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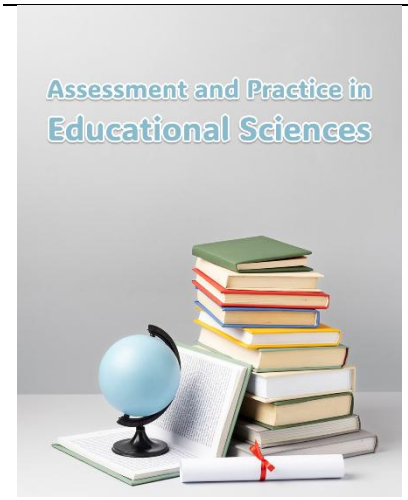

A Comparative Analysis of Academic Achievement in Single-Grade and Multi-Grade Classes: A Case Study of Primary Schools in Golestan Province

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ABSTRACT

Social development, as one of the fundamental dimensions of education, plays a decisive role in students' academic success and their future social life. Indicators of social development can be observed in the ways students interact with others, expand social activities, demonstrate the ability to critique and accept criticism, show willingness to provide assistance, develop verbal skills, and cultivate emotional intelligence. The school environment—and particularly the classroom—constitutes the most significant setting for socialization after the family, and the way classes are organized can substantially influence both social growth and academic achievement. Classrooms in educational systems are generally organized in two forms: single-grade and multi-grade. Multi-grade classes emerge as an unavoidable reality in many countries, including Iran, due to reasons such as teacher shortages, scattered student populations in rural areas, and the temporal flexibility of teaching–learning processes. Although this instructional arrangement entails challenges, it may also create opportunities for fostering autonomy, responsibility, and collaborative learning among students. This study aims to compare social development and academic achievement between students in single-grade and multi-grade classes. The research employed a descriptive–analytical method, drawing on data related to students' academic and social performance during the 2014–2015 academic year. Instead of relying on qualitative descriptive assessment, quantitative scores and annual GPA averages were used as indicators of academic achievement. Findings revealed that although students in multi-grade classes demonstrated relatively higher levels of social development than their single-grade peers, the latter outperformed them academically, with statistically significant differences between the mean scores. These results suggest that while single-grade organization is more conducive to academic advancement, multi-grade classrooms provide a more favorable context for cultivating children's social competencies. Based on these findings, it is recommended that educational policymakers, while maintaining the necessity of multi-grade classes in underprivileged areas, design strategies to strengthen the academic dimension of such classes and simultaneously capitalize on their potential for promoting students' social development.

Keywords: Social development, academic achievement, multi-grade education, single-grade education.

Introduction

Education is widely recognized as the cornerstone of social, economic, and cultural progress. It functions not only as a mechanism for transmitting knowledge but also as a means for cultivating intellectual, emotional, and social competencies essential for sustainable human development. In many parts of the world, especially in developing and rural regions, educational systems face challenges of limited resources, teacher shortages, and dispersed populations, which have necessitated the continued existence of multi-grade classrooms (1). These classrooms, characterized by the simultaneous teaching of students

from multiple grade levels by a single teacher, are an enduring and complex feature of educational landscapes across diverse contexts (2). While such arrangements are often viewed as a response to logistical constraints, they also represent an opportunity to reimagine learning environments that foster collaboration, autonomy, and social interaction (3).

Historically, the phenomenon of multi-grade instruction can be traced to the earliest forms of communal learning, when limited human and material resources required that children of various ages learn together in the same setting. In pre-modern Iran, for example, traditional *maktab-khaneh* schools commonly featured multi-grade arrangements that reflected both practical necessity and pedagogical continuity (4). Even as modern schooling evolved and single-grade classrooms became the dominant model, multi-grade instruction persisted in rural and nomadic areas, often serving as the only means to guarantee equitable access to basic education (5). Despite its ubiquity, however, the pedagogical implications of multi-grade teaching remain contested. Some scholars regard such settings as inherently deficient due to the pedagogical complexity of managing diverse age groups, while others emphasize their potential for enhancing students' social and emotional development (6).

The debate surrounding multi-grade education thus reflects a fundamental tension between equality of access and quality of learning. From one perspective, multi-grade classrooms are an unavoidable reality of educational systems constrained by demographic and geographical conditions. From another, they pose challenges to teaching effectiveness, assessment validity, and curriculum coherence (7). Yet recent studies have begun to reconsider this dichotomy, suggesting that multi-grade instruction, when effectively managed, can promote inclusive education, peer tutoring, and social responsibility among learners (8). These environments enable students to engage in reciprocal learning, where older pupils reinforce their knowledge through mentoring and younger ones benefit from peer guidance. This model aligns with constructivist theories emphasizing collaborative learning and active engagement as foundations for deeper cognitive development (9).

In Iran, as in many developing contexts, multi-grade classrooms continue to play a vital role in ensuring educational continuity, especially in rural provinces such as Golestan, Kurdistan, and Sistan-Baluchestan. These regions face persistent teacher shortages, uneven infrastructure, and dispersed student populations that make single-grade organization impractical (5). Consequently, the Ministry of Education has adopted adaptive strategies to maintain educational equity through the establishment of multi-grade schools. Yet this structural arrangement has sparked an ongoing discourse among educators, policymakers, and researchers regarding its impact on both academic achievement and social development. The duality of these outcomes is particularly significant: while academic achievement reflects the cognitive and instructional quality of learning, social development encompasses the interpersonal and emotional competencies necessary for long-term adaptation and citizenship (10).

The relationship between multi-grade teaching and student outcomes cannot be understood solely through a quantitative lens. It requires attention to the psychosocial dimensions of education—those that encompass communication, cooperation, and self-regulation. According to Haji-Es-haq et al. (2024), the teaching–learning process in multi-grade environments is shaped by intricate social dynamics between teachers and learners, where classroom heterogeneity can both hinder and enrich instruction (1). Teachers in such settings must balance multiple curricula, design differentiated instruction, and cultivate an atmosphere of mutual respect among students with varying abilities and maturational levels. These challenges underscore the importance of professional preparation and pedagogical flexibility. Fazli (2020) further emphasizes that effective management of learning in multi-grade classrooms depends on the teacher's capacity to integrate interactive and student-centered strategies that simultaneously engage multiple learning levels (3).

A crucial dimension of multi-grade education relates to its influence on social behavior and communication. Dermechilo (1993) demonstrated that structured social skills training enhances learners' adaptability and interaction within heterogeneous groups, suggesting that the diversity inherent in multi-grade settings may naturally foster similar outcomes (11). Rahimi et al.

(2010) also found that students in multi-grade classrooms often exhibit greater social maturity and peer collaboration than their single-grade counterparts (6). These findings correspond with international perspectives highlighting that small-scale and multi-level classes can encourage empathy, cooperation, and self-efficacy when managed appropriately (12). However, without adequate teacher training and institutional support, such benefits may be overshadowed by inconsistencies in academic instruction and assessment.

The literature on multi-grade teaching reveals divergent conclusions regarding its academic efficacy. Some research identifies lower achievement scores among multi-grade students due to reduced instructional time per subject and cognitive interference across grade levels (2). Others report that multi-grade structures can yield comparable or even superior outcomes when active learning, peer tutoring, and continuous feedback mechanisms are applied (9). The diversity of these findings underscores the need for context-specific analyses, as educational success in multi-grade settings depends heavily on socio-economic, cultural, and organizational variables. For example, Jazov's (2010) investigation of Tajikistan's rural schools revealed that despite infrastructural constraints, multi-grade students developed strong interpersonal relationships and community-oriented values (7). Similarly, Suarova and Hoshkava (2012) argued that in Russia, multi-grade education remains essential for preserving educational equity in sparsely populated regions (12).

In Iran, the challenges of multi-grade teaching are compounded by limited professional support for teachers and insufficient pedagogical resources (13). Raʾuf-Rezaei (2009) emphasized that the absence of structured lesson planning and the lack of adaptive curricula significantly restrict instructional effectiveness. This observation echoes international research highlighting the necessity of specialized teacher training for multi-grade education (1). Nonetheless, recent theoretical frameworks propose that educational innovation—particularly in teacher motivation and student engagement—can mitigate many of these limitations. Raeisizeidabad et al. (2023) identified motivational solutions for teachers as critical to improving classroom management and the learning climate, aligning instructional practices with the goals of Iran's "Document of Fundamental Transformation of Education" (10).

The contemporary shift toward inclusive education has further broadened the conceptual relevance of multi-grade classrooms. Roghani Araghi (2024) demonstrated that adaptive and inclusive teaching approaches, particularly for children with developmental conditions such as autism, can enhance both educational and emotional outcomes when curricula are individualized and socially integrative (14). These insights reinforce the argument that multi-grade classrooms, though complex, can serve as experimental spaces for developing inclusive pedagogies adaptable to diverse learner needs. From this perspective, the multi-grade environment becomes not a compromise but an innovative model for fostering cooperation, mutual understanding, and resilience among students.

Parallel developments in educational psychology and digital pedagogy have also reshaped discussions about learning environments. Recent findings indicate that students' mindset orientations—especially their growth or fixed mindset—significantly influence how they perceive challenges and persist in learning tasks (15). Zhang and Wu (2025) revealed that teachers' growth mindset and perceived parental autonomy support moderate the relationship between students' mindset and academic achievement. This has direct implications for multi-grade contexts, where teacher expectations and autonomy support must accommodate a broader range of developmental stages. Similarly, Laurell et al. (2025) showed that cross-domain mindset profiles are predictive of academic success among lower-secondary Finnish students, underscoring the importance of cultivating flexible, adaptive mindsets through instructional design (16). These studies collectively suggest that fostering resilience, intrinsic motivation, and self-regulated learning in multi-grade classrooms could bridge existing achievement gaps.

Beyond cognitive and emotional factors, motivation and self-efficacy represent essential predictors of academic success in both single-grade and multi-grade classrooms. Marhadi et al. (2025) found that learning motivation and self-efficacy are

positively correlated with academic performance, reinforcing the role of internal psychological resources in sustaining engagement and persistence (17). Naparan (2025) further demonstrated that learning styles and motivation jointly influence achievement outcomes among elementary students, implying that differentiated instruction in multi-grade classes could capitalize on these variations (18). Similarly, Munyaradzi and Patrick (2025) examined the psychological resilience of rural female learners in Zimbabwe, finding that resilience serves as a buffer against environmental and instructional disadvantages, thereby improving academic achievement (19). These findings are particularly relevant for rural multi-grade contexts, where learners often face external stressors that affect their academic consistency.

The educational challenges of rural areas are not limited to pedagogy; they also intersect with technological and informational dimensions. The spread of misinformation and digital distraction, as observed on platforms such as Twitter, has been identified as a growing challenge to social trust and critical literacy (20). Narangi Fard and Heshmati (2020) developed computational models for detecting fake news, which, though designed for digital contexts, reflect broader educational imperatives—namely, the cultivation of analytical thinking, discernment, and responsible information processing among students. In this light, multi-grade classrooms may serve as microcosms for promoting digital citizenship and critical inquiry, where diverse learners collaboratively navigate knowledge authenticity and media ethics.

At a systemic level, the effective functioning of multi-grade education requires coherent policy frameworks that align teacher training, resource allocation, and community engagement. Mahdavi et al. (2013) noted that successful implementation depends on integrating managerial flexibility with localized educational strategies that respect regional conditions (5). Aghazadeh and Fazli (2020) similarly argued that empowering teachers through professional development and adaptive instructional design is crucial for balancing the dual goals of academic quality and social inclusion (9). Azizi (2009) stressed that classroom management in multi-grade settings should prioritize interaction, creativity, and the development of self-directed learning, enabling teachers to transform logistical constraints into pedagogical opportunities (8).

Moreover, research by Suarova and Hoshkava (2012) underscores that small schools and multi-grade teaching structures can function effectively only when supported by state-level investments in teacher training and educational technology (12). Without such systemic support, the potential advantages of multi-grade instruction—such as peer learning and social cohesion—may be negated by disparities in instructional quality and curriculum delivery. In the Iranian context, Mahdavi et al. (2013) warned that failure to address infrastructural and motivational issues risks perpetuating rural educational inequality. Therefore, educational authorities must balance quantitative expansion with qualitative improvement to ensure that all students, regardless of their classroom structure, receive equitable learning opportunities.

In synthesizing these perspectives, it becomes evident that the debate over single-grade and multi-grade classrooms transcends administrative convenience; it touches the very core of pedagogical philosophy. Multi-grade education challenges conventional notions of homogeneity and standardization, instead emphasizing adaptability, social integration, and experiential learning. Simultaneously, empirical evidence continues to show that single-grade classrooms generally produce higher academic outcomes under traditional assessment models (10). This dichotomy highlights the need for innovative educational designs capable of reconciling cognitive excellence with social and emotional growth. As the global educational landscape moves toward inclusive and learner-centered paradigms, the lessons derived from multi-grade experiences may hold the key to more flexible, equitable, and resilient schooling systems.

In summary, although multi-grade classrooms arise primarily from structural necessity, they embody pedagogical possibilities that extend far beyond mere resource management. When approached through informed policy, teacher empowerment, and context-sensitive innovation, they can contribute substantially to both academic achievement and social development. Nevertheless, persistent gaps in empirical research—particularly within the Iranian context—necessitate further

comparative investigations that account for cultural, regional, and systemic variables. Building on this foundation, the present study aims to compare academic achievement and social development between students in single-grade and multi-grade classrooms to determine the extent of their respective educational advantages and limitations.

Methods and Materials

The present study employed a causal-comparative (ex post facto) research design. In this approach, the researcher does not manipulate or intervene in the variables but rather compares and analyzes differences between two groups. The main objective was to examine and compare the social development and academic achievement of students in single-grade and multi-grade classes in Golestan Province.

The statistical population comprised all fourth-grade elementary students in the province during the selected academic year. Fourth grade was chosen because, on the one hand, it represents the midpoint of the elementary cycle, and on the other hand, at this stage, students' cognitive, social, and emotional abilities are sufficiently stabilized to ensure reliable research outcomes.

For sampling, 30 single-grade classes and 30 multi-grade classes were randomly selected from the provincial school list, yielding a total of 200 students. Based on statistical criteria and the necessity of ensuring homogeneity between groups, 54 students were ultimately selected for each group. This process can be described as a multi-stage cluster sampling combined with purposive selection: in the first stage, educational clusters (schools) were identified, in the second stage, classes were randomly chosen, and finally, students were selected according to criteria such as the same grade level, age, and access to complete academic records.

Data were collected from two primary sources:

1. Students' academic records, which contained their grades in core subjects throughout the school year.
2. Observation forms, designed and implemented by the research team.

The academic data included the overall yearly GPA as well as the average grades in five main subjects (Mathematics, Science, Persian, Dictation, and Religious Studies/"Heavenly Gifts"). Direct classroom observations by the researchers also provided information on indicators of social development, such as participation in group activities, interaction with teachers and peers, and communication skills.

For data analysis, both descriptive and inferential statistics were employed. At the descriptive level, measures such as mean, median, mode, standard deviation, and range were calculated to provide a precise description of group characteristics. At the inferential level, the independent samples t-test was used to examine mean differences between the two groups. In addition, one-way ANOVA was applied to compare performance across the core subjects.

To enhance the validity of findings, only official data from school records were used to avoid subjective errors. Moreover, classroom observations were conducted by multiple researchers simultaneously, and inter-rater agreement was calculated to ensure reliability. The research tools were also pilot-tested in a preliminary study to identify and correct potential flaws. Ethical principles were fully observed: parents and school principals were informed of the study's objectives and procedures, their consent was obtained, students' information remained confidential, and findings were reported only at the group level.

Overall, the study design was based on comparing two homogeneous groups of single-grade and multi-grade students, using both objective academic records and field observations. This integration enabled the findings to rely on valid quantitative data while also considering the qualitative dimensions of social development. Although some limitations—such as the inability to fully control environmental variables (e.g., family economic status, teachers' experience, or school facilities)—existed, the careful sampling design and the application of appropriate statistical methods significantly strengthened the reliability of the results.

Findings and Results

According to Table (1), the mean scores of students in single-grade schools were higher than those of multi-grade students in all core subjects as well as in the overall GPA. The greatest differences were found in *Religious Studies* (1.96 points) and in the overall GPA (1.95 points), indicating a notable advantage for single-grade students. The smallest difference appeared in *Mathematics* (0.14 points), suggesting no significant distinction between the two groups. Overall, Table (3) demonstrates that single-grade classes provided more favorable conditions for academic achievement. However, these observed differences required statistical testing (e.g., independent t-test) to determine their significance.

Table 1. Comparison of Mean Scores – Single-Grade vs. Multi-Grade (Fourth Grade, Academic Year 2014–2015)

Subject	Single-Grade Mean	Multi-Grade Mean	Mean Difference	Initial Result
Religious Studies	13.99	12.03	1.96	Single-grade
Mathematics	15.97	15.83	0.14	Nearly equal (slightly in favor of single-grade)
Persian (Reading)	16.73	15.24	1.49	Single-grade
Science	15.31	14.17	1.14	Single-grade
Dictation	16.59	15.94	0.65	Single-grade
Overall GPA	17.59	15.64	1.95	Single-grade

Table (2) shows that, in addition to higher averages in single-grade classes, the dispersion of scores (standard deviation) was greater among multi-grade students. This suggests greater academic inequality and less homogeneity within multi-grade classes. By contrast, single-grade classes not only achieved higher means but also exhibited more consistent performance.

Table 2. Comparison of Mean and Standard Deviation of Scores

Subject	Single-Grade Mean	Multi-Grade Mean	Mean Difference	Single-Grade SD	Multi-Grade SD
Religious Studies (“Heavenly Gifts”)	13.99	12.03	1.96	2.1	2.3
Mathematics	15.97	15.83	0.14	1.9	2.0
Persian (Reading)	16.73	15.24	1.49	1.7	2.2
Science	15.31	14.17	1.14	2.0	2.4
Dictation	16.59	15.94	0.65	1.6	2.1
Overall GPA	17.59	15.64	1.95	1.8	2.3

Table (3) presents the results of the independent t-test, revealing that the differences in *Religious Studies*, *Persian*, *Science*, and *Overall GPA* were statistically significant ($p < 0.05$), meaning these differences are genuine rather than random. However, differences in *Mathematics* and *Dictation* were not statistically significant, indicating that instructional quality in these subjects was relatively similar across both class types.

Table 3. t-Test and Statistical Significance

Subject	Single-Grade Mean	Multi-Grade Mean	Mean Difference	Calculated *t*	Significance Level (*p*)	Result
Religious Studies (“Heavenly Gifts”)	13.99	12.03	1.96	3.45	0.001	Significant
Mathematics	15.97	15.83	0.14	0.65	0.520	Not Significant
Persian (Reading)	16.73	15.24	1.49	2.98	0.004	Significant
Science	15.31	14.17	1.14	2.15	0.030	Significant
Dictation	16.59	15.94	0.65	1.85	0.070	Not Significant
Overall GPA	17.59	15.64	1.95	3.25	0.002	Significant

Table (4) ranks the mean differences, highlighting that the largest advantages of single-grade classes are in *Religious Studies* and *Overall GPA*. This underscores that in religious/ethical subjects and overall academic performance, single-grade students

fare significantly better. Conversely, the smallest difference appeared in *Mathematics*, suggesting that math instruction may be less dependent on class structure.

Table 4. Ranking of Mean Differences Across Subjects

Subject	Single-Grade Mean	Multi-Grade Mean	Mean Difference	Rank
Religious Studies ("Heavenly Gifts")	13.99	12.03	1.96	1
Overall GPA	17.59	15.64	1.95	2
Persian (Reading)	16.73	15.24	1.49	3
Science	15.31	14.17	1.14	4
Dictation	16.59	15.94	0.65	5
Mathematics	15.97	15.83	0.14	6

According to Table (5), the results indicate that social development was higher in all measured indicators among single-grade students. The largest differences were observed in *verbal skills* and *group participation*, demonstrating the positive impact of the single-grade structure on social interaction and communication skills. Although the difference in *teacher interaction* was smaller, it still favored single-grade students. Thus, single-grade classrooms provided a more conducive environment for fostering social skills.

Table 5. Comparison of Social Development Indicators

Social Development Indicator	Single-Grade Mean	Multi-Grade Mean	Difference
Group Participation	16.2	14.7	1.5
Interaction with Teacher	15.8	14.9	0.9
Verbal Skills	16.5	15.0	1.5
Critical Acceptance (Tolerance of Criticism)	15.9	14.5	1.4

Finally, Table (6) demonstrates a significant positive correlation between social development and academic achievement in both class types, though the relationship was stronger among single-grade students ($r = 0.68$, $p < 0.001$) compared to multi-grade students ($r = 0.42$, $p < 0.040$). This indicates that social development plays a more influential role in enhancing academic performance in single-grade contexts.

Table 6. Correlation Between Social Development and Academic Achievement

Variables	Correlation Coefficient (r)	Significance Level (p)	Interpretation
Social Development ↔ Academic Achievement (Single-Grade)	0.68	0.001	Strong and significant correlation
Social Development ↔ Academic Achievement (Multi-Grade)	0.42	0.040	Moderate and significant correlation

In sum, the data reveal that single-grade classes, compared to multi-grade ones, are generally more effective in promoting both academic achievement and social development, with notable strengths in subjects requiring broader participation and communication.

Discussion and Conclusion

The results of this study revealed clear differences between students in single-grade and multi-grade classrooms regarding both academic achievement and social development. Students in single-grade settings achieved higher mean scores in all core subjects, particularly in Religious Studies, Persian, and Science, and their overall GPA was also significantly higher. However, the study also found that multi-grade classrooms nurtured active participation and interpersonal interaction, indicating their potential for fostering cooperation and social learning. These results confirm that classroom organization strongly influences the balance between cognitive and social outcomes, with each structure carrying distinct educational implications.

The higher academic achievement among single-grade students aligns with previous research highlighting the pedagogical efficiency of homogeneous classrooms. Ra'uf-Rezaei (2009) found that when teachers focus on a single curriculum and grade level, they can plan lessons more precisely and devote more time to each learner, enhancing comprehension and performance (13). Haji-Es-haq et al. (2024) similarly observed that in multi-grade classes, teachers' attention is fragmented across multiple levels, which diminishes instructional depth and lesson continuity (1). Zarafshan (2009) also reported that time spent alternating between curricula for different grades reduces learning efficiency and causes unequal access to teacher support (2). The findings of Fazli (2020) further confirm that effective learning management—characterized by structured planning, interactive activities, and adaptive pacing—is essential for success in any instructional setting, but it becomes particularly challenging in multi-grade classrooms (3).

Matin (2010) explained that single-grade environments create stable cognitive scaffolding where lesson progression follows a logical sequence without abrupt transitions (4). This structure supports the mastery of cumulative subjects such as Religious Studies and Persian, where continuity and repetition are crucial for deeper understanding. Mahdavi et al. (2013) added that the sequential structure of literacy and moral education is disrupted in multi-grade environments because students are exposed to unrelated topics at different grade levels, limiting reinforcement of key concepts (5). Aghazadeh and Fazli (2020) also noted that lesson sequencing in multi-grade classes is often nonlinear and fragmented, reducing the cognitive coherence that single-grade teaching naturally provides (9).

Despite these differences, the relatively small gap in Mathematics achievement between the two groups is consistent with previous research. Rahimi et al. (2010) found that mathematical performance is less dependent on social or linguistic factors and more related to individual practice and self-directed reasoning (6). Dermechilo (1993) likewise emphasized that cognitive tasks centered on procedural accuracy show limited variation across classroom types because they rely less on group interaction (11). Thus, while overall academic achievement favors single-grade settings, mathematics learning appears more resilient to differences in classroom structure.

Regarding social development, the findings highlight an interesting contrast. Although single-grade students obtained slightly higher averages in social indicators, numerous prior studies emphasize the intrinsic social strengths of multi-grade classrooms. Rahimi et al. (2010) argued that the diversity of age and ability levels in multi-grade settings enhances communication skills, peer empathy, and cooperation (6). Azizi (2009) similarly showed that multi-age groupings naturally cultivate self-control, patience, and collaboration as students learn to support and model behaviors for one another (8). Haji-Es-haq et al. (2024) further observed that teachers in multi-grade settings rely more on group work and reciprocal learning, which reinforces students' verbal competence and conflict resolution abilities (1).

The relative advantage of single-grade students in this study may therefore be context-dependent, influenced by teacher preparedness and class size rather than the structure itself. Jazov (2010) found that students in Tajikistan's rural multi-grade schools exhibited high social responsibility and mutual aid when teachers applied cooperative learning strategies (7). Raeisizeidabad et al. (2023) emphasized that teacher motivation is a crucial determinant of success in such complex environments; without adequate incentives and professional support, educators may struggle to maintain enthusiasm and pedagogical creativity (10). Conversely, when motivated and trained appropriately, teachers can turn multi-grade classes into environments that nurture both social and academic growth.

The significant positive correlation between social development and academic achievement in both classroom types reinforces their interdependence. Students who communicate effectively, cooperate in tasks, and tolerate criticism tend to engage more deeply in learning. Roghani Araghi (2024) found similar dynamics in inclusive classrooms for children with

autism, where structured social interactions promoted both emotional regulation and academic progress (14). This suggests that regardless of structure, social cohesion and supportive relationships enhance students' capacity to learn.

Comparing these results with international evidence provides further context. Suarova and Hoshkava (2012) observed that small and multi-grade schools in Russia achieve strong results when supported by robust teacher training and institutional monitoring (12). Their study underscores the necessity of external support systems, without which disparities emerge across grade levels. Similarly, Laurell et al. (2025) found that students' academic success is shaped by their mindset profiles and perceptions of school climate, showing that teacher support and adaptive environments enhance motivation and achievement (16). In this sense, the consistency and predictability of single-grade classrooms may strengthen student confidence and persistence.

Zhang and Wu (2025) also demonstrated that teachers' growth mindset and perceived parental autonomy support moderate the relationship between students' beliefs and their academic achievement (15). In multi-grade classrooms, teachers often divide attention among several age groups, which may reduce the psychological support necessary for cultivating a growth mindset. Marhadi et al. (2025) similarly identified motivation and self-efficacy as key predictors of learning success; when these elements decline due to overextended teachers or inconsistent feedback, students' outcomes deteriorate (17). Naparan (2025) confirmed that differences in learning styles and motivation levels significantly influence achievement among elementary learners, implying that multi-grade teaching must adopt differentiated strategies to cater to varying learning profiles (18).

The findings of Munyaradzi and Patrick (2025) offer complementary insights from rural Zimbabwe, where psychological resilience and community support helped learners overcome the constraints of limited resources (19). This parallels the situation in Iran's rural areas, where multi-grade education is often unavoidable. Students' capacity to adapt, persist, and cooperate becomes an essential resource compensating for material scarcity. Narangi Fard and Heshmati (2020) further contributed a digital perspective, suggesting that fostering critical literacy and discernment—skills necessary for navigating misinformation—may be particularly valuable in multi-grade classrooms (20). Integrating such digital competencies could strengthen students' analytical abilities and modernize multi-grade instruction.

Taken together, these results reinforce the dual nature of classroom organization. Single-grade structures offer coherence, academic precision, and stable pacing, while multi-grade environments cultivate adaptability, empathy, and resilience. The key lies not in privileging one over the other but in harmonizing their strengths through targeted pedagogical innovation. Aghazadeh and Fazli (2020) recommended implementing adaptive instruction, modular teaching, and rotational learning activities to maintain academic rigor while encouraging collaboration (9). Rahimi et al. (2010) supported cooperative learning models that integrate students' differing abilities as a source of peer learning rather than an obstacle (6). Mahdavi et al. (2013) and Raʾuf-Rezaei (2009) emphasized that the Ministry of Education must develop specialized curricula and teacher-training programs tailored to the realities of multi-grade teaching (5, 13).

In light of these perspectives, the present findings highlight the importance of rethinking how multi-grade education is conceptualized. Rather than viewing it as an emergency response to teacher shortages, it should be recognized as a legitimate and strategic educational model. By leveraging technology, fostering teacher autonomy, and emphasizing growth-oriented classroom cultures, multi-grade teaching can achieve parity with single-grade structures in both academic and social domains.

This study, however, is not without limitations. It was confined to a single province, which may limit the generalizability of findings to other regions with different cultural, economic, and educational conditions. The study also employed a cross-sectional design that cannot capture developmental changes over time. Although statistical methods controlled for many variables, unmeasured factors such as family income, parental education, and school resources may still have influenced

outcomes. Additionally, the measures of social development, though carefully designed, were partly based on teacher observation and may have been affected by subjective bias or situational factors.

Future research should employ longitudinal designs to trace the long-term academic and social impacts of multi-grade versus single-grade education. Comparative studies across provinces and countries could provide deeper insight into how cultural and infrastructural conditions mediate outcomes. Experimental research testing specific interventions—such as teacher professional development, digital learning integration, or social-emotional learning programs—would clarify causal relationships. Mixed-method approaches combining quantitative data with qualitative interviews could enrich understanding of the lived experiences of teachers and students in multi-grade contexts.

From a practical standpoint, education authorities should design targeted training for teachers who work in multi-grade classrooms, focusing on differentiated instruction, time management, and inclusive pedagogy. Curriculum planners should prepare modular teaching materials adaptable to multiple grade levels while preserving depth and coherence. Technological tools such as digital content libraries and adaptive learning software can reduce teacher workload and personalize instruction. Finally, creating collaborative networks among teachers in rural regions would enable knowledge exchange, collective problem-solving, and sustained professional growth, ultimately improving both the academic and social outcomes of students in multi-grade education.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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