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LESSON STRUCTURE IN THE PROCESS OF INTERDISCIPLINARY INTEGRATION: AN AUTHORIAL SIX-STAGE MODEL FOR CURRICULUM PLANNING

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Abstract

Interdisciplinary integration is one of the significant directions in contemporary curriculum planning because educational problems and real-life situations often require learners to combine knowledge from several academic disciplines. This article examines how lessons can be structured in the process of interdisciplinary integration and proposes an authorial practical model entitled the **Six-Stage Interdisciplinary Lesson Structure**. The study is based on a conceptual analysis of scientific literature on integrated curriculum, interdisciplinary learning, backward design, and constructive alignment. The article draws on the theoretical works of Fogarty, Jacobs, Drake and Burns, Biggs, Wiggins and McTighe, Boix Mansilla, and other scholars. The analysis shows that interdisciplinary integration should not be understood as a mechanical combination of subjects. Rather, it should be planned as a gradual pedagogical process in which students move from a meaningful problem to disciplinary inquiry, then to synthesis, product creation, and reflective assessment. The proposed six-stage model includes problem orientation, activation of prior knowledge, disciplinary exploration, interdisciplinary connection, integrative production, and reflective assessment. The article argues that this model can help teachers organize integrated lessons without weakening disciplinary depth. The findings also indicate that effective interdisciplinary curriculum planning requires clear learning outcomes, coordinated assessment criteria, teacher collaboration, and meaningful links between school knowledge and real-life contexts.

Keywords: interdisciplinary integration, integrated curriculum, lesson structure, curriculum planning, constructive alignment, backward design, interdisciplinary learning

Introduction

The development of students' ability to connect knowledge across disciplines has become an important pedagogical task in modern education. Many educational and social problems cannot be fully understood through one school subject alone. For example, water scarcity, climate change, digital safety, public health, environmental protection, and sustainable development require knowledge from science, mathematics, geography, technology, language, ethics, and social studies. Therefore, curriculum planning should create conditions not only for learning separate subject content but also for applying this content in broader and more complex situations (OECD, 2019; Drake & Reid, 2020).

Interdisciplinary integration is commonly understood as the purposeful use of concepts, methods, and forms of thinking from two or more disciplines in order to construct a more complete understanding of a problem. This view suggests that integration is not the simple placement of several subjects under one topic, but the intellectual coordination of disciplinary perspectives (Boix Mansilla & Duraisingh, 2007; Klein, 1990). From this perspective, an integrated lesson should help students understand how different subject areas contribute to one educational problem and how these contributions can be combined into a meaningful explanation, solution, or product.

The problem of lesson structure is especially important in interdisciplinary education. In practice, some lessons are described as integrated because they include several subjects, but they do not always lead to genuine synthesis. For instance, a lesson may mention biology, geography, and mathematics, but students may still learn these elements separately without understanding their relationship. Jacobs argues that interdisciplinary curriculum should be intentionally designed and should not depend on accidental or superficial links between subjects (Jacobs, 1989). Fogarty also emphasizes that curriculum integration has different levels and models, which means that teachers need to select an appropriate form of integration according to learning goals (Fogarty, 1991).

The theoretical basis of integrated curriculum shows that meaningful integration requires careful planning. Drake and Burns explain that integrated curriculum can support educational standards when teachers clearly define what students should know, what they should be able to do, and how they should demonstrate learning (Drake & Burns, 2004). Wiggins and McTighe's backward design model also shows that lesson planning should begin with desired learning outcomes and assessment evidence rather than with disconnected activities (Wiggins & McTighe, 2005). Biggs's theory of constructive alignment further supports this idea by stating that learning outcomes, teaching activities, and assessment tasks should be logically connected (Biggs, 1996; Biggs, 2014).

Based on these theoretical foundations, this article addresses the following research question: **How can a lesson be structured in the process of interdisciplinary integration in order to support meaningful curriculum planning and effective learning outcomes?**

The purpose of the article is to analyze the pedagogical structure of interdisciplinary lessons and to propose an authorial model for integrated curriculum planning. The specific objectives are: first, to clarify the theoretical principles of interdisciplinary lesson organization; second, to identify the main stages of an integrated lesson; and third, to present the **Six-Stage Interdisciplinary Lesson Structure** as a practical model for teachers.

Methods

This article uses a conceptual and analytical research design. Since the aim of the study is to develop a pedagogical model rather than to measure classroom outcomes experimentally, no empirical data were collected. Instead, the article synthesizes theoretical and methodological literature related to interdisciplinary integration, integrated curriculum, curriculum design, lesson planning, and assessment.

The literature was analyzed in three main directions. The first direction focused on classical theories of integrated curriculum. Fogarty's models of curriculum integration were used to understand how subjects may be connected at different levels, from simple internal connections within one discipline to broader integration across disciplines (Fogarty, 1991). Jacobs's work was used to explain the importance of purposeful interdisciplinary curriculum design and the need to avoid artificial combinations of unrelated topics (Jacobs, 1989). Drake and Burns's standards-based integrated curriculum approach was used to understand how integration can be connected with curriculum outcomes and assessment requirements (Drake & Burns, 2004).

The second direction focused on instructional design. Wiggins and McTighe's backward design model was used to justify the idea that teachers should first identify expected understanding and assessment evidence before planning classroom activities (Wiggins & McTighe, 2005). Biggs's constructive alignment theory was used to explain why learning objectives, teaching strategies, student tasks, and assessment criteria should support one another in an integrated lesson (Biggs, 1996; Biggs, 2014).

The third direction focused on recent studies of interdisciplinary and integrated learning. Research by Boix Mansilla and Duraisingh was used to clarify the assessment of interdisciplinary understanding and the role of disciplinary perspectives in integrative work (Boix Mansilla & Duraisingh, 2007). Lam, Alviar-Martin, Adler, and Sim's study was used to identify practical challenges faced by teachers in curriculum integration, including assessment difficulties and curriculum pressure (Lam et al., 2013). Le, Nguyen, and Nguyen's systematic review was used to support the argument that integrated learning, especially in STEM-related contexts, can contribute to students' achievement and higher-order thinking when it is carefully designed (Le et al., 2023).

The method of analysis consisted of three stages. First, key theoretical concepts related to interdisciplinary integration were identified. Second, the principles of curriculum planning and lesson design were compared across the selected literature. Third, the author synthesized these principles into a practical lesson model. As a result, the article proposes the **Six-Stage Interdisciplinary Lesson Structure** as an authorial model for organizing integrated lessons.

.Results

Theoretical Understanding of Interdisciplinary Integration

The analysis of the literature shows that interdisciplinary integration should be distinguished from related forms of curriculum organization. In a multidisciplinary approach, several subjects may study the same theme, but each subject usually keeps its own separate logic. For example, students may study "water" in geography, chemistry, biology, and literature, but the final learning result may remain a set of separate subject-based ideas. This type of organization may create thematic unity, but it does not always create conceptual synthesis (Jacobs, 1989; Drake & Burns, 2004).

In an interdisciplinary approach, the main pedagogical task is different. Students are expected to use disciplinary knowledge not separately, but in relation to one common problem or question. In this case, each discipline contributes its own concepts, evidence, methods, and explanations, and students combine them to develop a more complete understanding. Boix Mansilla and Duraisingh argue that interdisciplinary work should be assessed by how effectively learners use and integrate disciplinary perspectives, not simply by how many subjects are mentioned (Boix Mansilla & Duraisingh, 2007).

A transdisciplinary approach goes even further by organizing learning around broad real-life problems that may extend beyond traditional school subjects. Such an approach is often connected with project-based learning, community problems, and learner-centered inquiry (Drake & Burns, 2004). However, for general school curriculum planning, interdisciplinary integration is especially practical because it allows teachers to preserve subject content while creating meaningful connections between disciplines.

From the author's perspective, interdisciplinary integration should be understood as a structured movement from disciplinary knowledge to integrated understanding. This means that students first need to understand the contribution of each discipline and then learn how these contributions interact. Such an approach protects the lesson from two common risks: the loss of disciplinary depth and the superficial combination of unrelated subject elements.

Principles of Interdisciplinary Lesson Planning

The analysis of the literature suggests that interdisciplinary lesson planning should be based on several pedagogical principles.

First, an integrated lesson should begin with a meaningful problem or essential question. A problem gives students a reason to connect different areas of knowledge. Without a problem, integration may become a formal combination of subjects rather than a meaningful learning process. Wiggins and McTighe argue that essential questions help organize learning around deeper understanding and guide the selection of content and assessment tasks (Wiggins & McTighe, 2005).

Second, interdisciplinary integration should be built on disciplinary knowledge. Integration does not mean weakening individual subjects. On the contrary, students can connect knowledge effectively only when they understand the basic concepts, methods, and evidence of the relevant disciplines. Fogarty's models of curriculum integration also show that meaningful connections depend on the careful organization of disciplinary content (Fogarty, 1991).

Third, lesson objectives, learning activities, and assessment should be aligned. In an integrated lesson, every task should support either disciplinary understanding, interdisciplinary connection, or final synthesis. This principle is consistent with constructive alignment, according to which intended learning outcomes, learning activities, and assessment tasks should form a coherent system (Biggs, 1996; Biggs, 2014).

Fourth, assessment should evaluate both subject-specific knowledge and integrative thinking. If assessment focuses only on separate subject facts, students may not understand the value of integration. If assessment focuses only on creativity or presentation, the academic quality of the work may become weak. Drake and Burns emphasize that integrated curriculum should be connected with clear standards and assessment criteria (Drake & Burns, 2004).

Fifth, teacher collaboration is necessary for effective interdisciplinary planning. Since different subjects may have different methods, terminology, and assessment expectations, teachers need to coordinate their work. Lam et al. found that teachers value curriculum integration but often face challenges such as limited planning time, assessment pressure, and lack of confidence outside their own subject area (Lam et al., 2013). This means that integration should be supported not only at the lesson level but also at the curriculum and school-management levels.

Authorial Proposal: The Six-Stage Interdisciplinary Lesson Structure

The main practical contribution of this article is the **Six-Stage Interdisciplinary Lesson Structure** proposed by the author. The model was developed by synthesizing the principles of integrated curriculum, backward design, constructive alignment, and interdisciplinary assessment. Its purpose is to help teachers organize integrated lessons in a systematic and pedagogically justified way.

The proposed model is based on the idea that an interdisciplinary lesson should not move directly from a topic to a final project. Instead, it should guide students through a gradual process: identifying a problem, recalling previous knowledge, developing disciplinary understanding, connecting disciplinary perspectives, producing an integrated outcome, and reflecting on the learning process.

Stage	Name of the Stage	Main Purpose	Teacher's Role	Student's Role
1	Problem orientation	To introduce a real-life problem or essential question	Presents the problem and explains its educational relevance	Identifies the problem and formulates initial questions
2	Activation of prior knowledge	To connect students' previous knowledge with the new problem	Uses questions, discussion, concept maps, or diagnostic tasks	Recalls relevant knowledge from different subjects
3	Disciplinary exploration	To develop necessary subject-specific knowledge	Teaches key concepts, terminology, methods, and evidence	Studies information, solves problems, analyzes data, or conducts inquiry
4	Interdisciplinary connection	To help students compare and connect	Guides comparison, discussion, and	Identifies relationships among

		disciplinary perspectives	synthesis	concepts from different disciplines
5	Integrative production	To create a final product, explanation, model, or solution	Organizes collaboration and provides assessment criteria	Produces a report, presentation, project, model, or practical solution
6	Reflective assessment	To evaluate disciplinary learning and interdisciplinary synthesis	Uses rubrics, feedback, peer assessment, and reflection questions	Explains what was integrated, how it was integrated, and why it matters

This model differs from a simple thematic lesson plan because it clearly separates disciplinary exploration from interdisciplinary connection. In other words, students are not expected to integrate knowledge before they have enough disciplinary understanding. This feature of the model is consistent with Boix Mansilla and Duraisingh's view that interdisciplinary work requires both disciplinary grounding and purposeful integration (Boix Mansilla & Duraisingh, 2007).

The model is also connected with backward design because the final integrated product and assessment criteria are considered from the beginning of the planning process (Wiggins & McTighe, 2005). At the same time, it follows the logic of constructive alignment because each stage supports the intended learning outcome: the development of integrated understanding based on disciplinary knowledge (Biggs, 2014).

. Example of Applying the Model

The proposed model can be applied to a lesson or module on **water scarcity**. This topic is suitable for interdisciplinary integration because it cannot be fully explained through one discipline. Geography helps students understand climate, location, and water distribution. Chemistry explains water quality and pollution. Biology examines the effects of water scarcity on ecosystems and human health. Mathematics supports the analysis of water consumption data. Civic education helps students discuss responsibility, policy, and community decision-making.

At the first stage, **problem orientation**, students are introduced to the essential question: *How can a local community reduce water scarcity and use water more responsibly?* This question creates a common direction for learning and encourages students to understand why several disciplines are needed.

At the second stage, **activation of prior knowledge**, students discuss what they already know about water use, pollution, rainfall, drought, and community responsibility. This stage helps the teacher identify students' existing knowledge and misconceptions.

At the third stage, **disciplinary exploration**, students study the topic through different subject perspectives. They may analyze maps in geography, examine water pollution in chemistry, study ecological consequences in biology, calculate household water consumption in mathematics, and discuss public responsibility in civic education.

At the fourth stage, **interdisciplinary connection**, students compare the results of their subject-based learning. For example, they may connect mathematical data on water consumption with geographical information about drought, chemical information about water quality, and civic knowledge about community action. This stage is the central part of interdisciplinary integration because students begin to see how separate subject insights interact.

At the fifth stage, **integrative production**, students create a final product. This may be a scientific report, community proposal, infographic, presentation, or water-saving action plan. The product should demonstrate not only creativity but also accurate subject knowledge and meaningful integration.

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At the sixth stage, **reflective assessment**, students explain how each discipline contributed to their final product. They also reflect on how their understanding changed during the lesson. This stage helps students become aware of the integration process itself, which is important for developing transferable learning skills (Drake & Reid, 2020).

Discussion

The findings of this conceptual analysis show that interdisciplinary integration should be planned as a structured learning process rather than as a decorative addition to the curriculum. A common topic alone does not guarantee integration. Real integration appears when students use disciplinary knowledge to construct a new explanation, solve a problem, or create a product that could not be achieved through one discipline alone (Boix Mansilla & Duraisingh, 2007; Klein, 1990).

One important implication of the proposed model is that interdisciplinary lessons should begin with a problem instead of a list of subjects. When teachers begin with subjects, integration may become artificial because each subject is added separately. When teachers begin with a problem, disciplines are included because they are needed for understanding and solving that problem. This idea corresponds to backward design, where the teacher first defines the desired understanding and then selects appropriate content, learning activities, and assessment evidence (Wiggins & McTighe, 2005).

Another important implication is the need to preserve disciplinary depth. Interdisciplinary integration should not be interpreted as a reduction of subject knowledge. Instead, it should create a situation in which subject knowledge becomes more meaningful because students use it in a broader context. Fogarty's work on curriculum integration supports this view because it shows that integration can take different forms without removing the importance of disciplinary learning (Fogarty, 1991).

Assessment remains one of the most complex issues in interdisciplinary curriculum planning. Traditional tests may measure subject knowledge but may not show how well students connect and synthesize ideas. For this reason, the proposed model includes reflective assessment as a separate stage. Assessment in integrated lessons should include criteria such as disciplinary accuracy, quality of interdisciplinary connections, use of evidence, clarity of final product, collaboration, and reflection. This approach is consistent with Drake and Burns's argument that an integrated curriculum should be connected with clear learning standards and assessment criteria (Drake & Burns, 2004).

Teacher collaboration is another condition for successful implementation. In many schools, subjects are planned separately, and teachers may have limited time to coordinate integrated lessons. Lam et al. show that teachers often recognize the value of curriculum integration but experience difficulties related to examination requirements, lack of time, and limited confidence in teaching beyond their own discipline (Lam et al., 2013). Therefore, interdisciplinary integration requires not only individual teacher effort but also institutional support.

The proposed six-stage model may also support higher-order thinking. In this model, students do not simply remember information. They identify a problem, analyze subject-specific knowledge, compare perspectives, synthesize ideas, create a final product, and reflect on their learning. These activities are connected with analysis, evaluation, and creation, which are important aspects of advanced cognitive development. Research on integrated STEM learning also suggests that carefully designed integrated activities can support achievement and higher-order thinking skills (Le et al., 2023).

However, the model also has limitations. Since this article is conceptual, the proposed structure needs to be tested in real classroom conditions. Future empirical studies may examine how the model works in different subjects, grade levels, and educational contexts. It would also be useful to investigate how teachers design assessment rubrics for interdisciplinary competence and how students perceive integrated lessons.

Conclusion

This article analyzed lesson structure in the process of interdisciplinary integration and proposed the **Six-Stage Interdisciplinary Lesson Structure** as an authorial model for curriculum planning. The model includes six stages: problem orientation, activation of prior knowledge, disciplinary exploration, interdisciplinary connection, integrative production, and reflective assessment.

The main conclusion is that interdisciplinary integration should be planned as a gradual pedagogical process. Students should first understand the problem, then develop necessary disciplinary knowledge, connect subject perspectives, produce an integrated outcome, and reflect on the learning process. Such a structure helps avoid superficial integration and supports meaningful learning.

The article also concludes that interdisciplinary integration should not replace disciplinary learning. Its function is to strengthen subject knowledge by placing it in a wider educational and real-life context. When integrated lessons are designed through clear objectives, aligned activities, and appropriate assessment criteria, they can develop students' problem-solving, critical thinking, collaboration, creativity, and knowledge-transfer skills.

The proposed model may be useful for teachers, curriculum designers, and researchers interested in interdisciplinary education. Future research should test the model empirically and examine its effectiveness in different school subjects and educational environments.

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