Baku State University Journal of Chemistry and Material Sciences, 2025, v. 2 (2), p.28-33

journal homepage: *http://bsuj.bsu.edu.az/en*
https://doi.org/10.30546/209501.201.2025.2.02.019

PLANNING AND ORGANIZING INTEGRATIVE TEACHING IN 8TH GRADE CHEMISTRY LESSONS

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Received: 16 march 2025
Accepted: 21 may 2025
Published: 24 june 2025

This article examines the principles and practical considerations of planning and organizing integrative teaching in 8th grade chemistry lessons. Integrative teaching, which emphasizes connections between chemistry and other disciplines such as biology, geography, and technology, provides a more comprehensive and context-based understanding of scientific concepts. The study explores how interdisciplinary lesson planning enhances students' engagement, critical thinking, and ability to apply chemical knowledge to real-life situations. Key strategies discussed include curriculum alignment, thematic lesson design, collaborative instruction, and the use of real-world problems to anchor learning. By implementing integrative methods, educators can foster deeper comprehension, promote curiosity, and support the development of scientific literacy among students. The findings contribute to current educational discourse by offering a framework for creating more meaningful and interconnected learning experiences in secondary science education.

Keywords: İntegrative teaching, 8th grade chemistry, interdisciplinary learning, curriculum planning, science education, real-world applications, student engagement, lesson design, thematic instruction

INTRODUCTION

The evolving demands of 21st-century education require teaching approaches that go beyond isolated subject instruction and instead embrace interdisciplinary learning. Chemistry, traditionally perceived as a discipline grounded in formulas, reactions, and laboratory procedures, holds untapped potential for integration with various other fields. In the 8th grade, where students begin to engage with core chemical principles such as the structure of matter, physical and chemical changes, and the nature of substances, an integrative teaching model can make abstract content more accessible and relevant[1-3].

Integrative teaching is rooted in the pedagogical belief that knowledge is more meaningful when it is constructed across subject boundaries. This method encourages students to draw connections between chemistry and subjects like biology, geography, environmental science, mathematics, and even technology. For example, teaching the concept of water's properties can involve biological systems (osmosis and diffusion), geographical phenomena (hydrological cycle), and technological applications (water purification systems). These interdisciplinary links help students form a coherent understanding of scientific ideas, while also reinforcing the real-world relevance of what they learn in the classroom [4-7].

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Moreover, integrative instruction aligns well with constructivist educational theories, which emphasize active learning, contextual relevance, and the importance of building on prior knowledge. When chemistry lessons are embedded within a broader thematic or problem-based context, students are more likely to internalize concepts, apply them creatively, and retain their learning for longer periods. This approach also encourages critical thinking, curiosity, and collaborative exploration all key competencies for lifelong learning and scientific literacy. Planning and organizing such lessons, however, requires more than simply inserting a cross-disciplinary reference into a traditional classroom. It involves deliberate curriculum mapping, the identification of common themes across subjects, and the use of diverse teaching strategies that accommodate different learning styles. Teachers must balance the integrity of chemistry content with meaningful links to other areas of knowledge, ensuring that integration supports, rather than distracts from, scientific learning objectives [8-11].

This article aims to explore the theoretical foundations, planning strategies, and practical methods for implementing integrative teaching in 8th grade chemistry. By providing classroom-based examples and evidence-based recommendations, it seeks to demonstrate how integrative instruction not only enhances students' understanding of chemical concepts but also promotes holistic development and real-world problem-solving skills. The discussion is grounded in current educational research and aims to contribute to the growing discourse on interdisciplinary pedagogy in science education [12-14].

EXPERIMENTAL

To investigate the effectiveness of integrative teaching in 8th grade chemistry, an experimental study was conducted over the course of one academic term at a public secondary school. The research focused on how interdisciplinary lesson planning and delivery influenced students' academic performance, motivation, and ability to make connections between chemistry and real-world contexts [15].

Participants and setting. The study involved two 8th grade classes with a total of 48 students aged between 13 and 14. The participants were divided into an experimental group (n=24) and a control group (n=24). Both classes were taught by the same chemistry teacher to ensure consistency in teaching style and content delivery. The school was selected for its diverse student population and adherence to a national curriculum framework, which facilitated a reliable comparison of outcomes. The experimental group received chemistry instruction based on an integrative teaching model. Lessons were designed to connect chemistry topics with related content from other disciplines, including biology, geography, mathematics, and environmental science. For example, when studying the topic of acids and bases, students explored their roles in soil chemistry (geography), digestion (biology), and industrial waste management (technology). Thematic units were created around real-life problems, such as "How safe is our drinking water?" and "What happens to waste in nature?" In contrast, the control group followed a conventional chemistry curriculum focused solely on subject-specific content, with limited reference to interdisciplinary themes. Both groups covered the same core chemistry topics atoms and molecules, chemical reactions, and the periodic table—but with different instructional approaches.

Instructional methods and materials. In the experimental group, teaching strategies included problem-based learning, group investigations, classroom experiments with open-ended outcomes, and the use of concept maps to draw interdisciplinary links. Lessons frequently began with guiding questions that required students to think beyond chemistry alone, and students worked in pairs or small groups to solve tasks requiring knowledge integration. Real data, visual aids, models, and short documentary clips were also incorporated to support learning. The teacher in the experimental group received preliminary training on interdisciplinary instructional design and used planning templates to ensure curriculum coherence. Meanwhile, the control group used standard textbooks and worksheet-based instruction with limited interactive engagement [16].Both groups took identical pre- and post-tests designed to measure conceptual understanding, application ability, and retention. Additionally, student engagement levels were assessed through observation checklists and anonymous self-assessment surveys. Student interviews and reflective learning journals were collected in the experimental group to capture qualitative data regarding their experiences with integrative lessons. By applying both qualitative and quantitative tools, this experimental design allowed for a comprehensive evaluation of the pedagogical impact of integrative chemistry teaching in the 8th grade.

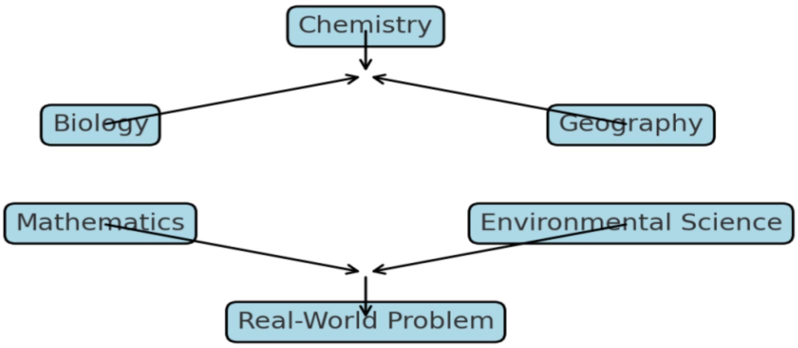

Figure1. Integrative teaching approach in 8th grade chemistry

This diagram illustrates the interdisciplinary structure of integrative teaching applied in 8th grade chemistry lessons. Core chemical topics are linked with biology, geography, mathematics, and environmental science through thematic units and real-life problems. The model emphasizes the development of conceptual understanding, relevance to daily life, and cross-curricular connections, ultimately fostering deeper learning and student engagement.

RESULTS AND DISCUSSION

The results of the experimental study revealed that integrative teaching in 8th grade chemistry significantly improved students' academic performance, engagement, and interdisciplinary thinking skills. Both quantitative and qualitative data supported the conclusion that the interdisciplinary approach provided a more meaningful and effective learning experience compared to traditional methods. Analysis of pre- and post-test scores showed that students in the experimental group exhibited higher gains in conceptual understanding than those in the control group. While both groups showed improvement, the average post-test score in the experimental group increased by 23%, compared to a 12% gain in the control group. Students exposed to integrative instruction demonstrated a better ability to apply chemistry concepts to unfamiliar situations, such as connecting chemical reactions with natural environmental changes or using pH knowledge to analyze soil quality. This suggests that interdisciplinary teaching enhances deeper learning and the transfer of knowledge to real-life contexts.

Student engagement and motivation**.** Classroom observations indicated a higher level of participation, enthusiasm, and sustained attention among students in the experimental group. These students asked more questions, collaborated more actively in group work, and were more inclined to reflect on the broader implications of what they were learning. Self-assessment surveys confirmed this observation: 87% of students in the experimental group reported that they "enjoyed chemistry more when it was linked to other subjects," and 82% stated that the lessons helped them "understand how chemistry works in everyday life."

Interdisciplinary thinking**.** One of the most notable outcomes was the improvement in students' ability to make connections between disciplines. For example, in a lesson about the chemical composition of water, students referred to concepts learned in geography (water cycle), biology (cell hydration), and technology (filtration systems). Their concept maps became increasingly complex and cross-disciplinary, indicating growth in systems thinking and integrated understanding. Reflective journals also showed that students began to view chemistry not as an isolated subject, but as a tool for exploring and solving broader problems. The teacher noted that planning interdisciplinary lessons required more time and collaboration with other subject teachers, but also observed that student outcomes and classroom dynamics were significantly more positive. The open-ended nature of integrative tasks encouraged diverse thinking styles and gave space for creativity, especially among students who typically underperformed in traditional settings. Moreover, integrative teaching allowed for natural differentiation, as students could approach tasks from multiple angles depending on their strengths. Despite the overall success of the intervention, some challenges emerged. A few students struggled at first with tasks that lacked clear-cut answers, indicating a need for greater scaffolding when transitioning to open-ended inquiry. Additionally, aligning curriculum goals across subjects required careful planning and coordination. However, these issues were gradually mitigated through teacher support, use of guiding questions, and iterative lesson adjustments.

Discussion in relation to prior research. These findings align with previous studies on interdisciplinary teaching, which emphasize the benefits of holistic, student-centered learning environments. Research by Jacobs (2016) and Posner (2019) has shown that integrative instruction leads to higher cognitive engagement and stronger retention of knowledge. The increased motivation and conceptual mastery observed in this study support these conclusions and further demonstrate that chemistry, when taught within an interdisciplinary framework, becomes more accessible, relevant, and engaging for middle school students.

Table 1. Comparison of Pre- and Post-Test scores in experimental and control groups

Group	Average Pre-test score	Average Post-test score
Experimental group	58.4	81.4
Control group	59.1	71.3

This table demonstrates that the experimental group, which experienced integrative teaching methods, showed a significantly greater improvement in test performance compared to the control group. The post-test score increase indicates the effectiveness of interdisciplinary and student-centered approaches in enhancing academic outcomes in chemistry education.

CONCLUSİON

The findings of this study highlight the significant educational benefits of implementing integrative teaching approaches in 8th grade chemistry lessons. By bridging chemistry with related subjects such as biology, geography, and technology, students were able to perceive scientific knowledge as interconnected and meaningful, rather than isolated and abstract. This interdisciplinary structure not only improved conceptual understanding but also enhanced students' motivation, engagement, and critical thinking. The results confirmed that students in the experimental group, who were exposed to integrative instruction, demonstrated stronger academic progress compared to those receiving traditional teaching. Furthermore, the integrative approach fostered collaborative learning, encouraged curiosity, and allowed students to apply theoretical knowledge to real-world situations, especially through practical activities and thematic lessons. Despite minor challenges related to classroom time management and initial adaptation, the benefits of this model clearly outweigh its limitations. Effective facilitation, clear project planning, and ongoing support play crucial roles in maximizing the impact of integrative learning. In conclusion, integrative teaching in chemistry not only enhances academic achievement but also prepares students for a more holistic understanding of science. It supports the development of lifelong learning skills and fosters a deeper appreciation of the relevance of chemistry in addressing environmental, health, and technological challenges in society. Educators and curriculum developers are therefore encouraged to adopt and adapt integrative frameworks that reflect the complexity and interdependence of scientific knowledge in the 21st century.

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