J. Raven. Personal development, in particular in the motivational–need sphere (leading motif), was assessed by the Creative Field method.

The Creative Field method (Bogoyavlenskaya, 1971), in contrast to the study of thinking by the method of problem situations, consists in solving a system of similar tasks. The method includes training and main experiments. In a Creative Field Training Experiment (CFTE), children master a new activity, which allows them to equalize their abilities and assess the level of learning that characterizes their intellectual abilities, their regulatory features. Successful mastery of the activity in the learning experiment makes it possible to proceed to the Creative Field Main Experiment (CFME), in which the child is offered a number of tasks of the same type, where, in addition to the level of intelligence, the ability to develop activities on their own initiative is assessed as the ability to be creative. If a child throughout the experiment uses the found method of solving the first task (even improving it), we classify him or her as a member of the stimulus-productive group, since their cognitive interest ends at the moment the solution is found. Their activity is externally stimulated. The heuristic level involves the development of activity on one's own initiative; it is not stimulated by the conditions of the problem. Analysis of the system of tasks and the discovery of new patterns, one's own ways of solving problems, is possible only with the dominance of cognitive motivation in the structure of the personality. At a creative level, open patterns are already seen as the problem of why they are the way they are. In the Main Experiment, we assess the level of intelligence, including the regulatory component, and the ability to develop activities on one's own initiative.

The Standard Progressive Matrices test by J. Raven examines non-verbal intelligence and is resistant to cultural differences (Carpenter et al., 1990). The first three series are a series of progressively more complex tasks that need to be compared using the analysis of the proposed matrix and solution options.

## **Participants**

The sample consisted of 100 subjects: 50 students in 2013 (sample No. 1) and 50 students in 2022–2023 (sample No. 2), which represented the standard classes of a comprehensive school. The average age of sample No. 1 was 8 years, sample No. 2 was

8.5 years. Both samples consisted of 28 girls and 22 boys, which is 56% versus 44%. The average age of the boys for sample 1 was 8 years, for sample 2 — 8 years 4 months. The average age of the girls for the first sample was 8 years, for the second sample — 8 years 6 months. The samples were studied within the same educational institution and the same school programs.

**Procedure**

The following indicators were identified in the “Animals in the Circus” methodology. We used the intellectual indicators “Number of Errors in the Creative Field Training Experiment (NE CFTE)” and “Time to Solve the main task in the Main Creative Field Experiment (TS CFME)”. NE CFTE represents the number of mistakes made by the subjects in the process of mastering the activity in the experiment. The best result is the absence of errors; the worst is the maximum number of errors in the group. TS CFME reflects the actual intellectual level of the child, the ability to accept the conditions of the problem and find its solution. The best result is the solution of the main task in the shortest time; the worst result is the absence of a solution. As a regulatory indicator, Sensorimotor Coordination (SC) was considered, which is easily distinguished in the children’s version of the methodology within the framework of the Creative Field method. Here the nature of the drawn line was evaluated, together with the accuracy of the trajectory through the corners of the cells of the experimental field. Personal indicators include “Ability to develop activities on the Initiative of the Subject” (IS). Interest and cognitive motivation were assessed here, as realized in the subjects’ development of activities on their own initiative.

The Standard Progressive Matrices test by J. Raven determined the level of intellectual development (RS). This is the most frequently used and informative non-verbal test (Davydova & Ptuha, 2013; Vucicevic, 2022). Series A, B, and C were conducted with the group.

To process the data, we used descriptive statistical methods, the U-Wilcoxon–Mann–Whitney test, and correlation analysis. The calculations were carried out using the R programming language. The conventions for the measured values are shown in Table 1 below.

Table 1  
*Symbols of the studied indicators*

Sample	Raven test score (RS)	Number of errors in the Creative Field (NE CFTE)	Time to solve the problem in the Creative Field (TS CFME)	Ability to develop activities on the initiative of the subject (IS)	Sensorimotor Coordination (SC)
No. 1 2013	R3	E3	T3	B3	S3
No. 2 2022–2023	R4	E4	T4	B4	S4

## Results

The results of the descriptive statistics of the experimental data are presented in Tables 2 and 3. According to the indicator of intellectual development of the J. Raven test, the maximum value in samples 1 and 2 is represented by 36 versus 34 (36 points is the highest possible result in the test), while the minimum number of points differs more significantly: 24 versus 11. This allows us to say that the modern sample is characterized by a drop in the lower values of indicators of intellectual development. The decrease in the median and mean in the modern sample (by 6.5 and 6.78 units, respectively), which is 19% of the total score, also confirms the conclusion. In the first quartile of the data of sample No. 1, we see a large scatter of data — 9 divisions — which characterizes the decline in indicators in the modern sample. In the third quartile, we see a less dramatic decline, where the difference is 5.25 units. This suggests that the drift of the extreme low results is directed towards their even greater decline. At the same time, a slightly smoother drop also applies to high values of intelligence in the sample. Thus, the difference in the values of the first and third quartiles between the 2013 and 2023 slices shows that the identified decrease affects the entire sample.

Table 2

*Descriptive statistics for sample No. 1 (2013)*

	Min	Max	Mean	Median	1st Quartile	3rd Quartile
Raven test score (RS) — R3	24.00	36.00	32.00	33.00	30.25	34.00
Number of Errors (NE CFTE) — E3	00.00	39.00	8.72	5.00	2.00	11.00
Time to Solve (TS CFME) — T3	55.0	3000	372.9	210.5	161.2	288.0
Ability to develop activities on the Initiative of the Subject (IS) — B3	1.00	2.00	1.24			
Sensorimotor Coordination (SC) — S3	1.00	4.00	1.94	2.00	1.00	2.75

Table 3

*Descriptive statistics for sample No. 2 (2022–2023)*

	Min	Max	Mean	Median	1st Quartile	3rd Quartile
Raven test score (RS) — R4	11.00	34.00	25.22	26.50	21.25	28.75
Number of Errors (NE CFTE) — E4	00.00	52.00	15.48	11.00	6.00	23.00
Time to Solve (TS CFME) — T4	60.00	3000	478.6	250.0	156.8	441.5
Ability to develop activities on the Initiative of the Subject (IS) — B4	1.00	2.00	1.1			
Sensorimotor Coordination (SC) — S4	1.00	4.00	1.74	2.00	1.00	2.00

The indicator “Number of Errors in the Creative Field Training Experiment (NE CFTE)” in both samples has the same minimum — 0.00, which indicates the children who learned without a single error (here, a zero result is the best). The maximum for this indicator differs in the direction of deterioration in sample No. 2 (39 versus 52). Comparison of the medians, arithmetic means, and indicators of the first and third quartiles of both samples demonstrates an increase in values approximately twice in sample No. 2, which shows a significant increase in the number of errors in mastering activities within the entire second group.

The indicator “Time to Solve the main task in the Main Creative Field Experiment (TS CFME)” reflects the speed of solving the problem, where the best result is a shorter period of time. This indicator is characterized by an increase in the minimum value of sample No. 2 by 5 points. The maximum is the same, since the last values were assigned to children who did not solve the problem. Here, the most informative for us are the indicators of the median and the arithmetic mean. The median difference is 40 units (210.5 versus 250). The arithmetic mean differs in the direction of increasing values in sample No. 2, 372.9 versus 478.6, that is, by 105 units. The difference begins to appear in the lower ranges (288 in 2013 versus 441.5 in 2023), that is, in children who have difficulty solving the problem.

The “Sensorimotor Coordination” (SC) indicator, allocated within the framework of regulatory indicators, has the same minimum and maximum in both samples, since it was evaluated as a ranking scale, where the value of 1 corresponded to the best indicator, while the value of 4 was the weakest development of this indicator. The mean and quartiles are characterized by somewhat higher results in sample No. 2, but the level of these differences does not reach the degree of significance.

The indicator “Ability to develop activities on the Initiative of the Subject” (IS) is characterized by significant differences in the two samples. The mean of the first sample is higher than that of the second sample, which indicates a greater number of children who showed the ability to develop activities on their own initiative in 2013 and, accordingly, a decrease in this indicator in 2022–2023, which is manifested in a smaller number of children who switched to the heuristic level of activity in the Creative Field method.

The results indicate that the level of intellectual development of today’s second-graders is lower than that of a similar age group 10 years ago. Mastering a new activity in the Creative Field, and the level of intelligence according to the Raven test, show a decrease in the average values of learning ability and intelligence among today’s schoolchildren. The time to solve the main problem tends to worsen in sample No. 2. The difference in the level of sensorimotor coordination of the two samples does not reach a significant level and has a positive trend in sample No. 2.

In the personal development of sample No. 2, we observe a decrease in the ability to develop activities on one’s own initiative. The number of children who went to heuristic level is reduced more than two-fold (12 people in 2013 and 5 people in 2022–2023). Children today demonstrate a stimulus–productive strategy in activity.

Below are the results of statistical analysis using the Wilcoxon–Mann–Whitney U test.

- The average “Level of intellectual development (according to J. Raven)” in sample No. 1 (R3) is greater than in sample No. 2 (R4) —  $W = 2,187.5$ ,  $p\text{-value} = 4.606e-11$ .
- The average number of errors in mastering a new activity (NE CFTE) in sample No. 1 (E3) is less than in sample No. 2 (E4) -  $W = 761.5$ ,  $p\text{-value} = 0.0003755$ .
- The average time to solve the main problem (TS CFME) in the samples does not differ significantly -  $W = 1,124.5$ ,  $p\text{-value} = 0.1944$ . At the same time, in sample No. 1 (T3), it is generally less than in sample No. 2 (T4).
- “Ability to develop activities on one’s own initiative” (B3 and B4) in the two samples differs significantly in the direction of its decrease in the modern sample B4 —  $W = 1,425$ ,  $p\text{-value} = 0.03224$ .
- “Sensorimotor Coordination” (S3 and S4) in the two samples does not differ on average —  $W = 1,402$ ,  $p\text{-value} = 0.131$ . In sample No. 2, it is slightly better.

The results of Spearman’s correlation analysis are shown in *Tables 4* and *5* for the first and second samples, respectively. The number of stars next to the correlation number corresponds to its significance: \*\*\* $p = 0.001$ ; \*\* $p = 0.01$ ; \* $p = 0.05$ .

In sample No. 1 (*Table 4*), we can talk about a significant possible relationship of the indicator “Ability to develop activities on the Initiative of the Subject” (B3) with the intellectual component: the Raven test (R3) ( $\rho = 0.57$  at  $p = 0.001$ ), with the indicator “Number of Errors in the process of mastering activities in the Creative Field” (E3) ( $\rho = -0.49$  at  $p = 0.001$ ), with the indicator “Time to Solve the main task in the Creative Field” (T3) ( $\rho = -0.44$ , at  $p = 0.01$ ), with the indicator “Sensorimotor Coordination” (S3) ( $\rho = -0.34$  at  $p = 0.05$ ). This means that the group of heurists (with big IS) in sample No. 1 more often had a high level of intelligence. They coped more easily with solving the problem in the Creative Field and are characterized by a relative absence of intellectual and psychophysiological problems.

Table 4

*Spearman correlations of indicators for sample No. 1 (2013)*

	R3	E3	T3	B3	S3
R3	1.00	-0.65***	-0.37**	0.57***	-0.42**
E3		1.00	0.46***	-0.49***	0.45***
T3			1.00	-0.44**	0.17
B3				1.00	-0.34*
S3					1.00

In sample No. 2 (*Table 5*), we can talk about a non-significant possible relationship of the indicator “Ability to develop activities on the Initiative of the Subject” (B4) with the indicator of intellectual development according to the Raven test (R4). In addition, there is a decrease in the relationship between all intellectual indicators. Indicators of different time slices do not reveal any significant correlations.

Table 5  
Spearman correlations of indicators for sample No. 2 (2022–2023)

	R4	E4	T4	B4	S4
R4	1.00	-0.39**	-0.33*	0.20	-0.29*
E4		1.00	0.31*	-0.34*	0.38**
T4			1.00	-0.21	0.32*
B4				1.00	-0.26
S4					1.00

**Discussion**

Generalization of the results suggests that the children in the 2023–2023 sample find it more difficult to master a new activity, and solving the main task in the experiment is a somewhat slower process. Raven’s test also shows a decrease in average intelligence values among schoolchildren today. We also observe a decrease in their cognitive motivation. At the same time, their level of sensorimotor coordination does not differ from their peers 10 years ago.

The absence of significant differences in regulatory indicators suggests that the cause of the identified problems should be sought not in the physiological and psychophysiological context, but rather in the pedagogical and social context. Since these samples were studied within the framework of one institution and one school program, we can assume that this situation is a consequence of new phenomena that have appeared over the past 10 years (digitalization, reorganization of the pedagogical system, the possibility of parental influence on the educational process). With a qualitative analysis of the protocols, we see that the decline in intellectual development is characterized by difficulties in mastering mental operations (generalization, anticipation, ease of transfer, as well as preservation of the mode of action).

With a qualitative analysis of the work of younger schoolchildren in the experiment, we managed to identify some phenomena that, in our opinion, reflect the particular features of thinking of second graders today.

The increase in the number of errors is embodied in the growth of repetitive errors, which indicates difficulties of generalization and poor preservation of the mode of action. It is difficult for the child to single out the essential features of the situation — in this case, the change in the size of the “cell” and the spatial position of the object.

The difficulties of anticipation are expressed in the inability to synthesize particular individual private representations into a holistic image. Understanding becomes available only with a visual explanation by an adult.

Another phenomenon can be called the quick result effect. If the child does not achieve a quick result and does not receive satisfaction, then interest fades, and he or she is ready to quit the activity (“I want everything to work right the first time”). The 2022–2023 sample is characterized by the lack of ability to exert effort without external dominance.

In sample No. 1 and earlier, we met children who continued to think about the proposed task “outside” of the activity with the experimenter (“I drew circles at home like you do”, “Where can I get such a form?”, “But I understood at home”). In sample No. 2, such desires (“May I take the form home?”, “Is it possible to take a picture?”), even when they appear, quickly fade away, are replaced by an external situation, do not have the character of a purposeful activity or persistent desire, and, accordingly, as a rule, are not maintained. Even with heuristics in sample No. 2, we rarely see the effect of further development of activity after entering heuristics. Only in two people did we see gradual progress in the analysis of the system of tasks: the discovery of many new regularities. The other part of the heuristic group remained within the same identified heuristic.

It should be said that the results we obtained, allow us to take a fresh look at today’s trend, which recognizes “the importance of a student’s well-being and experiences beyond their connection with achievements” (Polivanova, 2020, p. 26). Without questioning the importance of self-awareness and self-esteem, let us assume that learning activity, being the main activity at this age, should be successful as such. And if we do not associate well-being with academic achievement, then we are “getting away from the problem”. K.N. Polivanova writes about “a significant change in the ‘education’ construct itself: it is now considered not only as a preparation for future life through the achievement of educational results by the student, but also as a part of the life cycle, valuable in itself” (Polivanova, 2020, p. 27). It seems to us that the school life of many generations before these declarations met these requirements, including in addition to the educational labor, civil, active social component, which ensured the personal development of the child. And with the positioning of the school as only an educational, and not a parenting institution, with the total control and accountability of the teacher, the intervention of parenthood in the educational process, the school often becomes only a translator of knowledge, information without attention to the individual pace and personal characteristics of the child.

It seems to us that the attention of the pedagogical community, first of all, should be directed precisely to the problem of educational achievements in a “weak” child, and not to the formation of a sense of well-being in the face of real educational problems. The timely mastery of the necessary amount of knowledge and skills by the child with maximum assistance, including support for self-esteem, should remain the main point of the efforts of teachers and students, while also paying attention to the individual characteristics of this development and maintaining the opportunity for pedagogical maneuver. The need to focus on the zone of proximal development of any student, changing of communication in the degree and nature of the provision by adults of the assistance necessary for the child in mastering knowledge (Kravtsov & Kravtsova, 2020), changing adult–child relationships through expanding “the proactive repertoire of each student in a situation of an intellectual task” (Shur & Zuckerman, 2022, p. 83) are defined by researchers as necessary components of the educational process today. Changes in education should follow the path not so much of optimization as of a differentiated assessment of the need for the attention of different specialists (teacher, tutor, psychologist, speech therapist, special education teacher) in relation to all categories of students and the organization of this work within the school.

The largest monitoring study of educational achievement in different countries, PISA, determined that a qualified teacher is the main factor in a child's success. Practical conclusions indicate the importance of effective forms of teaching when technical devices are under the control of the teacher and not at the disposal of students. Some classroom technologies, such as laptops, tablets, and e-readers, actually slow down productivity. The best results are obtained by methods of active teaching of students (they put forward hypotheses and organize experiments), but only on the basis of the "foundation" received from the teacher, which is mastered in the strategy when "the teacher dominates". A decline in positive results is associated with the frequent use of discussions and debates without the basic knowledge conveyed by the teacher (Denoël et al., 2017).

The formation of the ability to develop activities on one's own initiative occurs only with the maturation of the intellectual and motivational components, which is expressed in a level of intelligence that allows one to master this activity and a level of cognitive motivation that provides the ability to independently advance in it beyond external requirements (Artemenkov, Bogoyavlenskaya, & Joukova, 2021; Bogoyavlenskaya, Artemenkov, & Joukova, 2021; Joukova 2021; Joukova, Artemenkov, & Bogoyavlenskaya, 2022). It seems to us that the significant differences in the intellectual level of the two samples make it possible to determine that the decline in the intellectual level is one of the reasons for the decreased ability to develop activities on one's own initiative in sample No. 2. At the same time, the most important change seems to us at the motivational-need level, which is characterized by a decrease in cognitive motivation, which ultimately leads to a decrease in the ability to develop activities on one's own initiative. And this applies to children with different levels of intelligence.

Analyzing the results, let us try to understand their causes, which are likely to be of a systemic nature. The introduction of technical, digital means (Prikhodzhan, 2010) is characterized by a variety of ready-made products that allow you to quickly and easily solve any problem. This creates a sense of success and well-being, but true skill is not born. Children do not learn to master either mental operations or the development of their own character and will. A.D. Andreeva writes that "new technical teaching aids create only the illusion that the educational environment of a modern school corresponds to some 'special' cognitive abilities of children of the 21st century that have not yet received scientific confirmation" (Andreeva, 2019, p. 13).

It is important to understand that school skills are based on functions that are formed at preschool age. Thus, recent longitudinal studies have revealed the relationship between the ability of children to maintain an isochronous beat (drumming task) with preliteracy skills in more than 150 preschoolers. Children who did well on the rhythm synchronization task had higher preliteracy scores, which is a predictor of successful language acquisition and reading skills. (Bonacina et al., 2021). Previous research emphasized that the child's ability to perceive and remember time signals helps first with speech development and then with reading (White-Schwoch et al., 2015). The data define the preschool period as extremely critical for the full development of the foundations of educational activity, and personal development of the child. Thus, the early debut of school activities (reading, counting) "forces out" the actual preschool activities (playing, modeling, drawing, experimenting), which are the basis for the development of mental functions that ensure successful schooling.



Violation of the natural course of the maturation of these functions in the long term can distort the further development of the child. The real preparation for schooling is the full development of the capabilities of one's age, which will provide a physiological foundation and be realized in the ease of passing to the next stage of development (Denisenkova & Fedorov, 2021; Joukova, 2021; Kantorova & Gorbachevskaya 2020).

It should be said that the subject of learning is distinguished not only by intellectual readiness, but also by motivational, personal readiness. Claudia M. Mueller and Carol S. Dweck conducted a study confirming that singling out children on the basis of intelligence (praise for intelligence) can negatively affect motivation and academic performance: "praise for intelligence seemed to teach children to value performance, even when following their own information-seeking interests, whereas praise for hard work seemed to lead children to value learning opportunities" (Mueller & Dweck, 1998, p. 48). Years of PISA research have shown that the change in learning comes along the lines of learning motivation. Numerous Olympiads and competitions aimed at testing the level of knowledge, but not passion and problem development, also do not contribute to the development of cognitive motivation, but stimulate the achievement motive. Rational changes towards reducing the supervisory function in the school and creating conditions for activities according to children's interests could be a solution to this problem.

## **Conclusion**

The analysis allows us to speak about a trend towards a decline in the general characteristics of thinking in today's 8-year-old. Thinking is more difficult for them than for their peers 10 years ago, given the preservation of the mode of action, its transfer to new spatial and metric conditions, the generalization of action in the absence of a difference in the level of sensorimotor coordination. The decline occurs in all ranges, but is more pronounced in the lower range of the sample: in other words, the weak pupils become even weaker.

The identified differences probably need to be assessed in terms of pedagogical and social impacts, as well as environmental factors in the child's life. It is necessary to pay attention to those types of activities that were cultivated in preschool, and occupied the greatest time and attention of the child, to assess their pedagogical impact in the present period of his or her development. The data allow us to speak about the social situation of a child's development 10 years ago as more favorable than today.

We consider the most important change at the motivational-need level, which is characterized not only by a decrease in cognitive motivation, but by "paralysis of the will", a refusal to make efforts, which ultimately leads to a decline in the ability to develop activities on one's own initiative. And this applies to children with different levels of intelligence.

It seems to us that attention should be paid not only to educational activities, but also to all spheres of a child's life. Personal maturity presupposes the formation of such personal qualities as independence and responsibility, which can only be "grown" through a relationship with a significant adult built in a certain way, the possibility of a safe experience, independence in choosing activities and goals. Informational "noise" that competes with real life and creates an imaginary feeling of success

often replaces the necessary efforts and experience that can only be acquired in live communication with the real world, objective or social. At the same time, it is important to build this communication more directly, reducing rather than increasing the chains of mediation in the process of organizing the study and life of schoolchildren. Unfortunately, the trends in society are typically directed in the opposite direction and this is not recognized as a problem (Artemenkov, 2021). Thus, we are raising a generation that is perhaps more knowledgeable than the previous one, but in terms of readiness for action, “loses” to its predecessors.

### **Limitations**

For greater validity of the conclusions, it is desirable to expand the sample through research at different educational institutions, which will confirm the data obtained and exclude the influence of the social component. This will allow a deeper analysis of the development of giftedness and intelligence at school age.

### **Ethics Statement**

Written informed consent to participate in this study was provided by the parents of all students. Parents and teachers received recommendations on the current situation of children’s development.

### **Author Contributions**

Research and experiments were carried out by E.S. Joukova. S.L. Artemenkov conducted a mathematical analysis of the data. Dr. D.B. Bogoyavlenskaya developed the theoretical and practical base for the study: a method, scales, and techniques for experimental diagnosis of giftedness in children of different ages. The authors jointly discussed the results of the study and collaborated on the manuscript.

### **Conflict of Interest**

The authors declare no conflict of interest.

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