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EFFECTIVENESS OF THE PEDAGOGICAL MODEL OF FORMING IDEOLOGICAL IMMUNITY IN STUDENTS: STATISTICAL ANALYSIS OF EXPERIMENTAL WORK

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Abstract
The article presents the results of an experimental study testing the effectiveness of a three-tier model of pedagogical prevention of religious extremism in secondary schools. The study was conducted during the 2024–2026 academic years in four schools and involved 390 participants (240 pupils of grades 8–9, 60 teachers, 90 parents). The baseline stage showed that 68,3 % of pupils do not verify the source of online information, while the teacher is the least consulted source for questions of religious content (9,6 %). After the formative stage, the high level of ideological immunity in the experimental group rose by 22,5 percentage points and the low level fell by 35,0. The results were confirmed by the chi-square test ($\chi^2 = 20{,}36$; $df = 2$) and Student’s t-test ($t = 10{,}42$; $df = 238$) at $p < 0{,}001$, with an effect size (Cohen’s d) of 1,34.

Keywords: Pedagogical experiment, ideological immunity, religious extremism, prevention, critical thinking, media literacy, chi-square test, Student’s t-test, effect size.

O‘QUVCHILARDA MAFKURAVIY IMMUNITETNI SHAKLLANTIRISHNING PEDAGOGIK MODELI SAMARADORLIGI: TAJRIBA-SINOV ISHLARINING STATISTIK TAHLILI

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Annotatsiya

Maqolada umumta’lim maktablarida diniy ekstremizmga qarshi pedagogik profilaktikaning uch bosqichli modeli samaradorligini tekshirishga qaratilgan tajriba-sinov ishlari natijalari bayon etilgan. Tadqiqot 2024–2026-o‘quv yillari davomida to‘rtta umumta’lim maktabi bazasida, jami 390 nafar ishtirokchi (240 nafar 8–9-sinf o‘quvchisi, 60 nafar pedagog, 90 nafar ota-ona) qamrab olingan holda uch bosqichda amalga oshirildi. Aniqlovchi bosqich o‘quvchilarning 68,3 foizi internetdagi ma’lumot manbasini tekshirmasligini, diniy mazmundagi savol bilan pedagogga eng kam — 9,6 foiz holatda murojaat qilishini ko‘rsatdi. Shakllantiruvchi bosqichdan so‘ng tajriba guruhida mafkuraviy immunitetning yuqori darajasi 22,5 foiz punktga oshdi, quyi darajasi 35,0 foiz punktga kamaydi. Natijalar xi-kvadrat ($\chi^2 = 20{,}36$; $df = 2$) va Styudent t-mezoni ($t = 10{,}42$; $df = 238$) yordamida $p < 0{,}001$ darajada tasdiqlandi, ta’sir kuchi ko‘rsatkichi (Koen d) 1,34 ni tashkil etdi.

Kalit so‘zlar: pedagogik eksperiment, mafkuraviy immunitet, diniy ekstremizm, profilaktika, tanqidiy tafakkur, media-savodxonlik, xi-kvadrat mezoni, Styudent t-mezoni, ta’sir kuchi.

Аннотация

В статье изложены результаты опытно-экспериментальной работы по проверке эффективности трёхуровневой модели педагогической профилактики религиозного экстремизма в общеобразовательных школах. Исследование проводилось в 2024–2026 учебных годах на базе четырёх школ и охватило 390 участников (240 учащихся 8–9 классов, 60 педагогов, 90 родителей). Констатирующий этап показал, что 68,3 % учащихся не проверяют источник информации в интернете, а к педагогу с вопросом религиозного содержания обращаются реже всего — в 9,6 % случаев. После формирующего этапа в экспериментальной группе высокий уровень идеологического иммунитета вырос на 22,5 процентных пункта, низкий снизился на 35,0. Результаты подтверждены критерием хи-квадрат ($\chi^2 = 20{,}36$; $df = 2$) и t-критерием Стьюдента ($t = 10{,}42$; $df = 238$) при $p < 0{,}001$; величина эффекта (d Коэна) составила 1,34.

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Ключевые слова: педагогический эксперимент, идеологический иммунитет, религиозный экстремизм, профилактика, критическое мышление, медиаграмотность, критерий хи-квадрат, t-критерий Стьюдента, величина эффекта.

Introduction

Preventive activities against religious extremism in secondary schools have long been evaluated mainly through organizational indicators - the number of events held, the number of students covered. Such an assessment method does not provide information about the real result of prevention, that is, changes in the student's outlook, critical skills and real behavior. As a result, a peculiar contradiction arises in pedagogical practice: in the reporting documents, preventive work seems to be fully implemented, but its mechanism of action and effectiveness remain scientifically unconfirmed.

In a previous study, the author developed a three-stage - primary, secondary and tertiary - differentiated model of pedagogical prevention against religious extremism and a five-criteria diagnostic apparatus for assessing ideological immunity. The purpose of this article is to experimentally verify the effectiveness of this model and substantiate the statistical reliability of the differences obtained. The study was based on the following hypotheses: 1) if preventive activities are elevated from a set of separate measures to a holistic pedagogical system that operates continuously and step-by-step, its results will be stable and measurable; 2) if prevention is transferred from a model of information provision based on prohibitions and warnings to a model based on the development of the student's critical thinking and value system, the resulting ideological immunity will be valid not only against known, but also against new ideological influences; 3) if the adolescent's needs for belonging, recognition, and seeking justice are satisfied through positive activities at school, and the teacher responds to "uncomfortable" questions with open dialogue, the attractiveness of radical groups will decrease.

Research methodology. Experimental and test work was carried out in three stages - identifying, formative, and final (control) stages - on the basis of four secondary schools during the 2024–2026 academic years. The study involved students in grades 8–9. The choice of this age group was not accidental: it is

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during adolescence that the search for identity, the need for group affiliation, and the sense of justice are intensified, that is, the sensitivity to radical influences is highest [17, p. 165; 18, p. 74]. The participants were divided into an experimental group (EG) and a control group (CG) (Table 1).

Table 1 Distribution of participants in the experimental study

Participant Category	Experiment group	Control group	Total
Students (8th–9th grade)	120	120	240
Teachers	30	30	60
Parents	45	45	90
Total	195	195	390

The diagnostic apparatus was built on the basis of five criteria in accordance with the five-component structure of ideological immunity: cognitive (knowledge), motivational-value, cognitive-critical, behavioral (activity) and reflexive criteria. The student's performance on each criterion was assessed on a 10-point scale, and the overall result was divided into three levels - high, medium and low.

The following methods were used to collect information: a questionnaire with closed and open questions; a test to determine the level of knowledge; a set of situational tasks; a pedagogical observation sheet; expert assessment (average of the assessments of the class teacher, subject teacher and school psychologist); separate questionnaires for teachers and parents. The calculation of expert assessment as an average value obtained from three sources served to reduce the subjectivity of an individual evaluator.

The study was conducted with the consent of the school administration, observing the conditions of voluntary participation, anonymity of responses, and presentation of the obtained data only in a generalized form. Parents' awareness was ensured when working with students.

Two statistical criteria were used to process the obtained data. Qualitative indicators (distribution by levels) were compared using the chi-square (χ^2) test, and quantitative indicators (mean scores on a 10-point scale) using the Student's t-test. The conditions for using these methods in pedagogical research are

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described in the works of M.I. Grabar and K.A. Krasnyanskaya [19] and D.A. Novikov [20]. To assess the strength of the effect, Cohen's d indicator was calculated; its interpretation was based on the criteria proposed by J. Cohen ($d \geq 0.80$ - large effect) [21, p. 26].

RESULTS

1. Determinative stage: homogeneity of groups

During the determinative stage, the level of formation of ideological immunity was measured in both groups of students (Table 2).

Table 2 Determinative stage: level of formation of ideological immunity

Group	High level	Intermediate level	Lower level
Experimental group (n = 120)	14 (11,7 %)	43 (35,8 %)	63 (52,5 %)
Control group (n = 120)	15 (12,5 %)	45 (37,5 %)	60 (50,0 %)

The chi-square test was used to test the significance of the initial difference between the groups. The calculation yielded a value of $\chi^2 = 0.153$. The critical value for the significance level of $p < 0.05$ is 5.991 when the degree of freedom is $df = 2$. Since $0.153 < 5.991$, the initial difference between the groups was considered statistically insignificant. This indicates that the experimental and control groups are homogeneous, that is, the difference observed in the subsequent stages can be attributed to the formative effect.

2. Exploratory stage: results of the student questionnaire

The questionnaire revealed a number of noteworthy facts. Out of a total of 240 students, 164 (68.3%) stated that they never or rarely check the source of information on the Internet. When asked who they would turn to when they had a question of religious content, the answers were distributed as shown in Table 3.

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Table 3 Resources consulted with religious questions (n = 240)

Source of referral	Number of students	Share, %
Internet	107	44,6
Parents	52	21,7
Neighborhood imam	44	18,3
Teacher	23	9,6
I don't turn to anyone	14	5,8

This distribution is key to the study. First, almost half of students seek answers to their religious questions in an uncontrolled digital environment. Second, the school teacher has become the least consulted source on this issue - this indicates a major weakness of preventive activities: if the teacher is not perceived as a reliable interlocutor for the student, then its preventive effect will be limited. Third, the 5.8 percent of students who stated that they do not turn to anyone constitute a risk group that requires special attention.

3. Descriptive stage: questionnaires for teachers and parents

The results of the questionnaires for teachers and parents confirmed the above conclusion (Table 4).

Table 4 Results of the questionnaires for teachers (n = 60) and parents (n = 90)

Indicator	Number	Share, %
Prophylactic work is mainly carried out in the form of lectures and conversations (pedagogues)	47	78,3
Needs modern methodological materials (pedagogues)	39	65,0
Has difficulty answering the student's "uncomfortable" question (pedagogues)	25	41,7
Has undergone special training (pedagogues)	14	23,3
Does not discuss religious topics with their child (parents)	56	62,2
Is not aware of their child's activities on the Internet (parents)	64	71,1
The child mainly receives information about religion from the Internet (parents)	31	34,4

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Thus, the explanatory stage revealed three serious gaps: the weakness of a reliable communication channel between the student and the teacher; the lack of family control and family communication; the lack of students' skills in checking the source of information. The program of the formative stage was focused on these three areas.

4. Content of the formative stage

The formative stage was carried out only in the experimental group for one academic year; in the control group, the educational process continued in the traditional manner. In the experimental group, a three-stage model was introduced with the following content: integration of preventive tasks into subject lessons (native language and literature, history, education); organization of a debate club and media literacy classes in extracurricular activities; use of folk pedagogy tools - proverbs and discussions, fairy tale analysis, family oral history project; practical seminars for parents; methodological seminar for teachers; individual work with students with identified risk factors.

Media literacy training was conducted on neutral materials (advertising, sensational news, rumors). The basis of this approach is that the student learns to recognize the manipulation technique independently of its content, and the resulting skill is applicable to any manipulative text, not just to a specific topic [22, p. 574].

5. Results of the final stage

After the formative stage was completed, repeated diagnostics were conducted in both groups. The dynamics of the results are reflected in Table 5.

Table 5 Dynamics of ideological immunity levels during the experiment

Group	Stage	**High**	**Medium**	**Lower**
Experimental group (n = 120)	Definitive	11,7 %	35,8 %	52,5 %
Experimental group (n = 120)	Final	34,2 %	48,3 %	17,5 %
Control group (n = 120)	Definitive	12,5 %	37,5 %	50,0 %
Control group (n = 120)	Final	15,8 %	42,5 %	41,7 %

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The table shows that in the experimental group, the high level indicator increased from 11.7 percent to 34.2 percent, an increase of 22.5 percentage points; the low level indicator decreased from 52.5 percent to 17.5 percent, a decrease of 35.0 percentage points. A certain positive shift was also observed in the control group — the high level increased by 3.3 percentage points, the low level decreased by 8.3 percentage points — but this change is explained by the influence of natural age development and the general educational process and is significantly lower than the shift in the experimental group.

The dynamics of average indicators across criteria is presented in Table 6.

Table 6 Dynamics of average scores by criteria (10-point scale)

Criterion	Experimental group (start → end)	Control group (start → end)	t-test
Cognitive	4,62 → 7,84	4,71 → 5,36	10,97
Motivational-value	4,85 → 7,51	4,90 → 5,28	9,65
Cognitive-critical	4,28 → 7,93	4,35 → 5,11	12,05
Behavioral	4,94 → 7,36	5,02 → 5,44	8,38
Reflexive	4,41 → 7,28	4,48 → 5,19	9,09
Overall average	4,62 → 7,58	4,69 → 5,28	10,42

The greatest increase was recorded in the cognitive-critical criterion: in the experimental group, the indicator increased from 4.28 points to 7.93 points (+3.65 points). A relatively smaller increase was observed in the behavioral criterion (4.94 → 7.36; +2.42 points).

6. Statistical reliability of the results

When comparing the experimental and control groups according to the distribution of levels at the final stage, the value of $\chi^2 = 20.36$ was obtained. With a degree of freedom of df = 2, the critical values are as follows: 5.991 for $p < 0.05$; 9.210 for $p < 0.01$; 13.816 for $p < 0.001$. Since the calculated value is higher than all critical values, the difference between the groups is recognized as statistically significant at the $p < 0.001$ level.

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At the final stage, when comparing the experimental group (M = 7.58) and the control group (M = 5.28) in terms of the total average scores, the value t = 10.42 was obtained. The critical value for $p < 0.001$ is 3.34 with a degree of freedom of df = 238; since 10.42 > 3.34, the difference is considered highly significant. The effect size (Cohen's d) is 1.34, which is interpreted as a large effect for pedagogical research [21, p. 26]. Thus, both statistical criteria lead to the same conclusion: the positive changes noted in the experimental group are not accidental, but the result of the implemented pedagogical model.

DISCUSSION

The most striking aspect of the results is the uneven distribution of growth across criteria. The highest score on the cognitive-critical criterion indicates that the media literacy and discussion components of the program worked most effectively. This result is consistent with international research: J. Roozenbeek and S. van der Linden experimentally showed that prior exposure to manipulation techniques on neutral material subsequently creates a stable resistance to real manipulative content [22, p. 576]. S. Lewandowsky and S. van der Linden generalize this mechanism as a prebunking strategy [23]. In this sense, the results of the study strengthen the empirical basis of the principle of “idea against idea, enlightenment against ignorance” in national pedagogy.

The relatively low growth in the behavioral criterion (+2.42 points) is an expected situation and should be interpreted not as a shortcoming of the program, but as a natural law of the educational process: more time and repeated social experience are required for the change in the level of knowledge and values to be consolidated in real behavior. This leads to a practical conclusion: the preventive program should not be limited to one academic year, but should be continued gradually throughout the student's entire school life. The most important result of the diagnostic stage is not statistical indicators, but information about the weakness of the trusting relationship between the student and the teacher. The fact that only 9.6% of students turn to the teacher with a question of religious content, and 41.7% of teachers have difficulty answering such questions, are two complementary indicators. This practically confirms an important principle of radicalization theory: when a teenager’s reliable channel of communication with

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adults is closed, an external, uncontrolled "mentor" takes its place [17, p. 165; 18, p. 76]. Thus, the primary task of prevention is not to impart knowledge, but to restore the channel of communication; and it is through this channel that knowledge is transmitted.

The small positive shift observed in the control group (high level +3.3 percentage points) is also methodologically important: it shows that in studies conducted without a control group, the result of natural age development can be interpreted as the effect of a special program. This fact confirms the need for the use of a control group in pedagogical experiments [19, p. 41].

The limitations of the study are as follows. First, a certain part of the data is based on self-assessment (questionnaire), which does not completely exclude the influence of social approval; to partially reduce this limitation, expert assessments from three sources were used. Second, the sample was limited to schools in one region, so the distribution of the results to the entire republic requires additional research. Third, the study does not include a long-term follow-up stage, while repeated measurements of at least one to two years are necessary to assess the stability of the preventive effect. Fourth, the final dynamics of the student-teacher trust channel were not measured separately; monitoring this indicator as an independent variable is a promising direction for further research. Based on the results obtained, the following practical recommendations were developed: formalize the preventive program as a coherent system planned for the academic year; introduce media literacy classes as a regular activity, not a separate event; introduction of a module for working with "uncomfortable" questions and discussion management into the professional development system of teachers; switching from lectures to practical exercises that improve communication skills when working with parents; recording the results of preventive work not in the form of "event held", but in terms of criteria and indicators.

CONCLUSION

1. Experimental and testing work empirically confirmed the effectiveness of the three-stage stratified model: in the experimental group, the high level of ideological immunity increased by 22.5 percentage points, and the low level decreased by 35.0 percentage points.

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2. The results were confirmed by two independent statistical criteria: $\chi^2 = 20.36$ ($df = 2$, $p < 0.001$) and $t = 10.42$ ($df = 238$, $p < 0.001$). The effect size is $d = 1.34$, which is considered a large effect for pedagogical research.
3. The fact that the greatest increase was recorded in the cognitive-critical criterion empirically substantiates the central idea of the model — the idea of forming immunity through the development of critical thinking, not prohibition.
4. The explanatory stage clearly showed the main weakness of preventive activities: students turn to the teacher with a question of religious content the least (9.6%), and the main source remains the uncontrolled digital environment (44.6%). Thus, the primary task of prevention is to restore a reliable channel of communication with the student.
5. The relatively low increase in the behavioral criterion indicates that the preventive program should not be limited to one academic year, but should be continued continuously throughout the student's entire school life.

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