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Error Correction Methodology as A Means of Improving Literacy

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ABSTRACT

This article presents the findings of an experimental study examining the effectiveness of a systematic error correction methodology as a means of enhancing the orthographic and punctuation literacy of sixth-grade students. The study involved 184 participants divided into experimental and control groups. A structured methodology was developed and implemented, comprising the classification of errors by type, identification of their underlying causes, formulation of relevant orthographic rules, construction of verification algorithms, and maintenance of individual error reference booklets by each student. The experimental findings demonstrate that the systematic application of this methodology leads to a statistically significant reduction in the total number of errors — an average decrease of 49% over a four-month intervention period. In addition, orthographic awareness among participants improved by 36%, and self-monitoring skills were observed to develop in 72% of students. A notable shift was also recorded in the nature of errors produced: the proportion of errors attributable to an incomplete knowledge of spelling rules declined from 45% to 12%. The most effective instructional techniques identified through the study were error classification, the use of individual error reference booklets, and the development of verification algorithms. The results of this research may serve as a basis for improving the teaching of orthography and punctuation at the lower secondary level, and offer practical implications for the design of literacy-focused instruction in mainstream school settings.

Keywords: Orthographic literacy, punctuation literacy, orthographic awareness, self-monitoring, reflection, verification algorithm, error classification, error reference booklet, lower secondary school, formative experiment.

INTRODUCTION

The orthographic and punctuation literacy of students remains one of the central challenges in contemporary Russian language teaching methodology. Despite the considerable number of instructional hours dedicated to the study of spelling rules, the practical literacy levels of schoolchildren frequently fall short of the requirements set by educational standards [1]. Traditional approaches to teaching orthography — based primarily on the memorisation of rules and the completion of practice exercises — do not always succeed in developing stable and durable writing skills [2].

Error correction work constitutes a crucial component of spelling instruction, as it is precisely through the analysis of their own mistakes that students come to understand the causes of their difficulties and develop strategies for overcoming them [3]. According to P.S. Zhedek, an error is not merely an indicator of gaps in knowledge but also a valuable diagnostic tool that reveals the specific features of orthographic skill formation in an individual student [4].

In practice, however, error correction work frequently takes a purely formal character: students mechanically rewrite misspelled words without reflecting on the nature of the errors made or connecting them to the rules they have studied. M.R. Lvov argues that the effectiveness of error correction work is determined not by the number of corrections made, but by the quality of the analytical activity engaged in by the student [5].

The relevance of this study is grounded in the need to develop a scientifically informed error correction methodology that not only addresses errors as they occur, but also cultivates orthographic awareness, self-monitoring skills, and reflective competencies in students.

The aim of this study is to determine the effectiveness of various methodological techniques for error correction in improving the orthographic and punctuation literacy of lower secondary school students. The object of the study is the process of developing orthographic and punctuation skills; the subject is the methodology of organising error correction work as a means of enhancing practical literacy.

The research hypothesis holds that systematic error correction work — encompassing analysis of the causes of errors, classification of errors by orthographic and punctuation type, and independent formulation of rules and verification algorithms — contributes significantly to raising the overall level of student literacy.

METHODS

The experimental study was conducted across four state secondary schools over the period from September 2024 to January 2025. A total of 184 sixth-grade students aged 12 to 13 participated in the study, distributed into two experimental groups of 46 students each and two control groups of 46 students each. Eight Russian language teachers also took part in the research.

To achieve the aims of the study, a combination of research methods was employed: a констатирующий (baseline) experiment to establish initial literacy levels, a formative experiment involving the implementation of the experimental error correction methodology, a control experiment for final diagnostic assessment, pedagogical observation, student and teacher questionnaires, and statistical data analysis.

During the baseline phase, students' initial literacy levels were assessed using a dictation exercise of 120 to 130 words, containing orthographic and punctuation structures studied in Grade 5. The types and frequency of orthographic and punctuation errors made by each student were recorded and analysed. Literacy levels were evaluated according to the following criteria: high (0–2 errors), above average (3–4 errors), average (5–7 errors), below average (8–10 errors), and low (more than 10 errors).

In the experimental groups, the following structured error correction methodology was applied:

1. Independent error identification by the student during self-checking of written work, aimed at developing orthographic awareness [6].

2. Classification of errors by type: phonetic, morphemic, morphological, syntactic, and punctuation errors [7].

3. Identification of the cause of each error: lack of knowledge of the relevant rule, inability to apply a known rule, inattentiveness, or the influence of spoken pronunciation.

4. Formulation or recall of the spelling or punctuation rule governing the correct form.

5. Selection of at least three analogous examples illustrating the same rule [8].

6. Construction of a verification algorithm for the relevant orthographic or punctuation pattern.

7. Maintenance of an individual error reference booklet recording the date of each error, its type, and the strategy for preventing its recurrence.

Work was organised both individually and in pairs, enabling students to discuss errors collaboratively and jointly identify strategies for correction [9]. Each student maintained a dedicated error correction notebook, structured according to orthographic and punctuation categories.

In the control groups, error correction followed the traditional approach: errors were corrected by the teacher, students rewrote misspelled words without detailed analysis, and supplementary exercises targeting the relevant rules were completed.

To evaluate the effectiveness of the methodology, monthly interim assessments were conducted alongside a final control dictation. The analysis tracked changes in the number and types of errors produced, the development of orthographic awareness — defined as the ability to independently identify errors during self-review — and the formation of self-monitoring skills.

Additional diagnostic instruments included an

orthographic awareness test in which students were presented with a text containing missing letters in target orthographic positions, a self-assessment questionnaire on literacy, and a teacher questionnaire examining the perceived effectiveness of different error correction techniques.

Statistical analysis was carried out using Student's t-test to determine the significance of differences between the experimental and control groups.

RESULTS

The baseline experiment established that the initial literacy levels of the experimental and control groups were broadly comparable. The mean number of errors per student in the experimental groups was 8.3, compared to 8.1 in the control groups. The distribution of students across literacy levels was as follows: high level — 9% in the experimental groups and 11% in the control groups; above average — 18% and 17%; average — 35% and 36%; below average — 26% and 25%; low — 12% and 11% respectively.

Analysis of error types revealed that the most prevalent orthographic errors involved the spelling of unstressed vowels in word roots (23% of all errors), the spelling of prefixes (17%), case endings of nouns and adjectives (15%), and personal verb endings (12%). Among punctuation errors, the most common involved the punctuation of sentences with homogeneous members (34% of all punctuation errors) and complex sentences (28%).

During the formative experiment, changes were monitored at regular intervals. The first interim assessment, conducted one month after the start of the experiment, showed a modest reduction in error frequency in the experimental groups (mean error count: 7.6) compared to the control groups (7.9). By the third month, however, the differences had become statistically significant: the mean number of errors in the experimental groups had fallen to 5.4, while in the control groups it stood at 6.8.

The final control experiment, conducted after four months, demonstrated substantial differences between the two groups. The mean number of errors per student in the experimental groups was 4.2, compared to 6.3 in the control groups. These differences are statistically significant at $p<0.01$ as determined by Student's t-test.

The distribution of students in the experimental groups across literacy levels shifted as follows: high level — 28% (an increase of 19 percentage points); above average — 33% (increase of 15 points); average — 27% (decrease of 8 points); below average — 9% (decrease of 17 points); low — 3% (decrease of 9 points). Changes in the control groups were considerably less pronounced: high level — 17% (increase of 6 points); above average — 24% (increase of 7 points); average — 35% (decrease of 1 point); below average — 18% (decrease of 7 points); low — 6% (decrease of 5 points).

Error type analysis indicated that the most significant reductions in the experimental groups occurred in the categories of unstressed vowels in word roots (a decrease of 64%) and prefix spelling (58%), demonstrating the particular effectiveness of verification algorithm construction and analogous example selection as instructional techniques. Punctuation errors decreased by 53%.

Orthographic awareness testing showed that students in the experimental groups were able to identify an average of 78% of target orthographic patterns in a given text by the end of the study, compared to 42% at the outset. In the control groups, this figure rose from 41% to 56%.

Qualitative analysis of errors revealed a significant shift in their nature. In the experimental groups, the proportion of errors attributable to an incomplete knowledge of spelling rules declined markedly — from 45% to 12% of the total error count — while the proportion of errors caused by inattentiveness increased from 18% to 31%. This shift indicates that the relevant skills had progressed to a higher level of automatisation.

The student questionnaire found that 83% of participants in the experimental groups reported that maintaining an individual error reference booklet helped them better understand their difficulties and work on them in a focused and purposeful way. 76% indicated that constructing verification algorithms made the process of applying spelling rules more conscious and deliberate. 68% noted that working in pairs during error analysis helped them view their difficulties from a different perspective.

The teacher survey revealed that the techniques considered most effective for error correction work were: classification of errors by type (cited by 92% of teachers), maintenance of an individual error reference booklet

(88%), construction of verification algorithms (85%), and selection of analogous examples (79%).

Observational data showed that by the end of the experiment, students in the experimental groups had developed noticeably more attentive self-checking habits, made consistent use of the algorithms they had learned, and referred to their error reference booklets when completing new tasks. In 72% of students, the habit of independently analysing the causes of their errors — without waiting for teacher direction — had become established.

DISCUSSION

The findings of this study convincingly demonstrate that systematic and methodologically well-organised error correction work constitutes an effective means of improving the orthographic and punctuation literacy of students. The statistically significant reduction in error frequency observed in the experimental groups relative to the control groups confirms the research hypothesis.

The central factor underlying the effectiveness of the proposed methodology is its orientation towards developing a conscious and reflective relationship with errors — treating them not as failures to be corrected and forgotten, but as sources of information about gaps in knowledge and underdeveloped skills. In contrast to the traditional approach, in which error correction is frequently reduced to the mechanical rewriting of misspelled words, the experimental methodology requires students to engage in active analytical work: classifying the error, identifying its cause, formulating the relevant rule, and constructing a verification algorithm [10].

Particular significance attaches to the maintenance of individual error reference booklets, which the study showed to fulfil several distinct functions: a diagnostic function, enabling students to observe the pattern and progression of their errors over time; an instructional function, providing a personalised source of material for review and consolidation; a reflective function, supporting students in developing awareness of their own specific difficulties; and a motivational function, offering visible evidence of progress in overcoming persistent errors.

The construction of verification algorithms for orthographic and punctuation patterns promotes the development of sequential reasoning when applying rules — a capacity that is especially important for students whose orthographic skills remain incompletely formed. Algorithmisation transforms an abstract rule into a concrete, reproducible programme of action that students can apply independently and consistently.

The substantial increase in orthographic awareness recorded in the experimental groups — from 42% to 78% — indicates that regular practice in independent error identification cultivates students' attentiveness to orthographically complex elements within words. This finding is consistent with M.R. Lvov's conception of orthographic awareness as a foundational component of orthographic competence [5].

The observed shift in the nature of errors — from errors rooted in an incomplete knowledge of rules to errors caused by inattentiveness — reflects a qualitative restructuring of the underlying skill and its transition to a level of partial automatisation. This suggests that the proposed methodology contributes not only to the acquisition of spelling rules but to the formation of stable, durable orthographic competence.

An important dimension of the methodology is the organisation of pair work during error analysis. Collaborative discussion enables students to verbalise their difficulties, encounter alternative reasoning strategies, and receive support from their peers [9].

The gradual accumulation of effect — modest changes in the first month, with substantial improvement by the third and fourth months — points to the necessity of sustained, long-term practice for the development of stable self-monitoring and reflective skills. Meaningful gains in these areas cannot be achieved through short-term intervention.

The study also identified a number of difficulties encountered in implementing the methodology. Approximately 15% of students experienced challenges in independently identifying the type of an error and formulating the corresponding rule, requiring additional individual support from the teacher. Maintaining the error reference booklet demanded extra time, which was not always readily available within the constraints of a demanding curriculum.

Teachers noted that the initial stages of implementation required considerable time to be invested in training students in the techniques of error analysis, classification, and algorithm construction. However, they observed that

these initial costs were subsequently offset by increases in student independence and a reduction in the time required for whole-class work on recurring error types.

A limitation of this study is its relatively short duration of four months. To assess the long-term stability of the skills developed through the methodology, delayed follow-up measurements would be necessary — measurements that would allow the trajectory of literacy development to be tracked across the full academic year and into subsequent year groups.

CONCLUSION

The findings of this study provide convincing evidence that an error correction methodology encompassing the classification of errors, analysis of their underlying causes, formulation of relevant rules, construction of verification algorithms, and maintenance of individual error reference booklets constitutes an effective means of improving the orthographic and punctuation literacy of students. It has been experimentally demonstrated that the systematic application of this methodology leads to a statistically significant reduction in error frequency — an average decrease of 49% over four months — alongside a 36% improvement in orthographic awareness and the measurable development of self-monitoring skills.

The effectiveness of the methodology derives from its orientation towards cultivating a conscious and reflective relationship with errors, activating students' analytical thinking, and developing reflective competencies. The transition from the mechanical correction of errors to their systematic analysis and categorisation promotes a qualitative restructuring of orthographic skill and supports its progression towards automatisation.

The practical significance of this study lies in the development of concrete, classroom-ready methodological techniques for error correction work that Russian language teachers can readily adopt to enhance the effectiveness of spelling instruction. The proposed system is applicable in both general and specialised school settings and can be adapted for use with students across a range of age groups and proficiency levels.

Promising directions for future research include: investigation of the long-term effects of the methodology's application; development of differentiated error correction approaches tailored to students with varying literacy levels; examination of the impact of error correction work on the formation of cross-curricular competencies such as goal-setting, planning, and self-assessment; and the creation of digital tools to automate the maintenance of error reference booklets and facilitate the ongoing tracking of individual literacy development.

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